

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 06/05/2026

First name: Nathan

Last name: Stirling

Organisation: ANS Construction Ltd

Preferred method of contact Email

Postal address: PO Box 2021, Taupo, New Zealand, 3351

Email: nathan.stirling@gjgardner.co.nz

Daytime Phone: 0274982299

Would you like to present your submission in person at a hearing? *

I do NOT wish to speak in support of my submission and ask that the following submission be fully considered.

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: PC44 General

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

I support removing plot ratio

The reason for my submission is::

plot ratio does not help urban planning

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 12/05/2026
First name: CGR Trustee Services Limited **Last name:** CGR Trustee Services Limited
Preferred method of contact Email
Postal address: PO Box 165, Taupo, New Zealand, 3351
Email: catrionae@cheal.co.nz
Daytime Phone: 073786405

Would you like to present your submission in person at a hearing? *

Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: Planning Maps

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Rezone the property at 304 Mapara Road, Taupo (Lot 7 DPS 54566) from General Rural Zone to Low Density Residential Zone

The reason for my submission is::

to rezone 304 Mapara Road, Taupo (Lot 7 DPS 54566) from General Rural Zone to Low Density Residential Zone. This rezoning is sought as the site adjoins the existing low density area and is a logical extension of the zoning whereby Hill View Road then creates a physical barrier to General Rural zone. The proposal to rezone is a logical extension of the existing zoning, the land has appropriate characteristics, the site is well serviced with infrastructure, will provide more housing, aligns with the character of the area, does not impact on sites of significance and reflects the existing character. Please see attached additional information.

Background and Context

The site is located within an area that has undergone a clear rural–residential transition over the past decade, with several nearby properties already developed at low-density residential scales. The site at 304 Mapara Road directly adjoins existing Low-Density Residential (LDR) zoned land and General Residential zoned land and forms a logical extension of the established Low Density Residential Zone.

The surrounding neighbourhoods including Loch Views Road, Highland Drive, Dalmore Way, Glenlochry Rise, and Stewart Glen are characterised by large residential allotments, typically around 0.5 ha, containing substantial single-storey dwellings that are well integrated into the landscape.

The subject property, legally described as Lot 7 DPS 54566, comprises 16.716ha of irregular-shaped land containing a shed and rainwater collection tank near the northern boundary. The site sits at the interface between the Low-Density Residential Zone and the Rural Zone and is also subject to the Māpara–Punatekahi Hill Amenity Landscape Area (ANFL22). Under the current General Rural zoning, subdivision below 10ha is a discretionary activity, and subdivision below 4ha is a non-complying activity. As a result, the District Plan provisions are highly restrictive and are designed to maintain rural uses rather than enable residential development.

Reasons for Supporting the Rezoning

a) Logical extension of existing zoning

The site adjoins existing Low Density Residential land. Rezoning would create a coherent and efficient zoning pattern rather than leaving an isolated pocket of Rural zoning within an otherwise residential environment. While the Māpara Valley growth area is no longer identified in the Taupō District 2050 District Growth Management Strategy, the existing low-density residential development surrounding the site indicates that residential use has already been established independently of the TD2050. Rezoning the site would match the zoning with what is already happening in the area. Hillview Road then becomes the separating feature between Low Density Residential and General Rural, a 20m separation between residential and rural activities.

b) Appropriate land characteristics

The site has a variety of slope and some stormwater gully features, however overall, it is similar to adjoining land which is proven to be suitable for low density residential land development. Although the land is subject to the Māpara–Punatekahi Hill Amenity Landscape Area (ANFL22), it is not visible from many locations, being located in a low area on the northern side of the Mapara hill. The site only visible from adjoining properties and from Mapara Road when in close proximity. The land is not highly productive rural land, and its landscape character align more closely with low density residential living than with traditional rural production.

c) Infrastructure feasibility

The area is already serviced by roading, power, and telecommunications. On site servicing solutions for wastewater and stormwater are feasible and consistent with the servicing approach used throughout the Mapara Road Low Density Residential Zone. There is sufficient area within the site for road (private or public) stormwater management which can be designed and managed in accordance with Taupō Council and Waikato Regional Council requirements.

The site has a 15m wide Right of Way legal access to Hill View Drive (a private road). From previous discussions with Council's Development Engineer, it is understood that up to 4 lots could likely be approved through this access which would then occur on a private right of way internal to the property. The property has no access rights to Hill View Drive.

Taupō District Council's Long-term Plan 2024–2034 includes dedicated funding for increasing water supply capacity in the Taupō – Mapara area, indicating that future residential growth in this locality is anticipated and supported by planned infrastructure upgrades.

Under the Waikato Regional Plan, permitted wastewater discharge requires 5000m² per system and sufficient nitrogen credits. Based on default stocking rates (12kg N/ha), the historical nitrogen discharge from the 11ha of pasture and 5ha of trees may provide sufficient nitrogen capacity for approximately 21 lots of 0.5ha (Note: 5ha trees were felled in 2018/19)

Preliminary discussions with Taupō District Council and Waikato Regional Council confirm that the site is not considered a HAIL site under the NESCS. No geothermal or flood hazards exist, and any overland flow paths can be appropriately managed at the time of development.

d) Positive effects on housing supply

Rezoning will enable additional low density residential opportunities in a location already sought after for lifestyle living, contributing to the district's housing choice and supply, in accordance with Taupō's Future Development Strategy and Housing Strategy.

e) Alignment with existing character

The surrounding area already functions as a low-density residential environment. Rezoning the site would reflect the existing character and settlement pattern rather than keeping the Rural zoning, reducing the conflicts between rural uses and residential uses often found in these areas.

f) Planning efficiency and land value

The current General Rural zoning significantly limits the ability to develop the land for residential purposes despite the surrounding residential context. Rezoning to Low Density Residential would enable development that is consistent with the area's character and would unlock the site's potential; improving its economic viability and enabling future residential use.

No additional provisions are sought in the plan for this site to be Low Density Residential. The normal subdivision rules and assessment criteria are applicable and suitable, with geotechnical assessment, roading design, and stormwater design at the time of subdivision further determining constraints, building platforms and lot size.

Summary

The site is zoned General Rural however is only 16ha with limited rural productivity. It is situated adjoining Low Density Residential, has limited visibility and is not subject to any known hazards. The land is appropriate as Low Density Residential as it has all required infrastructure available, limited legal access will limit its overall development density, and removes conflict between rural and residential uses.

In conclusion, the rezoning is appropriate given the surrounding residential context, and the ability to service future development. It represents a practical and positive planning outcome for the area. The proposed rezoning will enable a more efficient and appropriate use of the land while contributing positively to the district's housing supply.

Solution Sought

I request that Taupō District Council:

- Rezone the property at 304 Mapara Road from Rural Zone to Low Density Residential Zone.

The CGR Trustee Services Limited wishes to be heard in support of this submission.

Yours sincerely



GAYANI CHANDRASEKERA
PLANNER

Email: gayani.chandrasekera@cheal.co.nz

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 12/05/2026

First name:

DABB PROPERTY RENTALS LIMITED

Preferred method of contact Email

Last name:

DABB PROPERTY RENTALS LIMITED

Postal address: PO Box 165, Taupo, New Zealand, 3351

Email: catrionae@cheal.co.nz

Daytime Phone: 073786405

Would you like to present your submission in person at a hearing? *

Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: Restricted Discretionary Activity - GRZ-R2.3

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

1. Retain Plan Change 44 with some amendments, specifically.
 - a) Retain proposed Medium Density bulk and location changes;
 - b) Retain proposed Comprehensive Residential Development (CRD) definition and rule inclusion.
 - c) Amend CRD rules to include changes to EVMs and earthworks district wide rules t .

EVM threshold must be higher than 24evms in GRZ to reflect the scale of development anticipated and more effectively enable CRDs as intended.

Earthworks Rules must be adjusted to align with Medium Density Zone approach.

To retain restricted discretionary status for CRDs

The reason for my submission is::

A CRD allows multiple homes to be planned and delivered together, rather than one-by-one infill. This is essential for meeting large housing targets and for providing efficient spatial design of residentially zoned land. The Restricted Discretionary Status of CRDs must be retained. DABB support these changes as suitable because they provide practical, modern standards that support well-designed medium-density housing.

Removing plot ratio, increasing combined coverage, and allowing taller buildings and more flexible height-to-boundary rules all enable more efficient use of serviced residential land, however some amendments are needed.

We consider that a higher EVM threshold is appropriate for CRDs. A limit of 100 EVMs, consistent with the Medium Density Residential Zone, would better reflect the scale of development anticipated and more effectively enable CRDs as intended.

The GRZ earthworks standard limits earthworks to 50% of the site area, and any infringement of this rule (on its own) is a Restricted Discretionary Activity. However as notified the infringement of earthworks by a CRD will make the proposal a Discretionary Activity. Given the higher density and more intensive site development anticipated for Comprehensive Residential Developments (CRDs) undertaken at the site development phase, it is expected that earthworks will often exceed this 50% threshold. For this reason, the Medium Density Residential Zone approach - no maximum earthworks limit, standard cut/fill controls, and dust-nuisance management is more appropriate for CRDs. As all CRDs will require resource consent, earthworks effects can be managed through standard consent conditions, consistent with current practice.

Without the proposed changes, Comprehensive Residential Developments (CRDs) that cannot comply with the 24 EVM limit or the 50% maximum earthworks rule will default to a Discretionary Activity status. As these matters can be addressed via design and conditions, this status is not commensurate with Council's goal or NPZ-UD to enable development as it widens the assessment to the cumulative effects of the proposal. It also increases the risk of public notification. This outcome is inconsistent with the stated intention of enabling CRDs to occur more easily. Based on our experience, the CRD rule as notified is unlikely to meaningfully improve development feasibility.

See attached information.

2. Provision: 3.1 Definitions

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain the definition

The reason for my submission is::

The proposed definition of Comprehensive Residential Development is supported. It provides efficiency in processing (land use and subdivision together), and integrated design of a site allowing dwellings, access, lots, and services to be provided in one design.

3. Provision: Planning Maps

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Rezone 29 Charles Crescent, Taupō (Lot 2 DPS 12549 & Lots 70-71 DPS 6123, (RoT SA9C/1073)) from General Residential Zone to Medium Density Residential Zone

The reason for my submission is::

29 Charles Crescent is a 3316m², flat, serviced site located on the corner of Rainbow Drive, Lake Terrace and Charles Crescent. This site is an ideal location for Medium Density Residential Zone which would support this location as a planning node for the confluence of transport, housing and commercial activities in this area of Taupō. This site is on the outer edge of a suburb, on a bus route, with easy biking/walking access to the Lakeshore paths and reserves, adjoins reserves and shops, and easily accessed from Lake Terrace (an arterial road).

The site has previously been developed, is full serviced, located in a highly accessible urban area, and the area contains a variety of housing typologies. Rezoning this site to medium density is an efficient use of existing serviced urban land, as such it will minimise environmental impact compared to greenfield development, without impacting significantly on residential amenity. As such it aligns with Council's Future Development Strategy, Housing Strategy and Transport Strategy, and the National Policy Statement for Urban Development.

See attached information.

OUR REF 240407L28



6 May 2026

Taupō District Council
Private Bag 2005
Taupō Mail Centre
TAUPŌ 3352

ATTENTION: TAUPŌ DISTRICT PLAN REVIEW TEAM

Website: DistrictPlan@taupo.govt.nz

29 CHARLES CRESCENT, RAINBOW POINT: DISTRICT PLAN CHANGE 44 – SUBMISSION

DABB PROPERTY RENTALS LIMITED request that TAUPŌ DISTRICT COUNCIL:

1. Retain Plan Change 44 with some amendments, specifically.
 - A) Retain proposed Medium Density bulk and location changes;
 - B) Retain proposed Comprehensive Residential Development (CRD) definition and rule inclusion.
 - C) Amend CRD rules to include changes to EVMs and earthworks district wide rules.
2. Rezone 29 Charles Crescent from General Residential Zone to Medium Density Residential Zone.

This submission has been prepared on behalf of DABB Property Rentals Limited (DABB). DABB note that as a growth community Taupō needs Comprehensive Residential Development. We note the following statements from Taupō Housing Strategy and Future Development Strategy and provide the following assessment.

Taupō is facing significant growth pressure:

"We can expect an additional 25,500 people... by 2060... we will need another 12,400 homes."

"Housing supply has not kept up... suitable housing is not accessible for everyone."

CRD allows multiple homes to be planned and delivered together, rather than one-by-one infill. This is essential for meeting large housing targets and for providing efficient spatial design of residentially zoned land.

The Housing Strategy and FDS both highlight a mismatch:

"Very few one or two-bedroom houses were built... creating a mismatch between what has been built and what some residents need."

CRD can include a mix of 1–2 bedroom units, townhouses, and compact homes — exactly what Taupō is missing.

The Housing Strategy and FDS repeatedly state:

“Council will investigate areas suitable for housing intensification.”

“The District Plan... will enable a range of housing choices, including intensifying our urban areas where it makes sense.”

“Ensure well-designed urban environments and intensification.”

CRD is the most effective way to deliver intensification in a coordinated, high-quality manner.

Taupō needs Comprehensive Residential Development because the district is growing fast and does not have enough smaller, affordable homes. CRD lets multiple homes be planned together on one site, which makes better use of land, uses existing infrastructure efficiently, and creates well-designed, walkable neighbourhoods. It also helps avoid urban sprawl and supports Council's direction to increase housing supply through intensification in the right places.

1(A). Support for Proposed Medium Density Zone (MRZ) Changes

We note the key changes to Medium Density Zone bulk and location standards are:

- Removal of Plot Ratio.
- Accessory Buildings – Increase 10m² and Side Boundary Exclusion.
- Height to Boundary – 4m + 60° with Exclusions.
- Maximum Combined Coverage – 60%.
- Front Boundary Setbacks – 3m.
- Maximum Height – 11m + 1m.

DABB support these changes as suitable because they provide practical, modern standards that support well-designed medium-density housing. Removing plot ratio, increasing combined coverage, and allowing taller buildings and more flexible height-to-boundary rules all enable more efficient use of serviced residential land. The update to accessory buildings removes unnecessary constraints on typical residential design, while reduced front setbacks help create a more compact, walkable neighbourhood form. Together, these changes make it easier to deliver a range of housing types in locations where medium density is appropriate and anticipated.

1(B). CRD Definition and Rule

Taupō District Council defines a Comprehensive Residential Development as:

“Four or more residential units, designed and planned in an integrated manner, where all required resource and subdivision consents are submitted together, along with plans of the proposed development. The land on which the proposed residential units are to be sited must form a separate, contiguous area.”

The proposed definition of Comprehensive Residential Development is supported. It provides efficiency in processing (land use and subdivision together), and integrated design of a site allowing dwellings, access, lots, and services to be provided in one design.

The inclusion of Rule GRZ-R2 RDIS in the General Residential Zone is supported to enable integrated design of infill housing within the General Residential Zone. The greater flexibility through the use of MRZ Standards (and GRZ height and height to boundary) is welcomed, allowing designers and developers to respond to market requirements for townhouses quickly.

1(C). Amend CRD rules to include changes to EVMs and earthworks district wide rules

District Wide Rules for Vehicle Movement and Earthworks:

We request CRDs are subject to the vehicle movements that are greater than the GRZ 24 EVMs and earthworks provisions that are more flexible, specifically not those of General Residential.

Without the proposed changes, Comprehensive Residential Developments (CRDs) that cannot comply with the 24 EVM limit or the 50% maximum earthworks rule will default to a Discretionary Activity status. As these matters can be addressed via design and conditions, this status is not commensurate with Council's goal or NPZ-UD to enable development as it widens the assessment to the cumulative effects of the proposal. It also increases the risk of public notification. This outcome is inconsistent with the stated intention of enabling CRDs to occur more easily. Based on our experience, the CRD rule as notified is unlikely to meaningfully improve development feasibility.

Under the CRD definition, a proposal must contain four or more dwellings. Using the residential zone vehicle movement rate of 8 EVMs per dwelling, even the smallest CRD generates 32 EVMs. Because EVMs in the Residential Zone are calculated per site (defined as a single Record of Title), any CRD on a single title will exceed the TRAN-R5.3 limit of 24 EVMs per site, triggering Discretionary Activity status.

We consider that a higher EVM threshold is appropriate for CRDs. A limit of 100 EVMs, consistent with the Medium Density Residential Zone, would better reflect the scale of development anticipated and would more effectively enable CRDs as intended.

The GRZ earthworks standard limits earthworks to 50% of the site area, and any infringement of this rule (on its own) is a Restricted Discretionary Activity. However as notified the infringement of earthworks by a CRD will make the proposal a Discretionary Activity. Given the higher density and more intensive site development anticipated for Comprehensive Residential Developments (CRDs) undertaken at the site development phase, it is expected that earthworks will often exceed this 50% threshold. For this reason, the Medium Density Residential Zone approach - no maximum earthworks limit, standard cut/fill controls, and dust-nuisance management is more appropriate for CRDs. As all CRDs will require resource consent, earthworks effects can be managed through standard consent conditions, consistent with current practice.

Without the changes proposed here, any single infringement of bulk and location standards, vehicle movements (whether the 24 EVM limit in the GRZ or the 100 EVM limit in the MRZ), or earthworks will result in a Discretionary Activity status for CRDs. A Discretionary Activity status significantly broadens the scope of effects that must be assessed, including character and amenity. Until any amendments to the RMA are enacted, character and amenity remain within scope for effects assessments. A Restricted Discretionary Activity status, by contrast, limits assessment to only the effects of the specific infringements, providing a more targeted and efficient consenting pathway.

2. Rezoning of 29 Charles Crescent to Medium Density Residential Zone

29 Charles Crescent is a 3316m², flat, serviced site located on the corner of Rainbow Drive, Lake Terrace and Charles Crescent. This site is an ideal location for Medium Density Residential Zone which would support this location as a planning node for the confluence of transport, housing and commercial activities in this area of Taupō. This site is on the outer edge of a suburb, on a bus route, with easy biking/walking access to the Lakeshore paths and reserves, adjoins reserves and shops, and easily accessed from Lake Terrace (an arterial road). Similar to the Medium Density Zone areas along Lake Terrace, it frames Lake Terrace and assists to support this Rainbow Point location as a node. With the combination of shops, parking, bus services, access to Lake Terrace and existing services, such locations act as nodes.

Nodes are a strategic point of focus within an urban area's fabric where transit, commerce, and high-density residential life intersect, creating more vibrant, efficient, and walkable communities. Such nodes also support the efficiency and viability of public transport. Building nodes at existing centre of activity such as Rainbow Point shopping centre and the adjoining historic motel site is good planning and aligns with good Urban Design Practices as outlined in New Zealand Urban Design Protocol and the seven Cs of Urban Design being Context, Character, Choice, Connections, Creativity, Custodianship, and Collaboration. Supporting intensification in this location will strengthen the viability of the existing centre, enabling a more vibrant, walkable connected community and reducing the need for residents to travel long distances for daily needs. Overall rezoning sites such as this contributes to a more consolidated and sustainable urban form.

The site is already intensively developed (Existing Motel)

29 Charles Crescent is not a typical residential site. Retrolens aerial photos show buildings on the site as far back as 1961 operating as a 13-unit motel, with a manager's unit, reception, and associated vehicle movements. This means the site has already accommodated far more activity than a standard GRZ site, the surrounding environment is accustomed to higher levels of traffic, noise, high level of activity and non-typical built form.

Because the site is already a well-established built environment, redeveloping it for housing is a natural progression. It is not a greenfield site, and redevelopment will improve the quality of the built form while making better use of serviced residential land. This location adjoining wide open space is ideal for medium density housing having only one adjoining residential neighbour, with all other residential neighbours separated by Charles Crescent.

The site is fully serviced and located in a highly accessible urban area

- A 150mm wastewater main is located in Charles Crescent.
- A 100mm water main is located along the full length of the Charles Crescent frontage.
- Rainbow Drive has a footpath on the northern and southern sides, has a scheduled bus stop with a bus shelter, and connects with footpaths along Lake Terrace. These footpaths in turn connect with reserves and walkways in the area.
- This location is on the corner of a secondary collector and an arterial road allowing ease of traffic movement to and from the site.

The site is located at the entrance to Rainbow Point, giving it a prominent position within the local neighbourhood. It fronts both Lake Terrace and Rainbow Drive, which are key transport corridors carrying high volumes of local and through-traffic. It sits directly opposite the Rainbow Point neighbourhood centre, providing immediate access to local shops and services. The site is within easy walking distance of bus routes, Kokomea Village, and a range of local amenities, making it ideally suited for medium-density living.

The surrounding area already contains two storey and higher intensity housing and variety of buildings

The Rainbow Point neighbourhood is not made up of only single-storey houses, in fact, there is a real mix of one and two-storey homes, and almost half of the houses in the area (about 45%) are two storeys. This shows that taller buildings are already common and accepted in this part of Rainbow Point.

Because the area already has a lot of two-storey homes and a variety of building styles, adding more medium-density housing would not look out of place. It would fit in well with the existing character and continue the pattern of slightly higher-intensity development that is already happening in the neighbourhood.

The area also has a high proportion of holiday homes, which adds to the mix of building types and activity levels. 2018 Census data shows that the area contains a significant number of holiday homes, and it is likely that the proportion in the immediate surroundings is even higher. This means the neighbourhood does not function as a uniform, residential area. Instead, it has a mixed pattern of use and occupancy, with a blend of permanent residents, short-stay accommodation, and higher-intensity housing.

Summary of Submission

DABB support the Medium Density Residential Zone (MRZ) changes because they make it easier to build the types of homes Taupō urgently needs. The changes remove outdated rules, provide clearer and more practical standards, and allow well-designed housing to be delivered more efficiently. However, changes are needed to the current linkage to GRZ vehicle movement and earthworks standards to avoid CRDs being considered as Discretionary Activities. The current one infringed standard trigger to a Discretionary status needs also to be altered. Without such changes, CRDs will continue to be a higher risk consent to obtain, reducing developer interest in undertaking such consents.

Rezoning 29 Charles Crescent to Medium Density is recommended because the site has all the characteristics of a planning node - a good potential of development, fully serviced, and located in a highly accessible part of Taupō. It sits near shops, bus routes, biking/walking routes, and main roads, making it an ideal place for a medium density housing location. The surrounding area already has many two-storey and higher-intensity homes, as well as a mix of permanent and holiday houses, so medium-density development would fit in well. Rezoning this site to medium density is an efficient use of existing serviced urban land, as such it will minimise environmental impact compared to greenfield development, without impacting significantly on residential amenity. As such it aligns with Council's Future Development Strategy, Housing Strategy and Transport Strategy, and the National Policy Statement for Urban Development.

Hearing

DABB wishes to be heard in support of this submission.

Yours sincerely



GAYANI CHANDRASEKERA
PLANNER

Email: Gayani.Chandrasekera@cheal.co.nz

Reviewed and
Approved for
Release by



CATRIONA EAGLES
TECHNICAL LEAD - PLANNING

Email: Catriona@cheal.co.nz

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 18/05/2026
First name: Catriona **Last name:** Eagles
Organisation: Cheal Consultants
Preferred method of contact Email
Postal address: PO Box 165, Taupo, New Zealand, 3351
Email: catrionae@cheal.co.nz
Daytime Phone: 073786405
Would you like to present your submission in person at a hearing? *
 Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: GRZ-R5 Standards > 1. Maximum Combined Coverage

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Amend GRZ R5.1 to exclude accessory building 10m² or less.

The reason for my submission is::

The increase in the size of accessory buildings to 10m² removes an inconsistent with Building Code Schedule 1, removing confusion, enabling a reasonable size of accessory buildings for storage, wood etc.

The exclusion from the side boundary rule is also consistent with recent changes to the Building Code Schedule 1 and is a practical proposal given the location of many such buildings within the side boundaries of many residential properties. Such accessory buildings have long been excluded from the coverage provision of the Taupō District Plan. We request that this continues.

2. Provision: GRZ-R5 Standards > 3. Minimum Setbacks - Front Boundary

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Reinstate GRZ-R1.6 and 1.7 or achieve a similar outcome via an exclusion in GRZ-R5.1 (coverage), R5.3

(front Boundary) and R5.4
(other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō District Plan since 2000's. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks

3. Provision: GRZ-R5 Standards > 4. Minimum Setbacks - All Other Boundaries

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Reinstate GRZ-R1.6 and 1.7 or achieve a similar outcome via an exclusion in GRZ-R5.1 (coverage), R5.3 (front Boundary) and R5.4 (other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō District Plan since 2000's. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.

4. Provision: GRZ-R5 Standards > 7. Height to Boundary

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

iv. Boundaries adjoining sites zoned Town Centre, Neighbourhood Centre, Mixed Use or Industrial.

The reason for my submission is::

These exclusions for Height to Boundary will provide more flexibility for landowners in developing their residential properties and provides a sensible acknowledgement of the role that roads, and access lots/ROWs have in buffering effects of built form adjoining them. It will continue to ensure that residential buildings are largely one storey near boundaries.

5. Provision: GRZ-R5 Standards > 3. Minimum Setbacks - Front Boundary

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Alter GRZ-R5.3 and R5.4 wording for clarification to include retaining walls less than 2m in depth i.e.

Fences or walls (including retaining walls) not exceeding 2m in height or depth.

The reason for my submission is::

These alterations provide clarity for rules relating to retaining walls in setbacks.

6. Provision: GRZ-R5 Standards > 4. Minimum Setbacks - All Other Boundaries

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Alter GRZ-R5.3 and R5.4 wording for clarification to include retaining walls less than 2m in depth i.e.

Fences or walls (including retaining walls) not exceeding 2m in height or depth.

The reason for my submission is::

These alterations provide clarity for rules relating to retaining walls in setbacks.

7. Provision: Restricted Discretionary Activity - GRZ-R2.3

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Support the inclusion of the proposed Comprehensive Residential Development Rule with amendments to ensure the successful enablement of this style of development within the General Residential Zone. The following amendments requested relate to:

- o Activity Status

We request the activity status be reconsidered. We request that a CRD compliant with all applicable rules be a Controlled Activity. Infringements of any of the applicable rules should make the CRD a Restricted Discretionary Activity with assessment limited to only the matters of non-compliance.

- o District Wide Rules for Vehicle Movement and Earthworks

We request CRDs are subject to the vehicle movements that are greater than the GRZ 24 evms and earthworks provisions that are more flexible, specifically not those of General Residential.

- o Notification

We request that CRDs are assessed without public notification.

as follows

GRZ CON Rx.1 GRZ R2.3. Any Comprehensive Housing Development

Subject to:

a. Compliance with MRZ-R6.1-MRZ-R6.5, and GRZ-R5.6-GRZ-R5.7 and TRAN-R5.2 (100evms) and EW-R1.2 (no maximum earthworks);

b. Compliance with all relevant standards in District Wide chapters except TRAN and EW.

GRZ – R2 RDIS Any CRD activity which does not comply with any of the standards in GRZ CON Rx.1.

Matters of Discretionary – Restricted to only the matters of non-compliance specified in that standard.

The reason for my submission is::**Reasons**

Without these changes, the activity status of CRDs which infringe a single standard will be Discretionary Activity under GRZ-R3.1. Under the notified rule, a CRD with a single non-compliance (i.e Front Yard or Height to Boundary) will be a Discretionary Activity, under GRZ-R3.1. Additionally, CRDs unable to comply with 24evms or 50% maximum earthworks will have Discretionary Activity status and be available for notification assessment. If the intention is to enable CRDs to occur more easily, it is our experience that the CRD rule as notified is unlikely to achieve this to any significant degree.

As the definition for a CRD is 4 or more dwellings, the vehicle movement calculation dictates that such a proposal is deemed to have 32evms (8evms/dwelling x4 dwellings). Where the proposal is on a single title (regardless of how many parcels are in that title), the definition of EVMs in the residential zone is *the number of movements a vehicle makes to and from a site per day. A site is defined as a single Record of Title* (we noted that in General Rural EVMs are defined per allotment).

TRAN R5.3 limits EVMs per site to 24, any infringement of this rule is treated as a Discretionary Activity. We consider a greater level of vehicle movements is appropriate for CRDs, we recommend 100evms as per the Medium Density zone limit.

The GRZ Earthworks limitation for General Residential is 50%, any infringement of this rule (on its own) is treated as a Restricted Discretionary Activity. Due to the greater density and development proposed via CRDs a greater level of earthworks will occur in the first phase of the development and infringement of this 50% limit is likely more often than

not. Therefore, the Medium Density provisions of no maximum, normal cut/fill provisions and dust nuisance management are more appropriate. As CRDs will all require consent (either Controlled as proposed here, or Restricted Discretionary as notified), earthworks conditions can manage earthworks appropriately in all consents, as is current practice.

Without the changes proposed here, any single failure of bulk and location standards, vehicle movements (at either 24evms (GRZ) or 100evms (MRZ)) or earthworks will make CRDs a Discretionary Activity. A Discretionary Activity status widens the assessment of effects scope to all effects including character and amenity. Until any draft or proposed changes to the RMA are enacted, character and amenity remain in scope for an effects assessment. A Restricted Discretionary Activity would restrict assessment to only the effects of those infringements.

Simply put, the default of the CRD to a Discretionary Activity Status requires the consideration of all effects of such a proposal and consideration of all Residential zone Objectives and Policies. We note that Plan Change 44 does not seek to alter the Objectives and Policies specifically GRZ-O1 and GRZ-P1.

GRZ- O1 *The maintenance and enhancement of the character and amenity of the GRZ.*

GRZ- P1 *Maintain and enhance the character and amenity of the GRZ by controlling the bulk, location, and nature of activities to ensure activities are consistent with a residential scale of development, including an appropriate density and level of environmental effects.*

A slightly non-compliant CRD with 62% coverage, minor height to boundary infringement with compliant two storey buildings will not be similar to many of Taupō's existing neighbourhoods' character. Therefore the consenting pathway is unlikely to be straightforward with significant consideration to mitigation measures and affected parties. As a Restricted Discretionary Activity the consenting consideration is limited to the effects of the infringement not the wider effects on amenity and character of the neighbourhood.

Furthermore, without a rule specifying non-notification, a Discretionary Activity proposal is significantly more likely to be publicly notified than a Restricted Discretionary Activity. Retaining public notification will less likely enable such development, thus potentially limiting the use of this CRD provision, particularly in light of the Residential Policy frameworks current focus on current character. The changes proposed in this submission provide a compliant proposal as a Controlled Activity status enabling Council to maintain assessment and grant such consents with conditions for an appropriate outcome.

As proposed in this submission infringements of these bulk and location standards would lead to a Restricted Discretionary Activity status only, where assessment of effects, notification assessment and policy assessment are restricted to only the matters of non-compliance specified in that standard. Such a status would be more enabling, however, provide Council control over those matters of infringement/concern. The infringement(s) is then assessed against the effects and current policy framework of GRZ-O1 and GRZ-P1.

The proposal in this submission to exclude public notification is considered appropriate as CRDs are being proposed as part of the residential zone, a new typology for the residential zone. Effects to adjoining owners would continue to be assessed for written approval on a case-by-case basis.

Without such changes, the provision of a CRD is less likely to be taken up as the scope of assessment remains wide and public notification is still likely to occur. This is understood to not be the outcome sought by Council and we consider it will provide greater limitation to this style of development being undertaken.

8. Provision: MRZ-R6 Standards > 1. Maximum Combined Coverage

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Amend MRZ R6.1 to exclude accessory building 10m² or less.

The reason for my submission is::

The increase in the size of accessory buildings to 10m² removes an inconsistent with Building Code Schedule 1, removing confusion, enabling a reasonable size of accessory buildings for storage, wood etc. The exclusion from the side boundary rule is also consistent with recent changes to the Building Code Schedule 1 and is a practical proposal given the location of many such buildings within the side boundaries of many residential properties. Such accessory buildings have long been excluded from the coverage provision of the Taupō District Plan. We request that this continues.

9. Provision: MRZ-R6 Standards > 7. Height to Boundary**I seek an amendment to the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Support the change in MRZ Height to Boundary to 4m and 60 degrees.
- Support the exclusions particularly where it is not to apply to road boundaries, common walls, boundaries abutting ROW/access lots, boundaries adjoining less sensitive zones. Amendment recommended for clarify;

iv. Boundaries adjoining sites zoned Town Centre, Neighbourhood Centre, Mixed Use or Industrial.

The reason for my submission is::

In combination with the proposed changes to coverage, front setback, and height, the proposed increase to height to boundary will allow increased built form, and efficient use of medium density zoned land.

These exclusions for Height to Boundary will provide more flexibility for landowners in developing their residential properties and provides a sensible acknowledgement of the role that roads, and access lots/ROWS have in buffering effects of built form adjoining them. It will continue to ensure that residential buildings are largely one storey near boundaries.

10. Provision: MRZ-R6 Standards > 1. Maximum Combined Coverage**I seek an amendment to the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Reinstate MRZ-R1.7 and 1.8 or achieve a similar outcome via an exclusion in MRZ-R6.1 (coverage), R6.4 (Front Boundary) and R6.5 (Other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō Plan since 2000s. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.

11. Provision: MRZ-R6 Standards > Minimum building setbacks - Front Boundary**I seek an amendment to the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Reinstate MRZ-R1.7 and 1.8 or achieve a similar outcome via an exclusion in MRZ-R6.1 (coverage), R6.4 (Front Boundary) and R6.5 (Other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important

provision that has been in the Taupō Plan since 2000s. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.

12. Provision: MRZ-R6 Standards > Minimum building setbacks - Front Boundary

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Alter MRZ-R6.4 and R6.5 wording for clarify to include retaining walls less than 2m in depth i.e.

Fences or walls (including retaining walls) not exceeding 2m in height or depth.

The reason for my submission is::

These alterations provide clarity for rules relating to retaining walls in setbacks.

13. Provision: MRZ-R6 Standards > 2. Maximum Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Support removal of Plot Ratio.

The reason for my submission is::

The removal of the plot ratio rule will allow for increased built form enabling an efficient use of residential land. The combination of building height, building coverage, height and height to boundary will continue to provide residential built form of a character similar to that in our district. The removal of plot ratio will provide for an increase in first floor-built form however with increased housing demand and smaller sections, this additional floor area will contribute significantly. Removing this rule will also reduce the number of consents required for residential housing, reducing consenting costs for home builders.

14. Provision: LRZ-R5 Standards > 2. Maximum Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Support removal of Plot Ratio.

The reason for my submission is::

The removal of the plot ratio rule will allow for increased built form enabling an efficient use of residential land. The combination of building height, building coverage, height and height to boundary will continue to provide residential built form of a character similar to that in our district. The removal of plot ratio will provide for an increase in first floor-built form however with increased housing demand and smaller sections, this additional floor area will contribute significantly. Removing this rule will also reduce the number of consents required for

15. Provision: LRZ-R5 Standards > 5. Minimum setback - all other boundaries

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Amend GRS R5.5 to exclude accessory building 10m² or less.

The reason for my submission is::

The increase in the size of accessory buildings to 10m² removes an inconsistent with Building Code Schedule 1, removing confusion, enabling a reasonable size of accessory buildings for storage, wood etc. The exclusion from the side boundary rule is also consistent with recent changes to the Building Code Schedule 1 and is a practical proposal given the location of many such buildings within the side boundaries of many residential properties. Such accessory buildings have long been excluded from the coverage provision of the Taupō District Plan. We request that this continues.

16. Provision: LRZ-R5 Standards > 5. Minimum setback - all other boundaries

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Reinstate LRZ-R1.4 and 1.5 or achieve a similar outcome via an exclusion in LRZ-R5.1 (coverage), R5.4 (Front Boundary) and R5.5 (Other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō Plan since 2000s. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.

17. Provision: LRZ-R5 Standards > 4. Minimum Setback - Front boundary

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Reinstate LRZ-R1.4 and 1.5 or achieve a similar outcome via an exclusion in LRZ-R5.1 (coverage), R5.4 (Front Boundary) and R5.5 (Other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō Plan since 2000s. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage

and yard setbacks.

18. Provision: LRZ-R5 Standards > 1. Maximum Combined Coverage

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Reinststate LRZ-R1.4 and 1.5 or achieve a similar outcome via an exclusion in LRZ-R5.1 (coverage), R5.4 (Front Boundary) and R5.5 (Other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō Plan since 2000s. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.

19. Provision: LRZ-R5 Standards > 4. Minimum Setback - Front boundary

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Alter LRZ-R5.3 and R5.4 wording for clarity to include retaining walls less than 2m in depth i.e

Fences or walls (including retaining walls) not exceeding 2m in height or depth.

The reason for my submission is::

These alterations provide clarity for rules relating to retaining walls in setbacks.

20. Provision: LRZ-R5 Standards > 4. Minimum Setback - Front boundary

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Alter LRZ-R5.3 and R5.4 wording for clarity to include retaining walls less than 2m in depth i.e

Fences or walls (including retaining walls) not exceeding 2m in height or depth.

The reason for my submission is::

These alterations provide clarity for rules relating to retaining walls in setbacks.

21. Provision: LRZ-R5 Standards > 1. Maximum Combined Coverage**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Support increase to 10%.

The reason for my submission is::

The increase to 10% for coverage will allow for increased built form enabling an efficient use of low density residential land and providing greater consistency with consented coverage in the low density area. The increase in coverage will reduce the number of consents required for residential housing, reducing consenting costs for home builders without creating built form greater than that consented in the area.

22. Provision: GRZ-R5 Standards > 4. Minimum Setbacks - All Other Boundaries**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Support the exclusion for accessory buildings of 10m² or less

The reason for my submission is::

The increase in the size of accessory buildings to 10m² removes an inconsistent with Building Code Schedule 1, removing confusion, enabling a reasonable size of accessory buildings for storage, wood etc.

The exclusion from the side boundary rule is also consistent with recent changes to the Building Code Schedule 1 and is a practical proposal given the location of many such buildings within the side boundaries of many residential properties. Such accessory buildings have long been excluded from the coverage provision of the Taupō District Plan. We request that this continues

23. Provision: LRZ-R5 Standards**I seek an amendment to the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Amend LRZ 5.1 to exclude accessory building 10m² or less

The reason for my submission is::

The increase in the size of accessory buildings to 10m² removes an inconsistent with Building Code Schedule 1, removing confusion, enabling a reasonable size of accessory buildings for storage, wood etc. The exclusion from the side boundary rule is also consistent with recent changes to the Building Code Schedule 1 and is a practical proposal given the location of many such buildings within the side boundaries of many residential properties. Such accessory buildings have long been excluded from the coverage provision of the Taupō District Plan. We request that this continues.

24. Provision: GRZ-R5 Standards > 1. Maximum Combined Coverage

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Reinststate GRZ-R1.6 and 1.7 or achieve a similar outcome via an exclusion in GRZ-R5.1 (coverage), R5.3 (front Boundary) and R5.4 (other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō District Plan since 2000's. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.

25. Provision: MRZ-R6 Standards > Minimum building setbacks - all other boundaries

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Reinststate MRZ-R1.7 and 1.8 or achieve a similar outcome via an exclusion in MRZ-R6.1 (coverage), R6.4 (Front Boundary) and R6.5 (Other Boundaries).

The reason for my submission is::

The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō Plan since 2000s. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.



TAUPŌ DISTRICT COUNCIL

PC44 RESIDENTIAL ZONE

CHEAL CONSULTANTS LIMITED SUBMISSION

This submission provided preliminary technical comments on Plan Change 44. We welcome further discussion on the points outlined below.

#	Matter	Comment
PC44	Residential Zone – GRZ	
1	Plot Ratio	Decisions Sought – Retain - Support removal of Plot Ratio. Reasons The removal of the plot ratio rule will allow for increased built form enabling an efficient use of residential land. The combination of building height, building coverage, height and height to boundary will continue to provide residential built form of a character similar to that in our district. The removal of plot ratio will provide for an increase in first floor-built form however with increased housing demand and smaller sections, this additional floor area will contribute significantly. Removing this rule will also reduce the number of consents required for residential housing, reducing consenting costs for home builders.
2	Accessory Building	Decisions Sought – Retain - Support increase to 10m² and exclusion from side boundary rule. Decisions Sought – Amend - Amend GRS R5.1 to exclude accessory building 10m² or less. Reasons The increase in the size of accessory buildings to 10m² removes an inconsistent with Building Code Schedule 1, removing confusion, enabling a reasonable size of accessory buildings for storage, wood etc. The exclusion from the side boundary rule is also consistent with recent changes to the Building Code Schedule 1 and is a practical proposal given the location of many such buildings within the side boundaries of many residential properties. Such accessory buildings have long been excluded from the coverage provision of the Taupō District Plan. We request that this continues.
3	Height to Boundary	Decision Sought – Retain with Amendment - Support the exclusions proposed in this rule, particularly where it is not to apply to road boundaries, common walls, boundaries abutting Right of Ways (ROW)/access lots, boundaries adjoining less sensitive zones. Amendment below is recommended for clarity. <i>iv. Boundaries adjoining sites zoned <u>Town Centre, Neighbourhood Centre, Mixed Use or Industrial.</u></i>

		Reasons These exclusions for Height to Boundary will provide more flexibility for landowners in developing their residential properties and provides a sensible acknowledgement of the role that roads, and access lots/ROWS have in buffering effects of built form adjoining them. It will continue to ensure that residential buildings are largely one storey near boundaries.
4	Decks and structures under 1m height	Decision Sought – Seek Amendment - Reinstate GRZ-R1.6 and 1.7 or achieve a similar outcome via an exclusion in GRZ-R5.1 (coverage), R5.3 (front Boundary) and R5.4 (other Boundaries). Reasons The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō District Plan since 2000's. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.
5	Retaining walls less than 2m high not being structures	Decision Sought – Seek Amendment - Alter GRZ-R5.3 and R5.4 wording for clarification to include retaining walls less than 2m in depth i.e. <i>Fences or walls (including retaining walls) not exceeding 2m in height or depth.</i> Reasons These alterations provide clarity for rules relating to retaining walls in setbacks.
6	CRD Definition	Decision Sought – Retain - The proposed definition of Comprehensive Residential Development is supported. Reasons A Comprehensive Residential Development activity has long been absent from the Taupō District Plan. The current provisions provide for up to three dwellings via vehicle movements and coverage rules on an average sized property. A consenting avenue for greater density and greater number of units in a lesser activity status as proposed by Comprehensive Residential Development Activity is supported as it will enable redevelopment and infill housing to occur more easily.

7	CRD Rule GRZ-R2.3	Decision Sought – Retain with Amendment - Support the inclusion of the proposed Comprehensive Residential Development Rule with amendments to ensure the successful enablement of this style of development within the General Residential Zone. The following amendments requested relate to: - o Activity Status We request the activity status be reconsidered. We request that a CRD compliant with all applicable rules be a Controlled Activity. Infringements of any of the applicable rules should make the CRD a Restricted Discretionary Activity with assessment limited to only the matters of non-compliance. - o District Wide Rules for Vehicle Movement and Earthworks We request CRDs are subject to the vehicle movements that are greater than the GRZ 24 evms and earthworks provisions that are more flexible, specifically not those of General Residential. - o Notification We request that CRDs are assessed without public notification. as follows <u>GRZ CON Rx.1 GRZ R2.3. Any Comprehensive Housing Development Subject to:</u> a. <u>Compliance with MRZ-R6.1-MRZ-R6.5, and GRZ-R5.6-GRZ-R5.7 and TRAN-R5.2 (100evms) and EW-R1.2 (no maximum earthworks);</u> b. <u>Compliance with all relevant standards in District Wide chapters except TRAN and EW.</u> <u>GRZ – R2 RDIS Any CRD activity which does not comply with any of the standards in GRZ CON Rx.1.</u> <u>Matters of Discretionary – Restricted to only the matters of non-compliance specified in that standard.</u> <u>Notification - Any application for CRD as a Restricted Discretionary Activity shall not be publicly notified.</u> Reasons Without these changes, the activity status of CRDs which infringe a single standard will be Discretionary Activity under GRZ-R3.1. Under the notified rule, a CRD with a single non-compliance (i.e Front Yard or Height to Boundary) will be a Discretionary Activity, under GRZ-R3.1. Additionally, CRDs unable to comply with 24evms or 50% maximum earthworks will have Discretionary Activity status and be available for notification assessment. If the intention is to enable CRDs to occur more easily, it is our experience
---	-------------------	---

		that the CRD rule as notified is unlikely to achieve this to any significant degree. As the definition for a CRD is 4 or more dwellings, the vehicle movement calculation dictates that such a proposal is deemed to have 32evms (8evms/dwelling x4 dwellings). Where the proposal is on a single title (regardless of how many parcels are in that title), the definition of EVMs in the residential zone is <i>the number of movements a vehicle makes to and from a site per day. A site is defined as a single Record of Title</i> (we noted that in General Rural EVMs are defined per allotment). TRAN R5.3 limits EVMs per site to 24, any infringement of this rule is treated as a Discretionary Activity. We consider a greater level of vehicle movements is appropriate for CRDs, we recommend 100evms as per the Medium Density zone limit. The GRZ Earthworks limitation for General Residential is 50%, any infringement of this rule (on its own) is treated as a Restricted Discretionary Activity. Due to the greater density and development proposed via CRDs a greater level of earthworks will occur in the first phase of the development and infringement of this 50% limit is likely more often than not. Therefore, the Medium Density provisions of no maximum, normal cut/fill provisions and dust nuisance management are more appropriate. As CRDs will all require consent (either Controlled as proposed here, or Restricted Discretionary as notified), earthworks conditions can manage earthworks appropriately in all consents, as is current practice. Without the changes proposed here, any single failure of bulk and location standards, vehicle movements (at either 24evms (GRZ) or 100evms (MRZ)) or earthworks will make CRDs a Discretionary Activity. A Discretionary Activity status widens the assessment of effects scope to all effects including character and amenity. Until any draft or proposed changes to the RMA are enacted, character and amenity remain in scope for an effects assessment. A Restricted Discretionary Activity would restrict assessment to only the effects of those infringements. Simply put, the default of the CRD to a Discretionary Activity Status requires the consideration of all effects of such a proposal and consideration of all Residential zone Objectives and Policies. We note that Plan Change 44 does not seek to alter the Objectives and Policies specifically GRZ-O1 and GRZ-P1. GRZ-O1 <i>The maintenance and enhancement of the character and amenity of the GRZ.</i> GRZ-P1 <i>Maintain and enhance the character and amenity of the GRZ by controlling the bulk, location, and nature of activities to ensure activities are consistent with a residential scale of development, including an appropriate density and level of environmental effects.</i>
--	--	---

		A slightly non-compliant CRD with 62% coverage, minor height to boundary infringement with compliant two storey buildings will not be similar to many of Taupō's existing neighbourhoods' character. Therefore the consenting pathway is unlikely to be straightforward with significant consideration to mitigation measures and affected parties. As a Restricted Discretionary Activity the consenting consideration is limited to the effects of the infringement not the wider effects on amenity and character of the neighbourhood. Furthermore, without a rule specifying non-notification, a Discretionary Activity proposal is significantly more likely to be publicly notified than a Restricted Discretionary Activity. Retaining public notification will less likely enable such development, thus potentially limiting the use of this CRD provision, particularly in light of the Residential Policy frameworks current focus on current character. The changes proposed in this submission provide a compliant proposal as a Controlled Activity status enabling Council to maintain assessment and grant such consents with conditions for an appropriate outcome. As proposed in this submission infringements of these bulk and location standards would lead to a Restricted Discretionary Activity status only, where assessment of effects, notification assessment and policy assessment are restricted to only the matters of non-compliance specified in that standard. Such a status would be more enabling, however, provide Council control over those matters of infringement/concern. The infringement(s) is then assessed against the effects and current policy framework of GRZ-O1 and GRZ-P1. The proposal in this submission to exclude public notification is considered appropriate as CRDs are being proposed as part of the residential zone, a new typology for the residential zone. Effects to adjoining owners would continue to be assessed for written approval on a case-by-case basis. Without such changes, the provision of a CRD is less likely to be taken up as the scope of assessment remains wide and public notification is still likely to occur. This is understood to not be the outcome sought by Council and we consider it will provide greater limitation to this style of development being undertaken.
PC44	Residential Zone – MRZ	
8	Plot Ratio	Decisions Sought – Retain - Support removal of Plot Ratio. Reasons The removal of the plot ratio rule will allow for increased built form enabling an efficient use of residential land. The combination of building height, building coverage, height and height to boundary will continue to provide residential built form of a character similar to that in our district. The

		removal of plot ratio will provide for an increase in first floor-built form however with increased housing demand and smaller sections, this additional floor area will contribute significantly. Removing this rule will also reduce the number of consents required for residential housing, reducing consenting costs for home builders.
9	Accessory Building	Decisions Sought – Retain - Support increase to 10m² and exclusion from side boundary rule. Decisions Sought – Amend - Amend MRZ R6.1 to exclude accessory building 10m² or less. Reasons The increase in the size of accessory buildings to 10m² removes an inconsistent with Building Code Schedule 1, removing confusion, enabling a reasonable size of accessory buildings for storage, wood etc. The exclusion from the side boundary rule is also consistent with recent changes to the Building Code Schedule 1 and is a practical proposal given the location of many such buildings within the side boundaries of many residential properties. Such accessory buildings have long been excluded from the coverage provision of the Taupō District Plan. We request that this continues.
10	Height to Boundary	Decision Sought – Retain with Amendment - Support the change in MRZ Height to Boundary to 4m and 60 degrees. - Support the exclusions particularly where it is not to apply to road boundaries, common walls, boundaries abutting ROW/access lots, boundaries adjoining less sensitive zones. Amendment recommended for clarify; <i>iv. Boundaries adjoining sites zoned <u>Town Centre, Neighbourhood Centre, Mixed Use or Industrial.</u></i> Reasons In combination with the proposed changes to coverage, front setback, and height, the proposed increase to height to boundary will allow increased built form, and efficient use of medium density zoned land. These exclusions for Height to Boundary will provide more flexibility for landowners in developing their residential properties and provides a sensible acknowledgement of the role that roads, and access lots/ROWS have in buffering effects of built form adjoining them. It will continue to ensure that residential buildings are largely one storey near boundaries.

11	Decks and structures under 1m height	Decision Sought – Amendment - Reinstate MRZ-R1.7 and 1.8 or achieve a similar outcome via an exclusion in MRZ-R6.1 (coverage), R6.4 (Front Boundary) and R6.5 (Other Boundaries). Reasons The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō Plan since 2000s. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.
12	Retaining walls less than 2m high not being structures	Decision Sought – Retain with Amendment - Alter MRZ-R6.4 and R6.5 wording for clarify to include retaining walls less than 2m in depth i.e. <i>Fences or walls <u>(including retaining walls)</u> not exceeding 2m in height or depth.</i> Reasons These alterations provide clarity for rules relating to retaining walls in setbacks.
13	Maximum Combined Coverage	Decision Sought – Retain - Support increase to 60%. Reasons The increase to 60% for coverage will allow for increased built form enabling an efficient use of residential land. The proposed MRZ combination of building height, building coverage, height and height to boundary will enable infill to occur more easily within the residential areas of our district. The increase in coverage will reduce the number of consents required for residential housing, reducing consenting costs for home builders.
14	Front Boundary	Decision Sought – Retain - Support increase to 3m. Reasons In combination with the proposed changes to coverage, height, and height to boundary, the front boundary setback of 3m will allow increased built form, and efficient use of medium density zoned land.
15	Maximum Height	Decision Sought – Retain - Support increase to 11m + 1m. Reasons In combination with the proposed changes to coverage, front setback, and height to boundary, the proposed increase to maximum height will allow increased built form, and efficient use of medium density zoned land.

PC44	Residential Zone – LRZ	
16	Plot Ratio	Decisions Sought – Retain - Support removal of Plot Ratio. Reasons The removal of the plot ratio rule will allow for increased built form enabling an efficient use of residential land. The combination of building height, building coverage, height and height to boundary will continue to provide residential built form of a character similar to that in our district. The removal of plot ratio will provide for an increase in first floor-built form however with increased housing demand and smaller sections, this additional floor area will contribute significantly. Removing this rule will also reduce the number of consents required for residential housing, reducing consenting costs for home builders.
17	Accessory Building	Decisions Sought – Retain - Support increase to 10m² and exclusion from side boundary rule. Decisions Sought – Amend - Amend GRS R5.1 to exclude accessory building 10m² or less. Reasons The increase in the size of accessory buildings to 10m² removes an inconsistent with Building Code Schedule 1, removing confusion, enabling a reasonable size of accessory buildings for storage, wood etc. The exclusion from the side boundary rule is also consistent with recent changes to the Building Code Schedule 1 and is a practical proposal given the location of many such buildings within the side boundaries of many residential properties. Such accessory buildings have long been excluded from the coverage provision of the Taupō District Plan. We request that this continues.
18	Decks and structures under 1m height	Decision Sought – Seek Amendment - Reinstate LRZ-R1.4 and 1.5 or achieve a similar outcome via an exclusion in LRZ-R5.1 (coverage), R5.4 (Front Boundary) and R5.5 (Other Boundaries). Reasons The exclusion of decks and structures under 1m high from building coverage and setbacks is an important provision that has been in the Taupō Plan since 2000s. This provision needs to be maintained to allow these minor structures to occur without constraint of building coverage and yard setbacks.
19	Retaining walls less than 2m high not being structures	Decision Sought – Seek Amendment - Alter LRZ-R5.3 and R5.4 wording for clarity to include retaining walls less than 2m in depth i.e

		<i>Fences or walls (including retaining walls) not exceeding 2m in height or depth.</i> Reasons These alterations provide clarity for rules relating to retaining walls in setbacks.
20	Maximum Combined Coverage	Decisions Sought – Retain - Support increase to 10%. Reasons The increase to 10% for coverage will allow for increased built form enabling an efficient use of low density residential land and providing greater consistency with consented coverage in the low density area. The increase in coverage will reduce the number of consents required for residential housing, reducing consenting costs for home builders without creating built form greater than that consented in the area.
PC44	Other	
21	All other Provisions	No comments and no other changes requested.

Cheal Consultants Limited
10 May 2026

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 29/05/2026
First name: Breda Investments Limited **Last name:** EF Deadman Limited
Organisation: Cheal Consultants Ltd
Preferred method of contact Email
Postal address: PO Box 165, Taupo, New Zealand, 3351
Email: sarahh@cheal.co.nz
Daytime Phone: 021325103
Would you like to present your submission in person at a hearing? *
 Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: 3.1 Definitions > Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Support plot ratio deletion.

The reason for my submission is::

We support the deletion of plot ratio, as it is difficult to calculate, and building bulk is controlled by height, coverage, setbacks etc.

2. Provision: 3.1 Definitions > Comprehensive Housing Development

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

retain the proposed provision

The reason for my submission is::

Support the definition

3. Provision: Restricted Discretionary Activity - GRZ-R2.3

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

retain the propose provision.

The reason for my submission is::

Support enabling comprehensive residential development

4. Provision: GRZ-R5 Standards > 2. Maximum Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

delete plot ratio

The reason for my submission is::

Support the removal of plot ratio as building bulk is addressed by coverage, height, height to boundary and setbacks.

5. Provision: GRZ-R5 Standards > 3. Minimum Setbacks - Front Boundary

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain the proposed provision

The reason for my submission is::

Support that fences or walls less than 2m are not considered buildings in front boundary setback

6. Provision: GRZ-R5 Standards > 4. Minimum Setbacks - All Other Boundaries

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain the proposed provision

The reason for my submission is::

Support that small buildings less than 10m², rainwater tanks, and fences and walls less than 2m can be in side

boundary setbacks.

7. Provision: GRZ-R5 Standards > 7. Height to Boundary

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain the proposed provisions

The reason for my submission is::

Support the proposed height to boundary changes , and exclusions

8. Provision: LRZ-R5 Standards > 1. Maximum Combined Coverage

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain the proposed provision

The reason for my submission is::

Support the increase in coverage to 10%, as many consents have been granted for increased coverage in the low density zone. Generally people are building larger dwellings, with garages which need more coverage.

9. Provision: LRZ-R5 Standards > 2. Maximum Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Delete plot ratio

The reason for my submission is::

Plot ratio is difficult to calculate, and not needed to control building bulk, as this is done by coverage, height, height to boundary and setbacks.

10. Provision: LRZ-R5 Standards > 4. Minimum Setback - Front boundary

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain the proposed provision

The reason for my submission is::

Support that fences or walls less than 2m can be in the front setback

11. Provision: LRZ-R5 Standards > 5. Minimum setback - all other boundaries

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain the proposed provision

The reason for my submission is::

Support that small buildings, water tanks, and fences/ walls less than 2m can be in the side boundary setback.

12. Provision: Planning Maps

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

That Proposed Plan Change 44 be amended to rezone the subject land from Rural Zone to Low Density Residential Zone.

Insert a new Development area (DEV7 Kaiapo Road).

The reason for my submission is::

Submitters seek that the Site is rezoned from Rural Zone to Low-Density Residential Zone ("LRZ") and Neighbourhood Shops Zone, and that a new development area DEV7 Kaiapo Road is applied to the Site

13. Provision: PC44 General

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

That Proposed Plan Change 44 be amended to rezone the subject land from Rural Zone to Low Density Residential Zone.

Insert a new Development area (DEV7 Kaiapo Road).

Overview

The Kaiapo Outline Development Plan Area is identified on the Planning Maps and within this section. The Outline Development Plan Area comprises of 323.9ha legally described as Lot 1 DP 410435, Lot 2 DP 337255 and Lot 12 DP 582081. The intent of the Kaiapo Outline Development Plan is reflected in the Development Plan map which shows Low Density Residential Zone, Neighbourhood Shops Zone, Hazard Overlay, gully and buffer plantings, and indicative road / pedestrian access.

Subdivision of the development area is expected to occur in stages to ensure adequate servicing. Development capacity will be limited until new infrastructure, including a bridge near Taupō Control Gates Bridge is constructed. An Integrated Transport Assessment demonstrates up to 150 lots can be developed before a new bridge is provided by Council.

DEV7.1 Subdivision Design Standards

- a) Smaller low density residential lots should be located on gentler terrain, including the Kaiapo Valley basin, where development can be more readily absorbed.
- b) Larger lots shall be located in more sensitive or constrained parts of the site, including the Māpara Escarpment, the elevated terrain of the Waikarariki Point and Kaiapo Point headlands, the gully systems, and areas adjoining the rural environment.
- c) Built development within the Māpara Escarpment should be minimised, particularly on steep slopes and in locations that are visually prominent from the Māpara Valley.
- d) Building platforms should avoid steep slopes, prominent ridgelines, gullies, riparian margins and visually prominent locations where practicable.
- e) Cut and fill batters should be shaped to integrate with the surrounding natural landform. Steep batters and retaining walls greater than 1m in height should be avoided where practicable.
- f) Mitigation planting shall be provided throughout the site to reduce the visual prominence of future development, particularly when viewed from Highland Drive, Kaiapo Road, Kaiapo Bay.
- g) Additional planting should be provided along ridgelines, road corridors and between allotments to break up built form, soften views of roads and buildings, and reduce the perception of continuous residential development.
- h) Building heights within visually prominent parts of the site, including the upper slopes and main ridge of the Māpara Escarpment, should be restricted to 7m to reduce the prominence of future development.
- i) Fencing within the Māpara Escarpment should be rural in character, such as post and wire or post and rail.
- j) External lighting should be shielded and directed away from Lake Taupō, adjoining public reserves, and gully systems.
- k) Road or street lighting should be avoided along the access road where practicable. Where lighting is required for signage, safety or wayfinding, low-lumen downlights should be used.

Insert the following new Rules:

<u>SUB-R34 CON activity DEV7 - Kaiapo</u>	Subject to
1. <u>Subdivision and development in accordance with the DEV7-Kaiapo Road Development Area Plan that results in a cumulative completion of up to 150 residential lots</u>	<u>Matters of Control</u> <u>a. SUB-R2</u> <u>b. SUB-R14</u> <u>c. The development of more than 150 lots within the Kaiapo Development Plan Area shall not be complete* until the Taupō Waikato River Crossing project or equivalent upgrade is operational.</u> <u>*Complete in this instance refers to the signing of the Council Completion section 224(c) certificate.</u>
<u>SUB-R35 RDIS activity DEV7 - Kaiapo</u>	Subject to

1. <u>Subdivision at Kaiapo Road within the Natural Hazard Area in accordance with the DEV7-Kaiapo Road Development Area Plan</u>	<u>Matters of Discretion</u> a. <u>SUB-R2</u> b. <u>SUB-R14</u>
---	---

<u>SUB-R36 RDIS activity DEV7 - Kaiapo</u>	<u>Subject to</u>
1. <u>Subdivision at Kaiapo Road not in accordance with the DEV7-Kaiapo Road Development Area Plan that results in a cumulative completion of up to 150 residential lots</u>	<u>Matters of Discretion</u> a. <u>SUB-R2</u> b. <u>SUB-R14</u> c. <u>The development of more than 150 lots within the Kaiapo Development Plan Area shall not be complete* until the Taupō Waikato River Crossing project or equivalent upgrade is operational.</u> <u>*Complete in this instance refers to the signing of the Council Completion section 224(c) certificate.</u>

<u>SUB-R38 NC activity DEV7 - Kaiapo</u>	<u>Subject to</u>
1. <u>Subdivision within the Kaiapo Development Plan resulting in the cumulative completion of more than 150 lots prior to the Taupō Waikato River Crossing project or equivalent upgrade being operational</u>	

That any consequential amendments to the planning maps and provisions be made as necessary to give effect to this rezoning.

The reason for my submission is::

Breda Investments Limited and EF Deadman Limited at the address for service set out below ("**Submitters**") makes the following submission in relation to Proposed Plan Change 44 (Residential Zones) ("**PC44**") to the Taupō District Plan ("**District Plan**").

1. The Submitters could not gain an advantage in trade competition through this submission.
2. This submission relates to the zoning of 323.9ha of land owned by the Submitters at 37 and 40 Kaiapo Road, Acacia Bay, Taupō, legally described as Lot 1 DP 410435, Lot 2 DP 337255 and Lot 12 DP 582081 ("**Site**").
3. The Submitters seek that the Site is rezoned from Rural Zone to Low-Density Residential Zone ("**LRZ**") and

4. The reasons for the submission are as follows:
 - a. Unless the relief sought in this submission is granted, PC44 will:
 - i. Not promote the sustainable management of natural and physical resources;
 - ii. Not amount to and promote the efficient use and development of resources;
 - iii. Be otherwise inconsistent with the purpose and principles in Part 2 of the Resource Management Act 1991 ("**RMA**");
 - iv. Not comply with the Council's obligations under the RMA as amended by the Resource Management (Consenting and Other System Changes) Amendment Act 2025;
 - v. Not give effect to the NPS – Urban Development 2020 ("**NPS-UD**"); and
 - vi. Be inappropriate in terms of section 32 of the RMA.
 - b. Provided the relief sought below in this submission is granted, PC44 will be in accordance with the purpose and principles of the RMA and will be appropriate in terms of section 32 of the RMA.
5. In particular, but without derogating from the generality of the above:
 - a. Rezoning of the Site as sought by the Submitters is supported by the relevant national, regional and district-level planning instruments. More detail in this regard is provided in **Attachment 2** to this submission.
 - b. Rezoning of the site is appropriate when assessed against the LRZ Criteria set out in the PC44 Section 32 Analysis Report, as follows:
 - i. The Site is adjacent to existing LDRZ zoned land and forms a logical continuation of existing urban development;
 - ii. Development of the Site can be appropriately serviced, including through staging of development to ensure capacity is available at the time of development;
 - iii. Rezoning will not result in more than minor adverse effects on the supporting land transport network;
 - iv. The Site is neither an Outstanding Natural Landscape nor a Significant Natural Area, albeit a small portion of the Site is shown in the District Plan as being affected, this appears to be a mapping anomaly;
 - v. The Site is within 10km of Taupo township and is contiguous with existing LRZ land at Acacia Bay;
 - vi. The Site does not take direct access from a State Highway;
 - vii. The Site is not located within any geothermal systems mapped in the District Plan; and
 - viii. Any localised specific hazard considerations can be readily identified and addressed at the subdivision and/or building consent stage.

Assessment against these criteria is set out in greater detail in **Attachment 3** to this submission.

 - c. LDRZ is the most appropriate zone to apply to the Site for the purposes of section 32 of the RMA, as described in greater detail in the Section 32 further evaluation set out in **Attachment 4** to this submission.
 - d. Rezoning of the Site will have significant positive effects, including increased housing supply and choice, while maintaining environmental integrity and supporting the long-term growth strategy for Taupo.

- e. There are no technical, infrastructure or environmental constraints that would preclude rezoning of the Site.
- f. Any adverse environmental effects of the Rezoning sought by this submission can be readily and appropriately avoided, remedied and mitigated, as described in **Attachment 5** to this submission.

6. The Submitters seek the following relief with regard to PC44:

- a. Rezone the Site from Rural Zone to LDRZ and Neighbourhood Shops Zone;
- b. Introduce new Development Area “DEV7 Kaiapo Road”;
- c. Insert new Rules SUB-R34 - R38;

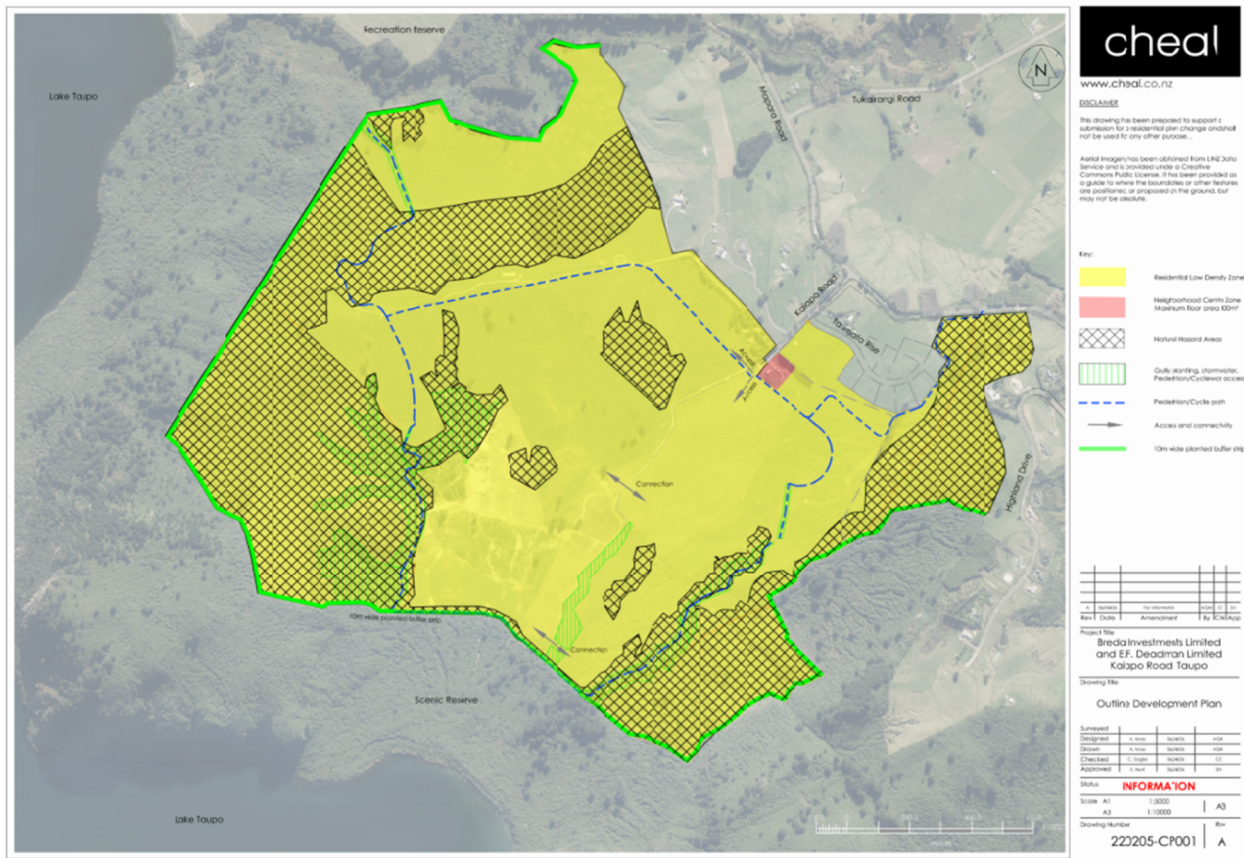
As set out in **Attachment 1** to this submission.

- d. Such alternative or other relief or consequential amendments as are considered appropriate or necessary to give effect to the relief sought in this submission.

1. ATTACHMENT 1 - RELIEF SOUGHT

That Proposed Plan Change 44 be amended to rezone the subject land from Rural Zone to Low Density Residential Zone.

Insert a new Development area (DEV7 Kaiapo Road).



Overview

The Kaiapo Outline Development Plan Area is identified on the Planning Maps and within this section. The Outline Development Plan Area comprises of 323.9ha legally described as Lot 1 DP 410435, Lot 2 DP 337255 and Lot 12 DP 582081. The intent of the Kaiapo Outline Development Plan is reflected in the Development Plan map which shows Low Density Residential Zone, Neighbourhood Shops Zone, Hazard Overlay, gully and buffer plantings, and indicative road / pedestrian access.

Subdivision of the development area is expected to occur in stages to ensure adequate servicing. Development capacity will be limited until new infrastructure, including a bridge near Taupō Control Gates Bridge is constructed. An Integrated Transport Assessment demonstrates up to 150 lots can be developed before a new bridge is provided by Council.

DEV7.1 Subdivision Design Standards

- Smaller low density residential lots should be located on gentler terrain, including the Kaiapo Valley basin, where development can be more readily absorbed.

- b) Larger lots shall be located in more sensitive or constrained parts of the site, including the Māpara Escarpment, the elevated terrain of the Waikarariki Point and Kaiapo Point headlands, the gully systems, and areas adjoining the rural environment.
- c) Built development within the Māpara Escarpment should be minimised, particularly on steep slopes and in locations that are visually prominent from the Māpara Valley.
- d) Building platforms should avoid steep slopes, prominent ridgelines, gullies, riparian margins and visually prominent locations where practicable.
- e) Cut and fill batters should be shaped to integrate with the surrounding natural landform. Steep batters and retaining walls greater than 1m in height should be avoided where practicable.
- f) Mitigation planting shall be provided throughout the site to reduce the visual prominence of future development, particularly when viewed from Highland Drive, Kaiapo Road, Kaiapo Bay.
- g) Additional planting should be provided along ridgelines, road corridors and between allotments to break up built form, soften views of roads and buildings, and reduce the perception of continuous residential development.
- h) Building heights within visually prominent parts of the site, including the upper slopes and main ridge of the Māpara Escarpment, should be restricted to 7m to reduce the prominence of future development.
- i) Fencing within the Māpara Escarpment should be rural in character, such as post and wire or post and rail.
- j) External lighting should be shielded and directed away from Lake Taupō, adjoining public reserves, and gully systems.
- k) Road or street lighting should be avoided along the access road where practicable. Where lighting is required for signage, safety or wayfinding, low-lumen downlights should be used.

Insert the following new Rules:

<u>SUB-R34 CON activity DEV7 - Kaiapo</u>	<u>Subject to</u>
1. <u>Subdivision and development in accordance with the DEV7-Kaiapo Road Development Area Plan that results in a cumulative completion of up to 150 residential lots</u>	<u>Matters of Control</u> <u>a. SUB-R2</u> <u>b. SUB-R14</u> <u>c. The development of more than 150 lots within the Kaiapo Development Plan Area shall not be complete* until the Taupō Waikato River Crossing project or equivalent upgrade is operational.</u>

	<u>*Complete in this instance refers to the signing of the Council Completion section 224(c) certificate.</u>
<u>SUB-R35 RDIS activity DEV7 - Kaiapo</u>	Subject to
1. <u>Subdivision at Kaiapo Road within the Natural Hazard Area in accordance with the DEV7-Kaiapo Road Development Area Plan</u>	<u>Matters of Discretion</u> <u>a. SUB-R2</u> <u>b. SUB-R14</u>

<u>SUB-R36 RDIS activity DEV7 - Kaiapo</u>	Subject to
1. <u>Subdivision at Kaiapo Road not in accordance with the DEV7-Kaiapo Road Development Area Plan that results in a cumulative completion of up to 150 residential lots</u>	<u>Matters of Discretion</u> <u>a. SUB-R2</u> <u>b. SUB-R14</u> <u>c. The development of more than 150 lots within the Kaiapo Development Plan Area shall not be complete* until the Taupō Waikato River Crossing project or equivalent upgrade is operational.</u> <u>*Complete in this instance refers to the signing of the Council Completion section 224(c) certificate.</u>

<u>SUB-R38 NC activity DEV7 - Kaiapo</u>	Subject to
1. <u>Subdivision within the Kaiapo Development Plan resulting in the cumulative completion of more than 150 lots prior to the Taupō Waikato River Crossing project or equivalent upgrade being operational</u>	

That any consequential amendments to the planning maps and provisions be made as necessary to give effect to this rezoning.

2. ATTACHMENT 2 – STATUTORY FRAMEWORK

2.1. Relevant Planning Documents

2.1.1. National Policy Statement – Urban Development (NPS-UD)

The proposed rezoning at Kaiapo Road is broadly consistent with the objectives and policies of the NPS-UD. It supports Objective 1 by contributing to a well-functioning urban environment through the provision of additional housing capacity adjoining existing development in Acacia Bay, enabling social and economic wellbeing.

It also aligns with Objective 2 by increasing the supply of residential land and improving market responsiveness, particularly in addressing the identified demand for low density and lifestyle housing. While private vehicle use will remain the primary mode, this is characteristic of the Acacia Bay environment. The proposal incorporates internal walking and cycling connections and is of a scale that can support future public transport provision over time, thereby improving accessibility within the wider urban area. The proposal is consistent with Objective 3 on the basis that it responds to high demand for residential land in this part of Taupō. It also supports Objective 4 by facilitating the outward expansion and evolution of the urban edge in a manner consistent with strategic growth directions. In relation to Objective 6, the proposal adopts a staged development approach linked to infrastructure capacity, including transport and water upgrades, ensuring integration with infrastructure planning over time.

The proposal is consistent with Policy 1 by enabling a greater diversity of housing types and improving connectivity through walking and cycling links, contributing to a well-functioning environment. It also gives effect to Policy 2 by providing additional development capacity to meet future demand. Under Policy 5, the proposed low-density form is appropriate given the site's accessibility and reflects strong market demand for lifestyle development.

Finally, the proposal aligns with Policies 6 and 8, as the proposal represents a logical and contiguous extension of the existing urban area and provides significant development capacity, and is therefore an appropriate and responsive addition to planned growth. The benefits of increased housing supply and development capacity outweigh potential adverse effects, which are assessed as minor and manageable.

Overall, the proposal is consistent with the intent of the NPS-UD, providing additional housing capacity in a manner aligned with market demand, infrastructure provision, and the planned growth of Taupō.

2.1.2. National Policy Statement – Freshwater Management (NPS-FM 2020).

The proposal is consistent with the NPS-FM, as it will not result in significant adverse effects on freshwater and enables development to be managed in accordance with Te Mana o te Wai. The transition from pastoral to residential land use is expected to reduce nutrient inputs, with modern wastewater and stormwater systems ensuring effects are managed. Sufficient nitrogen credits are available to enable compliant wastewater discharge. Overall, freshwater effects can be appropriately managed at later consenting stages.

2.1.3. National Policy Statement – Indigenous Biodiversity (2023)

The proposal is consistent with the NPS-IB, as the site is highly modified and does not contain significant indigenous biodiversity. Effects are limited and can be managed through subdivision design, including planting and buffers. There are opportunities to enhance biodiversity and connectivity with adjacent reserve land.

2.1.4. National Policy Statement – Natural Hazards (2025)

The proposal is consistent with the National Policy Statement for Natural Hazards (NPS-NH), which requires a risk-based approach to identifying and managing natural hazards. The CMW geotechnical assessment provides a comprehensive evaluation of hazards affecting the site, including fault rupture, slope instability, erosion, and subsidence, and assesses both their likelihood and consequences.

The assessment identifies that while some hazards particularly slope instability and erosion present moderate to high inherent risk, these can be effectively avoided or mitigated through appropriate design measures, including hazard setback areas, site layout controls, and detailed geotechnical investigation. This is consistent with the NPS-NH direction to avoid development in areas of very high risk and reduce other risks to acceptable levels.

Following implementation of these mitigation measures, the residual risks across the site are generally reduced to low levels. Other hazards, including fault rupture, liquefaction, geothermal activity, and flooding, are assessed as low or negligible in either likelihood or consequence, and can be appropriately managed through standard planning controls.

Overall, the assessment demonstrates that natural hazard risks are well understood and can be effectively managed through site-specific design and staged development. As such, the proposal is consistent with the intent of the NPS-NH, ensuring that significant risks are avoided and remaining risks are mitigated to acceptable levels.

2.1.5. National Policy Statement – Highly Productive Land 2022

The Site contains LUC 4 and 6, and therefore the NPS has no implications for the proposed rezoning and development.

2.1.6. National Environmental Standards

Relevant National Environmental Standards include:

- National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES-Contamination 2011);

A Contaminated Land Assessment has been undertaken, which concludes that the majority of the site is suitable for the proposed residential development. Contaminant levels across most of the site comply with applicable soil guideline values and do not pose an unacceptable risk to human health or the environment.

The only exception is a small, localised area within a runoff paddock near the stockyards at 37 Kaiapo Road, where elevated concentrations of arsenic and lead (with associated

copper and zinc) exceed residential guideline values. This contamination is highly confined and is considered most likely to be associated with historic storage or handling of hazardous substances, rather than widespread site activities. This area is located within the proposed Neighbourhood Shops zoning, and any potential effects can be addressed through further assessment and, if required, consent at the subdivision or development stage.

- National Environmental Standards for Freshwater 2020 (**NES-FW**)
If any natural inland wetlands or streams are identified, the relevant rules of the NES FW will apply to manage adverse effects.

2.1.7. Regional Policy Statement

The Waikato Regional Policy Statement (RPS) is a high-level, broad-based document containing objectives and policies the purpose of which is to provide an overview of the resource management issues of the region and to achieve integrated management of the natural and physical resources of the Region.

WRPS Plan Change 1 was notified on 18 October 2022. The hearing was held on 8 and 9 May 2023, and was adjourned until 23 May 2023. Decisions were publicly notified on 15 November 2023, and are still subject to appeal. This plan change incorporates the requirements of the National Policy Statement on Urban Development 2020 (NPS-UD). The plan change deletes the specific provisions relating to growth strategies prepared by territorial authorities outside of the Future Proof subregion (ie Taupō 2050). These have been replaced with generic provisions to guide preparation of, and give weight to, growth strategies.

Greater weight has been given to the proposed plan change than the operative RPS because it has proceeded through to the decisions stage of the statutory process, and the operative RPS is out of date with the current statutory requirements.

Issues

Key issues that relate to this proposal are the state of resources (Issue 1), managing the built environment (Issue 4), relationship of tangata whenua within the environment (Issue 5).

Objectives

There are a number of overlapping objectives under each of these relevant to this proposal. These are:

IM-O1 Integrated Management

Natural and physical resources are managed in a way that recognises:

1. the inter-relationships within and values of water body catchments, riparian areas and wetlands, the coastal environment, the Hauraki Gulf and the Waikato River;
2. natural processes that inherently occur without human management or interference;
3. the complex interactions between air, water, land and all living things;
4. the needs of current and future generations;
5. the relationships between environmental, social, economic and cultural wellbeing;
6. the need to work with agencies, landowners, resource users and communities; and
7. the interrelationship of natural resources with the built environment.

IM-O2 – Resource Use and Development

Recognise and provide for the role of sustainable resource use and development and its benefits in enabling people and communities to provide for their economic, social and cultural wellbeing, including by maintaining and where appropriate enhancing:

1. access to natural and physical resources to provide for regionally significant industry and primary production activities that support such industry;
2. the life supporting capacity of soils, water and ecosystems to support primary production activities;
3. the availability of energy resources for electricity generation and for electricity generation activities to locate where the energy resource exists;
4. access to the significant mineral resources of the region; and
5. the availability of water for municipal and domestic supply to people and communities

In relation to the Integrated Management objectives (IM-O1, IM-O2), the proposal recognises the interrelationship between land use, freshwater systems, and infrastructure, with assessments confirming that environmental effects, including transport and contamination, are limited and can be appropriately managed. The development also provides for sustainable use of land to support housing demand, contributing to social and economic wellbeing while maintaining environmental safeguards.

IM – O5 – Climate Change

Land use is managed to:

- 1) Avoid the potential adverse effects of climate change induced weather variability and sea level rise on:
 - a. Amenity;
 - b. The built environment, including infrastructure;
 - c. Indigenous biodiversity;
 - d. Natural character;
 - e. Public health and safety; and
 - f. Public access
- 2) Support reductions in greenhouse gas emissions within urban environments and ensure urban environments are resilient to the current and future effects of climate change.

The proposal is consistent with IM-O5 (Climate Change), as development is proposed in a staged and planned manner, enabling future design to incorporate resilience and support reductions in emissions through improved connectivity and potential active transport links.

IM-O6 – Ecosystem services

The range of ecosystem services associated with natural resources are recognised and maintained or enhanced to enable their ongoing contribution to regional wellbeing.

The proposal is consistent as there is no identified loss of key ecological functions, and opportunities exist to enhance ecological values through planting and design.

IM-O7 – Relationship of Tangata Whenua with the Environment

The relationship of tangata whenua with the environment is recognised and provided for, including:

1. the use and enjoyment of natural and physical resources in accordance with tikanga Māori, including mātauranga Māori; and
2. the role of tangata whenua as kaitiaki.

The proposal does not preclude recognition of tangata whenua values, with further engagement and consideration to occur at subsequent stages. The archaeological and environmental assessments acknowledge the importance of whenua values and support ongoing consultation.

IM-O9 – Amenity

1. The qualities and characteristics of areas and features, valued for their contribution to amenity, are maintained or enhanced; and
2. Where intensification occurs in urban environments, built development results in attractive, healthy, safe and high quality urban form which responds positively to local context whilst recognising that amenity values change over time in response to the changing needs of people, communities and future generations, and such changes are not of themselves an adverse effect.

The proposal represents an extension of the existing Acacia Bay environment and enables change over time in response to community needs, while maintaining overall amenity through low density design and appropriate servicing.

ECO-O1 – Ecological integrity and indigenous biodiversity

The full range of ecosystem types, their extent and the indigenous biodiversity that those ecosystems can support exist in a healthy and functional state.

The site is highly modified and does not contain significant indigenous biodiversity, meaning ecological integrity is maintained.

UFD-O1 – Built environment

Development of the built environment (including transport and other infrastructure) and associated land use occurs in an integrated, sustainable and planned manner which enables positive environmental, social, cultural and economic outcomes, including by:

1. promoting positive indigenous biodiversity outcomes;
2. preserving and protecting natural character, and protecting outstanding natural features and landscapes from inappropriate subdivision, use, and development;
3. integrating land use and infrastructure planning, including by ensuring that development of the built environment does not compromise the safe, efficient and effective operation of infrastructure corridors;
4. integrating land use and water planning, including to ensure that sufficient water is available to support future planned growth;
5. recognising and protecting the value and long-term benefits of regionally significant infrastructure;
6. protecting access to identified significant mineral resources;
7. minimising land use conflicts, including minimising potential for reverse sensitivity;
8. anticipating and responding to changing land use pressures outside the Waikato region which may impact on the built environment within the region;
9. providing for the development, operation, maintenance and upgrading of new and existing electricity transmission and renewable electricity generation activities including small and community scale generation;

10. promoting a viable and vibrant central business district in Hamilton city, with a supporting network of sub-regional and town centres; and
11. providing for a range of commercial development to support the social and economic wellbeing of the region.
12. strategically planning for growth and development to create responsive and well-functioning urban environments, that:
 - a. support reductions in green house gas emissions and are resilient to the current and future effect of climate change;
 - b. improve housing choice, quality, and affordability;
 - c. enable a variety of homes than enable Māori to express their cultural traditions and norms;
 - d. ensure sufficient development capacity, supported by integrated infrastructure provision, for identified housing and business needs in the short, medium and long term;
 - e. improves connectivity within urban areas, particularly by active transport and public transport;
 - f. take into account the values and aspirations of hapū and iwi for urban development.

The proposal provides for integrated and planned urban development. The proposal adjoins existing low density residential areas and will not introduce significant reverse sensitivity effects on established rural activities. It aligns land use with infrastructure capacity through staging, supports housing supply, and recognises the need to integrate transport, water, and servicing. It also contributes to a well-functioning urban environment by providing housing choice and aligning with strategic growth patterns on the western side of Taupō.

Policies

The key objectives are achieved through a range of policies in the RPS. Those of most relevance to this particular proposal have been listed below:

ECO-P1 – Maintain or enhance indigenous biodiversity

Promote positive indigenous biodiversity outcomes to maintain the full range of ecosystem types and maintain or enhance their spatial extent as necessary to achieve healthy ecological functioning of ecosystems, with a particular focus on:

- working towards achieving no net loss of indigenous biodiversity at a regional scale;
- the continued functioning of ecological processes;
- the re-creation and restoration of habitats and connectivity between habitats;
- supporting (buffering and/or linking) ecosystems, habitats and areas identified as significant indigenous vegetation and significant habitats of indigenous fauna;
- providing ecosystem services;
- the health and wellbeing of the Waikato River and its catchment;
- contribution to natural character and amenity values;
- tangata whenua relationships with indigenous biodiversity including their holistic view of ecosystems and the environment;
- managing the density, range and viability of indigenous flora and fauna; and
- the consideration and application of biodiversity offsets.

The proposal is consistent with ECO-P1, as it avoids adverse effects on significant indigenous biodiversity and enables opportunities for enhancement.

UFD-P1 – Planned and co-ordinated subdivision, use and development

Subdivision, use and development of the built environment, including transport, occurs in a planned and co-ordinated manner which:

1. has regard to the principles in APP11;
2. recognises and addresses potential cumulative effects of subdivision, use and development;
3. is based on sufficient information to allow assessment of the potential long-term effects of subdivision, use and development; and
4. has regard to the existing built environment.

UFD-P2 – Co-ordinating growth and infrastructure

Management of the built environment ensures:

1. the nature, timing and sequencing of new development is co-ordinated with the development, funding, implementation and operation of transport and other infrastructure, in order to:
 - a. optimise the efficient and affordable provision of both the development and the infrastructure;
 - b. maintain or enhance the operational effectiveness, viability and safety of existing and planned infrastructure;
 - c. protect investment in existing infrastructure; and
 - d. ensure new development does not occur until provision for appropriate infrastructure necessary to service the development is in place;
2. the spatial pattern of land use development, as it is likely to develop over at least a 30-year period, is understood sufficiently to inform reviews of the Regional Land Transport Plan. As a minimum, this will require the development and maintenance of growth strategies where strong population growth is anticipated or as required for tier 3 local authorities as set out in UFD-P18 and its associated methods;
3. the efficient and effective functioning of infrastructure, including transport corridors, is maintained, and the ability to maintain and upgrade that infrastructure is retained; and
4. a co-ordinated and integrated approach across regional and district boundaries and between agencies; and
5. that where new infrastructure is provided by the private sector, it does not compromise the function of existing, or the planned provision of, infrastructure provided by central, regional and local government agencies.

UFD-P18– Tier 3 local authority areas outside the Future Proof Strategy

New urban development in tier 3 local authority areas shall be managed in a way that:

1. recognises and provides for the intended urban development pattern as set out in any agreed council-approved growth strategy or equivalent council-approved strategies and plans;
2. contributes towards sufficient development capacity required to meet expected demand for housing and for business land over the short term, medium term, and long term as set out in the National Policy Statement on Urban Development;
3. focuses new urban development in and around existing settlements;
4. prevents a dispersed pattern of settlement and the resulting inefficiencies in managing resources that would arise from urban and rural residential development being located in the rural environment outside of identified urban growth areas;

5. avoids the cumulative effect that subdivision and consequent fragmented land ownership can have on the role of identified urban growth areas in providing a supply of land for urban development;
6. ensures that any development is efficient, consistent with, and supported by, appropriate infrastructure necessary to service the area;
7. has particular regard to the principles in APP11;
8. recognises environmental attributes or constraints to development and addresses how they will be avoided or managed including those specifically identified in UFD-M8, highly productive land, and planning in the coastal environment as set out in CE-M1;
9. in relation to urban environments:
 - (a) concentrates urban development through enabling heights and density in those areas of an urban environment with accessibility by active or public transport to a range of commercial activities, housing and community services, and where there is demand for housing and business use;
 - (b) provides for high-quality urban design which responds positively to local context whilst recognising and allowing for amenity values of the urban and built form in areas planned for intensification to develop and change over time, and such change is not, in and of itself, an adverse effect;
 - (c) enables a diverse range of dwelling types and sizes to meet the housing needs of people and communities, including for:
 - (i) households on low to moderate incomes; and
 - (ii) Māori to express cultural traditions and norms;
 - (d) enables a variety of site sizes and locations in urban environments suitable for different business sectors;
 - (e) supports reductions in greenhouse gas emissions including through providing for an increasingly compact urban form that supports less carbon intensive transport modes such as active and public transport.

UFD-P19– Being responsive to significant unintended and out-of-sequence growth within tier 3 local environments

Where alternative urban land release patterns are promoted through district plan and development area processes, either out-of-sequence or unanticipated by a council-approved growth strategy or equivalent council strategies and plans, justification shall be provided to demonstrate consistency with the principles in APP11, and particular regard shall be had to the proposed development capacity only where the local authority determines that the urban development proposal is significant, by assessing the proposal for consistency with the criteria in APP14.

The proposal aligns with UFD-P1 and UFD-P2, as development is planned and coordinated with infrastructure, with staging ensuring servicing and transport upgrades keep pace with growth. Importantly, the proposal is consistent with UFD-P18, as it focuses development adjacent to an existing settlement, avoids dispersed rural subdivision, provides long-term development capacity, and can be supported by infrastructure. It also enables a diversity of housing types and maintains an efficient urban form relative to demand.

Finally, the proposal is consistent with UFD-P19, as it can be considered a logical and responsive extension to the urban boundary that adds significant development capacity, aligns with strategic growth patterns, and does not undermine infrastructure planning or environmental outcomes.

Overall, the proposal is consistent with the relevant Waikato RPS objectives and policies, representing an integrated, efficient, and appropriately managed urban expansion that balances development needs with environmental and cultural considerations.

2.1.8. Iwi Management Plans

The site is located within the areas of interest for Ngāti Tūwharetoa and Raukawa.

Ngāti Tūwharetoa Iwi Management Plan

The Ngāti Tūwharetoa Environmental Iwi Management Plan provides a background to and identifies key resource based issues for Ngāti Tūwharetoa. The vision of the management plan is for Ngāti Tūwharetoa to 'assert their custodial and customary right of tino rangatiratanga over their respective taonga, and Tūwharetoa collectively, will sustain and protect the life force of all tribal and inherited taonga.'

As the site is within an existing modified rural area, with no waterbodies, no identified waahi tapu, waahi taonga sites, in terms of the relevant chapters *Papatūānuku*, and *Ngā Wāhi Tapu*, it is considered that the proposal is not inconsistent with those policies and is consistent with this iwi management plan.

Raukawa Environmental Management Plan 2015

Te Rautaki Taiao a Raukawa is a statement of Raukawa issues, aspirations, and priorities in relation to the environment.

The proposal is consistent with Land – Whenua chapter in that the land use is suitable for the soil type, the nitrogen discharge from the property will decrease with the removal of farmed animals, and the future landscaping on the lots will improve the biodiversity of the property. The large lots enable self-sufficiency in terms of vegetable gardening, and alternative energy sources eg solar. The proposed road linkages provide connection to existing roads to the north.

Generally, the proposal is consistent with the relevant objectives.

2.1.9. Regional Plans

Any development within the Kaiapo Road Development Area will need to accord with the provisions of the Waikato Regional Plan, including for any matters associated with land development and subsequent discharges (including stormwater and wastewater), air quality, excavation.

2.1.10. Taupō District Future Development Strategy

The Waikato Regional Policy Statement requires that there must be a growth strategy for the Taupō District and prescribes what the strategy should contain. Council has named its growth strategy the 'Taupō District Future Development Strategy' to align with the terminology in the NPS-UD. The Taupō District Future Development Strategy (FDS) was adopted in March 2025. It is the third growth strategy for the district. TD2050 was adopted in 2006 and updated in 2018 (which is referenced in the Taupō District Plan). The FDS uses population projections to identify how many additional people will call the district home over the period to 2060 and how many homes and business land are required to accommodate these people. The FDS identifies the new residential and industrial growth areas to accommodate this growth.

The FDS implementation plan identifies two actions that relate to the residential chapters–

1. *Review the Residential Chapters of the District Plan to ensure that they enable different typologies and allow for intensification. Public transport routes are to be taken into account when considering intensification provisions.*
2. *Each time we review the Residential Chapters of the District Plan, undertake an assessment to determine whether future growth areas need to be rezoned.*

Taupō District Council engaged Property Economics to undertake an assessment, which determined there is a projected demand for LRZ properties that would not be met by existing supply. An options analysis undertaken by Taupō District Council concluded that this type of development did not contribute significantly to overall growth and is inherently an inefficient use of land proximate to urban amenities, so it is not proposed to zone greenfield areas to low density residential, and instead any person may submit for their landholding to be included in LRZ where it meets certain criteria. It is considered that the Kaiapo Road Development Area meets those criteria.

4. ATTACHMENT 4 – SECTION 32 FURTHER EVALUATION

4.1. Legislative Requirements

Section 32 of the RMA requires that before giving effect to a proposed plan change, an evaluation must be undertaken to:

- Examine whether the objectives of the proposal are the most appropriate way to achieve the purpose of the RMA; and
- Examine whether the provisions are the most appropriate way to achieve those objectives, including:
 - Identifying reasonably practicable alternatives,
 - Assessing efficiency and effectiveness, and
 - Summarising reasons for the preferred option.

In accordance with section 32(1)(c), the level of detail contained in this evaluation reflects the scale and significance of the anticipated environmental, economic, social and cultural effects.

The proposal is an amending proposal under section 32(3), as it seeks amendment to the proposed Plan Change only. Section 32(6) clarifies that where no actual objectives are stated in the proposal, the objective is the purpose of the proposal.

4.2. Identification of the Issue

The core issue is that Rural Zone no longer represents the most appropriate zoning for the Kaiapo Road land, given its location, surrounding land use pattern, infrastructure availability, and the identified need for additional Low Density Residential capacity within Taupō.

Specifically:

- The site is physically and functionally part of the urban edge of Taupō;
- The site adjoins existing Low Density Residential development;
- Council's own PC44 Section 32 analysis acknowledges ongoing demand for LRZ land but does not zone additional areas, instead relying on submissions; and
- Retaining Rural zoning risks inefficient, ad-hoc development through consent pathways rather than coordinated urban growth.

4.3. Taupō District Plan Objectives

This proposal does not seek to amend any Objective or Policy, accordingly the s32A tests for the proposed rezoning and amendments to the subdivision rules is whether the proposal is appropriate to achieve the existing objectives and implementing the policies.

The relevant matters of Strategic Direction in the Taupō District Plan are assessed below.

4.3.1. Strategic Direction - Climate Change

Section 6.1 of the Plan contains the strategic Climate Change policy framework.

The relevant provisions seek positive climate change outcomes (CC-O1), resilience to current and future effects of climate change (CC-O2), and adapt to the risks and effects from climate change (CC-O3).

The proposal supports climate change objectives by enabling a logical urban extension that reduces reliance on dispersed rural development and associated emissions. While low density development typically relies on private vehicles, the proposal reduces emissions relative to dispersed rural development and incorporates active transport opportunities and infrastructure that can support future transport change. Conversion from pastoral land use reduces agricultural emissions, while the low density form enables climate-responsive design and household-level mitigation. The staged approach also supports long-term resilience and adaptability.

4.3.2. Strategic Direction - Fresh Water Quality

Section 6.2 of the Plan contains the strategic Freshwater Quality / Te Mana o Te Wai policy framework.

The relevant provisions seek that subdivision and land use is managed in a way that promotes the positive effects, while avoiding, remedying, or mitigating adverse effects (including cumulative effects) of that development, on the mauri, health and well-being of water bodies, to benefit freshwater ecosystems, the wider environment, and the community.

The proposal supports freshwater objectives by reducing nutrient inputs relative to pastoral use and enabling modern wastewater and stormwater management. Effects can be managed through subdivision design, supporting improved water quality outcomes.

4.3.3. Strategic Direction - Land Development

Section 6.3 of the Plan contains the strategic land development policy framework.

The relevant provisions seek to provide for and manage urban growth (LD-O1) through recognising the appropriateness of Urban Growth Areas as a resource for planned and staged urban growth; and ensuring that any new urban development is predicated by way of Taupō District Development Plan Process and plan change (LD-O2). Any development needs to ensure the maintenance of an appropriate and sufficient level of infrastructure within existing serviced areas (LD-O3). Any development is to avoid degradation of the Lake and waterways (LD-O4), and not detract from the amenity value or qualities of the local environment (LD-O5).

The rezoning of the Kaiapo Road Development Area achieves these provisions by going through this plan change process, demonstrating sufficient servicing, avoiding degradation of water quality, and not detracting from the amenity value or qualities of the local environment. This site is an extension to the Mapara Road Low Density Zoning area and meets the LRZ criteria identified by Council.

It is considered the rezoning of the Kaiapo Road Development Area achieves the objectives and policies in Section 6.3, and while located outside the identified Urban Growth Areas, the proposal

represents a logical and contiguous extension of existing development and is consistent with the intent of enabling planned growth.

4.3.4. Strategic Direction - Natural Environment Values

Section 6.5 of the Plan contains the strategic directions for Natural Environment Values.

The relevant provisions seek to recognise the importance of the District's natural values and landscapes and their significance to the Taupō District's communities and identity (NEV-O1), protect areas of significant indigenous vegetation (NEV-O2), enhance indigenous biodiversity values (NEV-O3), protect outstanding landscape areas from inappropriate subdivision, land use and development (NEV-O5), recognise the relationship of tangata whenua with the natural values of their ancestral lands, waterbodies, cultural landscapes (NEV-O6), and preserve and enhance the natural character of riparian margins (NEV-O7).

The proposal avoids significant natural areas and outstanding landscapes and provides opportunities to enhance ecological values through planting and restoration. Effects are minor and can be managed through design.

Overall, the proposal avoids inappropriate development effects, maintains and enhances natural values where present, and represents a positive and sustainable land use change consistent with the intent of the Natural Environment Values objectives.

4.3.5. Strategic Direction - Tangata Whenua

Section 6.6 of the Plan contains the strategic directions for Tangata Whenua.

The relevant provision seeks that the values, rights and interests of Taupō District mana whenua are recognised and protected.

The proposal acknowledges the importance of mana whenua relationships with land, water and natural values by avoiding identified culturally significant areas and supporting enhancement of natural systems, thereby aligning with kaitiakitanga and the protection of environmental taonga. The submitter has undertaken and will continue engagement with mana whenua consistent with the principles of te Tiriti o Waitangi.

4.3.6. Strategic Direction - Urban Form and Development

Section 6.8 of the Plan contains the strategic directions for urban form and development.

The relevant provisions seek that the district develops in a cohesive, compact and structured way (UFD-O1). The effective functioning of rural zones is protected, and the efficient use of zoned and serviced urban land is co-ordinated with the provision of cost-effective infrastructure (UFD-O2). Development of land in appropriate locations which demonstrates social and/or cultural benefits is recognised and provided for (UFD-O3). The development is serviced by an appropriate level of infrastructure (UFD-O4), and is designed to avoid, remedy or mitigate adverse effects on the environment and occurs in a sequenced and coherent manner (UFD-O7).

The proposal supports cohesive, planned urban growth by extending existing low-density development and integrating with infrastructure. It increases housing choice and supply while managing environmental effects through staging and design controls.

It is considered the rezoning of the Kaiapo Road Development Area achieves the objectives and policies in Section 6.8.

4.3.7. Transport

Section 7.3 of the Plan contains the objectives and policies for transport. The relevant objective is the safe and efficient operation of the roading network, and movement of traffic, including cyclists and pedestrian within the District.

The traffic assessment considers matters in relation to effects on the wider transport network, access and safety. The ITA concludes that subject to recommended infrastructure upgrades and staging controls, the proposed rezoning is assessed as generating acceptable transport effects with no more than minor adverse impacts.

Accordingly, the rezoning proposed will achieve Objective TRAN-O1.

4.3.8. Natural Hazards

Section 8.3 of the Plan contains the objectives and policies for natural hazards.

The relevant objectives are the protection of activities, development and life from the adverse effects of natural hazards (NH-O1), and activities and development do not create, accelerate, displace or increase the effects of a natural hazard.

The geotechnical assessment concludes that that natural hazard risks are well understood and can be effectively managed through site-specific design and staged development. Therefore, the proposal is consistent with this objective and associated policies.

4.3.9. Operative District Plan Summary

There are a significant number of objectives and policies that have some bearing on this proposal.

The proposal supports climate change outcomes by enabling a logical urban extension, reducing reliance on dispersed rural development, removing agricultural emissions, and providing for low-carbon living and adaptive, resilient design. It also promotes freshwater quality objectives through the reduction of pastoral nutrient inputs, implementation of on-site wastewater and stormwater management, and opportunities for gully enhancement. In terms of land development, the proposal provides for planned and serviced urban growth through the plan change process, with only minor tension arising from its location outside identified Urban Growth Areas, although it directly adjoins existing Low Density Residential zoning and meets Council's LRZ criteria. The proposal is consistent with natural environment values objectives by avoiding impacts on significant natural areas and outstanding landscapes while enabling biodiversity enhancement and gully restoration. It also recognises tangata whenua values through ongoing engagement, and alignment with kaitiakitanga. Finally, the proposal supports urban form and development objectives by promoting cohesive, serviced growth adjacent to existing development, delivering social and housing benefits, and appropriately managing environmental effects, while achieving transport and natural hazard objectives through safe access and suitability of the land for development.

The proposed rezoning of Kaiapo Road is considered to achieve the respective objectives (and implement the policies) of the ODP.

4.4. Evaluation of benefits and costs (s32(2)(a))

Benefits	Costs
Environmental	
• More efficient land use by consolidating development adjacent to existing urban areas, reducing pressure for dispersed rural subdivision • Opportunities to enhance indigenous biodiversity through native planting, ecological restoration, buffers, and covenant protection • Reduction in agricultural greenhouse gas emissions (methane and nitrous oxide) through the conversion of pastoral farming to residential use • Decrease in nutrient inputs, particularly nitrogen, to the Lake Taupō catchment, contributing to improved freshwater quality	• Potential edge effects on adjacent ecological areas (eg weeds, domestic animals) • Increased impervious surfaces • Continued reliance on private vehicle relative to higher density environments. • Loss of rural character and open landscape values.
Economic	
• Supports housing supply and responds to identified demand for low density residential land. • Generates economic activity through land development and construction, and rates • More efficient use of existing infrastructure networks • Supports local economy including potential neighbourhood centre	• Development costs including infrastructure upgrades • Development contributions and servicing costs • Loss of productive land (albeit low productivity LUC 6 land)
Social	
• Increased housing choice and availability for the community • Supports community growth and wellbeing • Provision for a neighbourhood centre reducing travel for daily needs • Opportunities for self-sufficiency (e.g. vegetable growing, water harvesting)	• Change in local amenity experienced by neighbouring rural residents • Increased activity and human presence in currently rural area • Dependence on private vehicles typical of low density areas

Enhanced recreational opportunities through delivery of pedestrian/cycling link through the site	
Cultural	
- Improved access to otherwise constrained land (including nearby Māori land access) - Opportunity to incorporate kaitiakitanga through ecological enhancement and land management	Potential effects on unidentified cultural values

4.5. Economic Growth and Employment Opportunities (s32(2)(a))

The proposed rezoning and development of the Kaiapo Road land will generate substantial economic growth and employment opportunities at both the local and district level, supported by the Formative economic assessment.

The development is anticipated to deliver approximately 320 low density residential lots, generating around \$540 million in direct development expenditure, and contributing approximately \$262 million in GDP to the Taupō District economy over the same period.

This level of investment will support an estimated 3,600 full-time equivalent (FTE) jobs over the life of the project, with approximately 60% of these roles associated with land development and construction, and the remainder arising through indirect and induced economic activity in supporting sectors such as materials supply, transport, and professional services.

Beyond the construction phase, the proposal will support ongoing economic activity by accommodating population growth and increasing household expenditure within Taupō, thereby benefiting local retail, hospitality and service industries.

The inclusion of a small-scale neighbourhood commercial centre (approximately 170–300m² GFA) will provide additional local employment opportunities and support small business activity, while reducing travel demand for day-to-day services and retaining spending within the local community.

The proposal also contributes to addressing a projected shortfall in low density residential supply, which is estimated to be insufficient to meet long-term demand, thereby supporting labour market attraction, housing affordability, and economic resilience.

4.6. The risk of acting or not acting if there is uncertain or insufficient information (s32(2)(c))

Effects are well understood and supported by comprehensive technical evidence base, so the risk of acting is low. Not proceeding would perpetuate identified development capacity shortfalls.

4.7. The efficiency and effectiveness of provisions (s32(1)(b)(ii))

4.7.1. Efficiency

The rezoning of the Kaiapo Road land to Low Density Residential is considered efficient for the following reasons:

- Efficient use of land and infrastructure: The site adjoins existing Low Density Residential development and can utilise and extend established infrastructure networks, avoiding the need for new, standalone infrastructure systems and reducing overall capital and environmental costs to the wider community.
- Avoidance of inefficient development patterns: While low density development is less efficient in a purely spatial sense, it responds to a clearly demonstrated and currently unmet demand for this housing typology and therefore contributes to a well-functioning urban environment by improving housing choice. Rezoning enables a planned and coordinated urban expansion, avoiding fragmented and ad hoc rural subdivision that would otherwise occur through the resource consent process, which is typically less efficient and results in poorer outcomes.
- Net environmental benefits: The transition from pastoral farming reduces greenhouse gas emissions and nutrient inputs to the Lake Taupō catchment, creating environmental gains at a relatively low societal cost when compared with continued rural land use.
- Economic returns exceeding costs: The proposal delivers substantial economic benefits, including approximately \$540 million in development expenditure and \$262 million in GDP, supporting around 3,600 FTE jobs, which significantly outweigh the costs associated with development and infrastructure provision.
- Alignment with infrastructure funding mechanisms: Development contributions and staging ensure that growth pays for growth, minimising fiscal burden on the wider community.
- Enablement of self-sufficiency and reduced environmental demand: Larger allotments allow for water harvesting, renewable energy generation, and local food production, contributing to reduced long-term demand on municipal systems and external supply chains.

While there are costs associated with the loss of rural land, infrastructure upgrades, and potential environmental effects, these are moderate, well understood, and able to be internalised by the developer or mitigated through design and consenting mechanisms.

4.7.2. Effectiveness

The rezoning is considered highly effective for the following reasons:

- Directly addresses housing supply issues: The proposal contributes meaningful low density residential capacity (approximately 320 lots), helping to address identified shortfalls in this housing typology and supporting a well-functioning urban environment.
- Delivers planned urban growth: The rezoning provides a structured and coordinated framework for development through the District Plan, rather than relying on less certain and less integrated consent-based development pathways.
- Strong alignment with strategic objectives: The proposal achieves climate change, freshwater, infrastructure, urban form, and natural environment objectives by enabling development in an appropriate location with manageable effects.
- Effectively manages environmental effects: The scale and nature of effects are well understood and can be avoided, remedied or mitigated through subdivision design, consent conditions, and best practice environmental management.
- Supports resilient and adaptive development: The low-density format enables site-specific responses to natural hazards, climate change, and future adaptability, increasing the long-term effectiveness of the development.
- Provides certainty and clarity: Rezoning provides a clear planning framework for landowners, Council and infrastructure providers, improving certainty and enabling better long-term planning outcomes.

4.8. Options considered s32(1)(b)(i)

Option 1: Status Quo The existing Rural Zone and related provisions applying to the sites would be retained and non-complying consent would be required.	Continuing to apply Rural Zone provisions to the identified areas of land will not assist in achieving the ODP's objectives relating to ensuring sufficient residential development capacity and providing for sustainable growth. Any consent would be high risk, with uncertainty as residential development in rural zones is not supported by the objectives and policies.
Option 2: Rezoning the site as Low Density Residential without the development area plan	This option would not provide a coordinated and integrated framework for development. The development area plan addresses connectivity, ecological protection, local commercial nodes, infrastructure and natural hazards. The development area plan allows environmental constraints to be identified and appropriately managed upfront.
Option 3: Lodge a private plan change request to rezone the site low density residential with a development area plan.	This option was seriously considered, however would be inefficient when the Council has already notified Plan Change 44, and would be much more costly. The same outcomes would be achieved as per this submission for this proposal.

4.9. Reason for option chosen s32(1)(b)(iii)

Submitting on Council's Proposed Plan Change 44 to rezone the Kaiapo Road site, supported by a development plan, is the most appropriate option because it utilises an existing statutory process specifically designed to consider residential zoning changes, ensuring timely and efficient decision-making without the need for a standalone private plan change.

This approach aligns directly with Council's Section 32 evaluation, which anticipates and invites landowner-led submissions for additional Low Density Residential land, thereby reducing duplication of process, cost, and delay.

Incorporating a development plan within this submission further strengthens the proposal by demonstrating comprehensive and coordinated planning, including how infrastructure, access, and environmental constraints will be managed.

Together, this approach provides a balanced and efficient pathway that achieves the benefits of integrated development planning while leveraging the broader strategic and policy framework already being progressed through PC44, making it a practical, effective and cost-efficient method of securing rezoning outcomes.

5. ATTACHMENT 5 – ASSESSMENT OF ENVIRONMENTAL EFFECTS

5.1. Economic Effects

An economic assessment was undertaken by Formative in May 2026. The analysis demonstrates that the proposal responds directly to a significant and quantifiable shortfall in Low Density Residential (LDR) and large-lot residential capacity in the Taupō District, while delivering significant economic benefits, including approximately \$540 million in development expenditure, \$262 million in GDP, and around 3,600 employment-years. These benefits extend beyond construction, supporting ongoing economic activity through increased population, household expenditure, and local service demand.

Taupō has experienced sustained population and employment growth, resulting in increased housing demand and emerging supply constraints. Updated analysis indicates demand for low density residential (LDR) land significantly exceeds available capacity, with existing supply expected to be exhausted within 1–4 years. This demonstrates a clear and immediate shortfall in this housing typology.

The proposal will deliver approximately 320 LDR lots, making a meaningful contribution toward addressing identified capacity shortfalls and improving housing choice within the district. It responds directly to a demonstrated market demand for larger lot residential living that is not adequately provided for under the current planning framework.

Overall, the proposal will provide significant net economic benefits while improving the responsiveness and efficiency of the local housing market.

5.2. Ecological Effects

An Ecological Assessment was undertaken by Singers Ecological in 2024 and updated in May 2026. This report provides a desktop ecological assessment of the proposed rezoning and development of the Kaiapo Bay site at Acacia Bay, Taupō, to enable Low Density Residential (LDR) development of approximately 320 lots. The assessment evaluates existing ecological values, potential adverse effects, and recommended mitigation measures.

The site is predominantly highly modified pastoral land with low inherent ecological value and no identified Significant Natural Areas (SNAs) within the development footprint. Indigenous vegetation is sparse and limited primarily to isolated gullies and small patches, resulting in negligible direct effects on indigenous biodiversity.

The primary ecological considerations relate to the site's proximity to adjacent SNAs, including Kaiapo Bay Scenic Reserve. Potential adverse effects are therefore indirect and include increased predation from domestic animals, weed invasion, habitat disturbance, and potential edge effects

on adjoining ecosystems. There is also potential for limited habitat use by indigenous fauna such as lizards and birds.

These effects can be effectively avoided, remedied, or mitigated through subdivision design and management measures. These include establishment of vegetated buffer zones, restrictions on pest species, ecological planting, and species-specific management where required (e.g. lizard or bat habitat). SUB-R14 (i) allows Council to consider any actual or potential effects on areas or features of cultural, historical, landscape or ecological value as identified in the plan.

With implementation of these measures, ecological effects are expected to be minor overall. In addition, the transition from pastoral land use provides opportunities to enhance ecological values over time through restoration planting and improved land management, resulting in a net positive outcome relative to the existing baseline.

5.3. Landscape and Visual Effects

A Landscape and Visual Assessment was undertaken by Mansergh Graham. This report assesses the landscape, visual amenity, and natural character effects of the proposed rezoning of the Kaiapo Bay site from General Rural Zone to Low Density Residential Zone (LDRZ), with a small Neighbourhood Centre Zone (NCZ). The assessment evaluates the suitability of the site for development and the extent to which potential effects can be appropriately managed.

The proposal will result in a localised change in landscape character through the transition from pastoral land to a low-density residential environment. This will introduce built form, roading, and infrastructure into a currently open rural setting.

However, the site has moderate suitability for development, as it does not contain Outstanding Natural Features and Landscapes (ONFLs) or Significant Natural Areas within the developable area, and is partially screened by topography and vegetation. Visibility is largely confined to nearby elevated viewpoints, with limited wider visual exposure.

Potential adverse effects relate to changes in rural character and visual amenity, particularly in more open or elevated areas. These effects can be appropriately mitigated through a landscape-led design approach, including careful siting of building platforms, retention of open space in sensitive locations, and extensive indigenous planting. These design standards are incorporated into the Development Outline Plan. Matters of Discretion SUB-R2 (e) and SUB-R14(i) enable Council to consider and impose conditions to address actual or potential effects on landscape values.

Over time, mitigation planting will soften built form and integrate development into the landscape. Overall, landscape and visual effects are assessed as no more than minor.

5.4. Geotechnical Effects

A preliminary geotechnical investigation was undertaken by CMW. This assessment evaluates the site's geology, geotechnical constraints, and natural hazard risks.

The site comprises an extensive amphitheatre landform typical of the Taupō Volcanic Zone, with pumice soils, ignimbrites, and volcanic deposits. Overall, the site is considered suitable for residential development, subject to appropriate design and mitigation.

Key geotechnical constraints include active faulting, steep slopes, erosion gullies, and variability in ground conditions due to historical earthworks. The Kaiapo Fault traverses part of the site; however, fault rupture risk is low and can be managed through appropriate setbacks and further investigation.

Slope stability and erosion are the primary considerations, particularly along escarpments and gullies. While these areas present increased risk, they can be effectively managed through site design, hazard zoning, and mitigation measures such as setbacks, earthworks controls, and localised engineering works.

Other hazards, including liquefaction, lateral spreading, and geothermal effects, are assessed as low due to the site's elevation, soil profile, and distance from geothermal systems.

Foundation conditions are generally suitable, although localised risks associated with fill, weak soils, or subsurface voids will require site-specific investigation and design at later stages. The natural hazards assessment indicates that, with appropriate mitigation, residual risks can be reduced to low levels.

Further investigations will be required at subdivision stage to confirm ground conditions and refine design responses. A restricted discretionary rule is proposed which provides Council the ability to specifically consider and impose conditions on development within the hazard overlay.

Overall, the assessment concludes that there are no geotechnical or natural hazard constraints that would preclude rezoning, and that development can proceed subject to standard engineering design and mitigation measures.

5.5. Transportation Effects

A Traffic Assessment was undertaken by CKL. The assessment considers existing transport conditions, future traffic generation, network capacity, and infrastructure requirements.

The proposed development will generate additional traffic on the local road network, with estimated flows of up to approximately 1,100–1,200 vehicle movements per day and peak hour increases consistent with low-density residential activity.

The surrounding transport network, including Mapara Road and its connections to the wider Taupō network, has capacity to accommodate this level of growth, subject to targeted upgrades and staging. The Kaiapo Road / Mapara Road intersection is expected to operate satisfactorily, while improvements to the Mapara / Wakeman intersection may be required at higher levels of development.

Traffic effects on key network constraints, including the Control Gates Bridge, are consistent with growth already anticipated in strategic transport planning. A staged development approach ensures that infrastructure upgrades are implemented in line with increasing demand, maintaining acceptable levels of service and safety. A specific rule has been proposed to address the staged

development of the subdivision given the limitations of Council's existing roading infrastructure (ie a second bridge). The other roading upgrades recommended by the traffic assessment can be undertaken by a consent holder, and this can be addressed by the matter of discretion SUB-R2 (a).

The proposal also provides opportunities to improve active transport infrastructure, including walking and cycling connections, and may support future extension of public transport services.

Overall, transport effects are considered manageable and no more than minor, subject to recommended staging and infrastructure upgrades.

5.6. Infrastructure Effects

An engineering services assessment was undertaken by Cheal Consultants. The assessment considers the ability of the site to be serviced for a staged residential development of approximately 320 lots, together with a neighbourhood commercial area and associated infrastructure.

Overall, the assessment demonstrates that the site can be developed for low density residential purposes, with engineering constraints that are typical of greenfield development and capable of being appropriately managed through detailed design and staged delivery.

From a geotechnical and earthworks perspective, the site is considered suitable for residential development, with anticipated cut and fill requirements generally modest for building platforms and manageable for roading, including crossings over gullies. Earthworks will be undertaken in accordance with relevant standards and supported by detailed geotechnical input at subdivision stage.

Stormwater management can be effectively achieved on-site through a combination of swales, soakage pits, culverts, and stormwater reserves, designed to attenuate flows and maintain natural drainage patterns. Preliminary analysis indicates that sufficient land is available within the development area to accommodate stormwater infrastructure, with capacity significantly exceeding minimum requirements.

Wastewater servicing is proposed via onsite treatment and discharge systems (AWTS with nitrogen reduction), consistent with Waikato Regional Council requirements for the Lake Taupō catchment. The development can comply with permitted activity rules, with sufficient nitrogen allocation available across the parent titles to enable this approach. Site-specific design will be required at the building consent stage.

The proposed roading network can be constructed to meet Taupō District Council standards, with appropriate provision for vehicle access, walkways, and cycle connections. The layout responds to site topography and minimises earthworks where practicable, while maintaining safe and efficient access throughout the development.

In terms of water supply servicing, the assessment confirms that the existing network does not currently have sufficient capacity to service the full development, particularly under peak demand conditions. Hydraulic modelling identifies pressure and headflow limitations within the Mapara Road and Kaiapo Road network, as well as constraints associated with the Blueridge Reservoir and Cherry

Lane pump station. However, the modelling also demonstrates that these constraints can be addressed through a combination of network upgrades and operational improvements. These include upgrades to existing water mains, potential enlargement of storage capacity, improvements to pump station performance, and staged reticulation extensions within the development. The proposed development will operate on a trickle feed water supply system, supplemented by on-site storage tanks, which reduces peak demand pressures on the network. Subject to these upgrades and the implementation of staged development aligned with infrastructure delivery, an adequate and reliable water supply can be achieved.

The assessment confirms that there are no fundamental servicing constraints that would preclude rezoning, and that water supply issues are manageable through established engineering solutions. Other services, including power and telecommunications, can be extended to the site in accordance with standard practice. Matter of Discretion SUB-R2(c) enables infrastructure requirements to be addressed by conditions of consent.

Overall, the assessment concludes that the site can be appropriately serviced for the proposed residential development. While infrastructure upgrades particularly for water supply are required, these are typical of developments of this scale and can be implemented in a coordinated and staged manner. Accordingly, from an engineering servicing perspective, there are no constraints that would prevent the proposed rezoning and development proceeding.

5.7. Archaeological Effects

An archaeological assessment was undertaken by Ken Phillips in 2025. The assessment evaluates the presence of known archaeological sites, the likelihood of unrecorded sites, and potential effects arising from earthworks associated with development.

Two previously recorded sites were identified within the property; however, these could not be relocated and are considered likely to have been destroyed or significantly modified by past land disturbance activities.

The site has been extensively modified through pastoral use and earthworks, reducing the likelihood of intact subsurface archaeological features remaining. No additional archaeological sites were identified during the field survey.

Based on these findings, the archaeological value of the site is considered low, and the potential for encountering significant archaeological remains during development is also low.

Standard accidental discovery protocols can be implemented, requiring works to cease and appropriate authorities to be notified if material is uncovered as part of conditions of a land use consent for earthworks.

Overall, archaeological effects are assessed as no more than minor.

5.8. Land Contamination Effects

A contaminated site investigation was undertaken by Geohazards Environmental. A contaminated site investigation confirms that the majority of the site is suitable for residential development, with soil contaminants generally within acceptable guideline values and posing no significant risk to human health or the environment.

A single localised area of contamination was identified within a runoff paddock near the stockyards at 37 Kaiapo Road (proposed to be Neighbourhood Shops zoning), where elevated levels of arsenic and lead exceed residential standards. This contamination is confined in extent and is likely associated with historic site activities. All other sampling locations comply with relevant standards.

Exposure pathways across the wider site are incomplete, meaning contaminants do not present a credible risk under normal use. In the affected area, potential risks can be appropriately managed through standard remediation measures.

The impacted area is classified as a "piece of land" under the NES for Contaminated Soil, and further assessment and management (including a remediation or site management plan) will be required at development stage.

With appropriate management, contaminated land effects are minor and do not constrain the proposed rezoning.

6. ATTACHMENT 6 - ENGAGEMENT

Since 2023, communication has been sent to:

Wider Parties	Response
Department of Conservation	Acknowledgement – no prelim issues raised
Waikato Regional Council	Email summary of issues – received list of issues
Taupō DC Asset Managers – Water	Water report provided
Taupō DC Development Engineer	Discussion on key issues
Bike Taupō	Email summary of issues - connection
Ministry of Education	Acknowledgement – no interest in a school
TDC Policy	Several discussions
Neighbours	
Whakaipo 1D Block	No discussion to date – several texts, still discussing
Highland Drive	
Lot 25	Discussions undertaken
104 Highland Drive	Discussions undertaken
Kaiapo Road	
14 Kaiapo Road	Discussions undertaken
22 Kaiapo Road	Discussions undertaken
32 Kaiapo Road - Milvic Equipment Ltd	Discussions undertaken
34 Kaiapo Road – Cosmos Property Ltd	Discussions undertaken

Iwi	
Tūwharetoa Māori Trust Board	Acknowledgement and initial response but no response to request for hui date
Te Kotahitanga O Ngāti Tūwharetoa	As per TMTB
Te Rangiita Marae (Ngāti Ruingarangi)	As per TMTB
Nukuhau Marae	As per TMTB
(Ngāti Rauhoto):	As per TMTB
(Ngāti Te Urunga)	As per TMTB
Raukawa	Acknowledgement, and an in person discussion
Mokai Marae	Requested hui via Raukawa, no response.
Services	
Unison	Acknowledgement

3. ATTACHMENT 3 – ASSESSMENT AGAINST LRZ CRITERIA

3.1.1. Location Relative to Existing LRZ or GRZ / Consistent Existing Development Pattern

The subject land is located immediately adjacent to existing Low Density Residential land and forms a logical continuation of established urban development.

The surrounding development pattern is characterised by large residential allotments, low dwelling densities, detached housing on larger sections consistent with low density residential and rural lifestyle character.

Rezoning would consolidate the urban edge, and avoid dispersed or sporadic development, aligning with the intent of PC44.

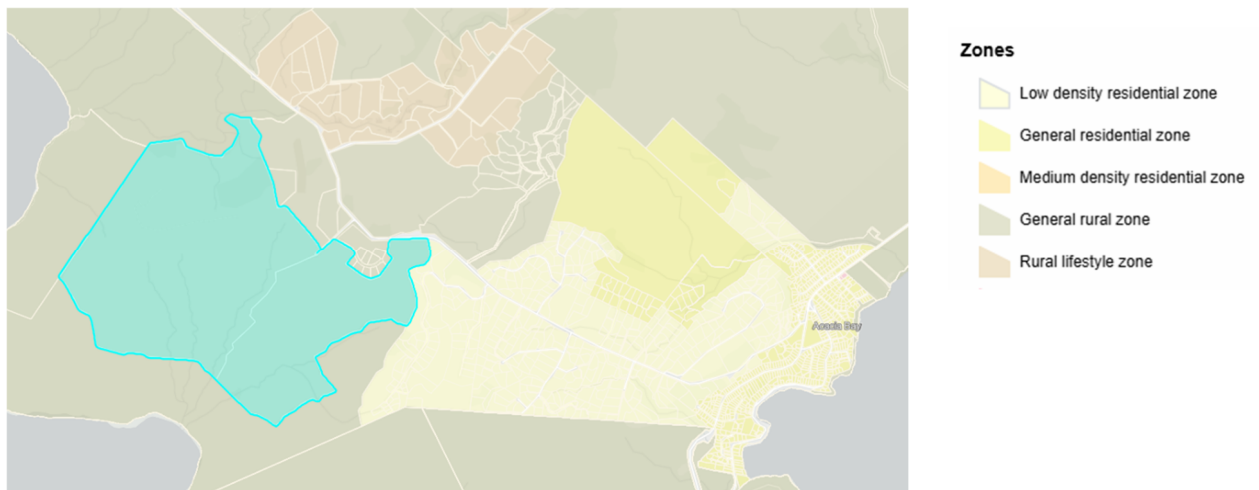


Figure 1: Subject site (Blue) adjoining LRZ

3.1.2. Infrastructure Servicing – Council Water Supply

In terms of water supply servicing, while the existing network does not currently have sufficient capacity to service the full development under peak demand conditions, hydraulic modelling confirms that these constraints can be addressed. Identified limitations within the Mapara Road and Kaiapo Road network, and at the Blueridge Reservoir and Cherry Lane pump station, can be resolved through network upgrades and operational improvements.

The proposed development will utilise a trickle feed system supported by on-site storage, reducing peak demand pressures on the network, and can be staged to align with infrastructure upgrades. Development contributions will be payable to support the necessary upgrades and ensure capacity is provided in a timely and coordinated manner.

Overall, water supply constraints are understood and are able to be resolved through defined upgrades, with staging ensuring capacity is available at each stage of development.

3.1.3. Land Transport Effects

The development of allotments enabled by LRZ zoning would not result in more than minor adverse effects on the supporting land transport network. Access is gained from local roads, not high-order transport corridors. Traffic generation associated with low density residential development is modest and consistent with surrounding residential activity. Any site-specific roading or intersection upgrades can be appropriately addressed at the subdivision stage. This aligns with PC44's effects-based approach to managing transport impacts.

3.1.4. Outstanding Natural Landscape and Significant Natural Areas

The majority of the site (96.5%, 312.45ha) is not identified as an Outstanding Natural Landscape nor as a Significant Natural Area in the Taupō District Plan. There are four small segments (totalling 3.5%, 11.45ha) on the southern and western side of the site subject to Outstanding Natural Landscape which future development can avoid. The overlay is considered to be a mapping anomaly, as the landscape assessment did not identify outstanding natural features or significant natural features within the site.

The rezoning will therefore avoid adverse effects on nationally or regionally significant landscapes or ecological areas, and be consistent with the environmental limits recognised in PC44 and higher-order planning documents.

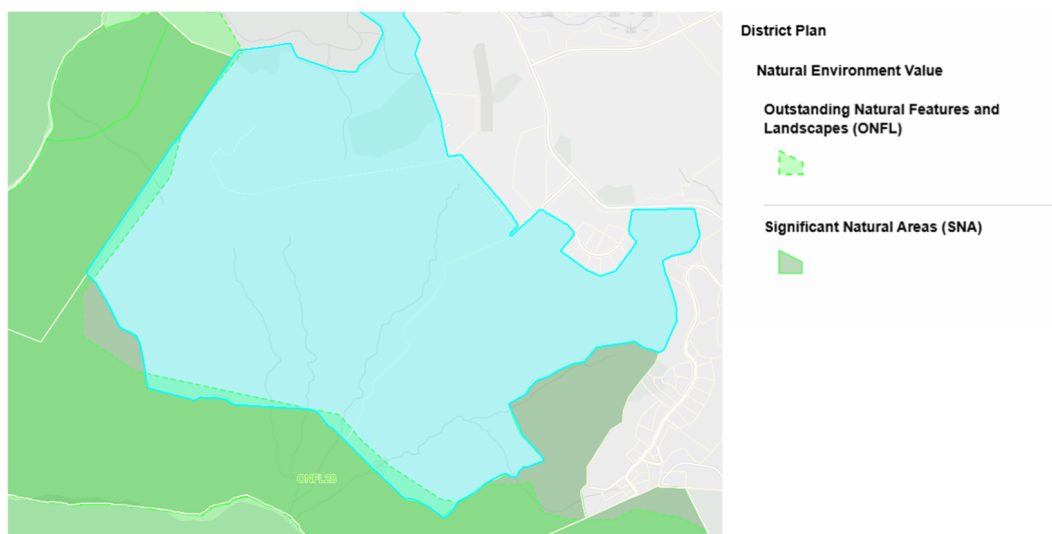


Figure 2: Outstanding Natural Features and Landscapes overlay on the subject site

3.1.5. Proximity to Taupō Township and/or Existing LRZ

The subject land is 10km to the Taupō township and adjoins existing LRZ land, meaning future residents will have reasonable access to employment, education, services, and community facilities. This proximity contributes to a well-functioning urban environment, consistent with the National Policy Statement on Urban Development (NPS- UD).

3.1.6. Access from State Highway

The site does not take direct access from a State Highway. Accordingly, rezoning would avoid reverse sensitivity effects on state highway infrastructure, and align with district-wide objectives relating to the safe and efficient functioning of nationally significant infrastructure.

3.1.7. Geothermal Systems

The land is not located within the Wairakei Tauhara or Ōhāaki Geothermal Systems shown on Map D1. There are therefore no geothermal constraints that would preclude Low Density Residential zoning.

3.1.8. Natural Hazard Risk

The land can be demonstrated to be free of significant natural hazard risk. Any localised or site specific hazard considerations can be identified through LIM and PIM processes, and appropriately managed at subdivision and building consent stages, consistent with the National Policy Statement for Natural Hazards and Council's risk based planning approach.



Contaminated Site Investigation Report

Kaiapo Road, Taupo

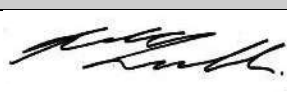
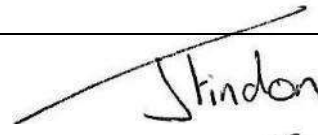
**14 May 2026
Job# 221103 Rev A**

Contaminated Site Investigation Report Kaiapo Road, Taupo

This report has been prepared for Breda Investments Ltd (The Client) by Geohazard Environmental Ltd. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other parties.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

The contents of this report comply with good practice and professional standards. It has been approved for release and signed by a Suitably Qualified and Experienced Practitioner.

Quality Assurance Statement		
Task	Responsibility	Signature
Prepared	Susan McLachlan	
Reviewed	Jonathan Findon	
Approved for issue	Jonathan Findon	

Revision Schedule		
Revision	Reason	Date
Original Report	-	10 May 2023
Revision A	Update for Kaiapo Plan Change 44 Submission	14 May 2026

Prepared by:

Geohazard Environmental Ltd

PO Box 7053

Rotorua 3042

Telephone: 0800 GEOHAZARD (436 429)

Job No.: 221103

E-mail: info@geohazard.co.nz

**Contaminated Site Investigation Report
Kaiapo Road, Taupo
TABLE OF CONTENTS**

EXECUTIVE SUMMARY	1
Recommendations	4
1.0 INTRODUCTION	5
1.1 Background and Objectives	5
1.2 Scope of Work	5
1.3 Limitations	6
2.0 SITE OVERVIEW	7
2.1 Site Identification	7
2.2 History of Site Ownership and Use	8
2.3 Site Owner Information	22
2.4 Previous Investigations	23
2.5 Current and Future Use	23
2.6 Geology and Hydrology	23
2.7 Land Use Capability (LUC)	26
2.8 Climate	27
2.9 Additional Site Information	28
2.10 Summary of Desktop Information	29
3.0 SITE CONDITION AND SURROUNDING ENVIRONMENT	30
3.1 Site Inspection	30
3.2 Conditions at Site Boundaries	30
3.3 Visible Inspection, Signs of Contamination and Odours	30
3.4 Summary of Potential Contamination Risks Identified	47
3.5 Initial Conceptual Site Model	48
4.0 DISPOSITION OF SITE CONTAMINATION	50
4.1 Basis for Soil Contaminants Standards (SCS)	50
4.2 Field Sampling and Analysis	52
4.3 Results	53
4.4 Quality Control	57
5.0 SITE CHARACTERISATION	61
5.1 Type of Environmental Contamination	61
5.2 Extent of Environmental Contamination	61
5.3 Potential for Degradation and Interaction	61
5.4 Additional Risk Assessment	62
5.5 Exposure Routes and Risks to Exposed Populations	63
5.6 NES Consents	66
5.7 Other Consent Requirements	67
6.0 PROPOSED SITE REMEDIATION/MANAGEMENT OPTIONS	68
6.1 Remediation Objectives	68
6.2 Option 1 – Remediation Earthworks	68

6.3	Option 2 - Site Management (Capping)	69
6.4	Option 3 – Soil Mixing	69
6.5	Completion Reporting	70
7.0	CONCLUSIONS AND RECOMMENDATIONS	71
7.1	Summary and Conclusions	71
7.2	Recommendations	74
7.3	Further Client Actions	74
8.0	REFERENCES	75
9.0	STATEMENT OF QUALIFICATION	76
APPENDIX A	Historical Certificates of Title	
APPENDIX B	Sample Location Plan	
APPENDIX C	Laboratory Results	
APPENDIX D	Geohazard Environmental Ltd PSI	
APPENDIX E	Geosciences Ltd DSI	

EXECUTIVE SUMMARY

Breda Investments Ltd (The Client) has commissioned Geohazard Environmental Ltd to prepare a Contaminated Site Investigation (CSI) Report to investigate Kaiapo Road, Taupo for the presence of contaminants. The primary purpose of this is to investigate whether contaminants are present, or more likely than not be present, at levels that would warrant further action prior to a proposed plan change for the proposed mixed use (predominantly rural residential) subdivision.

This report summarises Geohazard Environmental Ltd.'s investigation and has been prepared following the Ministry for the Environment's Guidelines for investigations involving potentially contaminated land (referred to herein as the MfE Guidelines). The report consisted of a desktop study and interviews, to gather information about the site and its history, and a site inspection; this information was used to develop an initial conceptual site model, which identifies potential sources of contamination, pathways for release, and potential effects.

Additionally, for this CSI 34 confirmatory soil samples were collected from 37 Kaiapo Rd. The 57 samples (15 composite samples) collected from 15 Kaiapo Rd (previously part of the site) and the 28 samples (7 composite samples) collected from 40 Kaiapo Rd under previous site investigations are discussed in this report.

The findings reported herein indicate that contaminants are present at **part of** the site at levels that are in excess of relevant soil guideline values for use as a rural residential subdivision.

The presence of any contaminants at site, even at levels that exceed the relevant soil guideline values, does not necessarily mean that an unacceptable human health risk or environmental risk exists. Specific conclusions and recommendations based on findings herein are summarised as follows:

- **Overall, the majority of the site is suitable for a proposed low density residential land use.**
- The site currently supports undeveloped grazing land with a dwelling (40 Kaiapo Rd), woolshed (37 Kaiapo Rd), 2 sets of animal handling yards and auxiliary buildings. It is understood that the site is planned to be subdivided and redeveloped for mixed, predominantly rural-residential use.
- Geohazard Environmental Ltd undertook a Preliminary Site Investigation dated December 2021 (ref.: 211003) for a proposed subdivision site at 15 Kaiapo Rd (Lot 1 DP 337255), this subdivision has now been completed and the residue amalgamated with 37 Kaiapo Rd sometime between 2023 and 2026.
 - Samples were collected on on a 30m grid basis, composited by the laboratory and tested for cadmium.
 - All samples were within SCS guidelines for a rural residential use.
 - The report found that *"The site **is not** considered to be a "Piece of Land" under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply."* And that for the avoidance of doubt, it is highly unlikely the proposed rural-residential use will present a risk to human health.
- Geoscience Ltd Limited Detailed Site Investigation dated February 2022 (ref.: REP-H0180/DSI/FEB22/REV1) for 40 Kaiapo Rd (Lot 1 DP 410435).

- A site investigation identified a small, isolated area impacted by diesel refuelling, the report found that the identified hydrocarbon staining was aesthetic in nature rather than representative of gross contamination.
- Field sampling for cadmium was undertaken, and the results are included in section 4.3.1 of this report. Samples were collected from the paddocks where it was clear uniform application of fertilizers would have occurred and limited to the flat areas where accumulation would occur. The samples were composited by the lab into 7 composite samples comprised of 4 subsamples.
- All samples were within SCS guidelines for a rural residential (and therefore also residential) use.
- The report found that *“The site **is not** considered to be a “Piece of Land” under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply.”* And that for the avoidance of doubt, it is highly unlikely the proposed rural-residential use will present a risk to human health.
- Aerial images indicate that from at least 1945 the site was assumed undeveloped grazing land. By 1967 a dwelling had been constructed on 40 Kaiapo Rd and a woolshed erected on 37 Kaiapo Rd. In 1975 the wider land parcel was leased to a **farmer**. By 1979 stockyards had been constructed adjacent the woolshed on 37 Kaiapo Rd.
- More recent aerial images indicate that by 2008 land disturbance (likely tilling for recontouring) had been undertaken on 37 Kaiapo Rd and that a bush block had been established in the north of 40 Kaiapo Rd. By 2014 a haybarn had been constructed and land disturbance (likely tilling for recontouring) undertaken on 40 Kaiapo Rd.
- The entire site area of c.335ha was viewed from 3 vantage points and a site walkover of the area surrounding the woolshed was undertaken on 8 February 2023. Geohazard Environmental Ltd staff returned to site on 20 February to collect soil samples from the woolshed and stockyard area.
 - The potential for ground contamination from sheep dip and spray race operation and run-off paddocks was confirmed by the presence of stockyards; however, no evidence of a sheep dip was observed.
 - Stockyards and holding pens with a 200-300 litre above ground diesel tank were located 150m west of the eastern boundary of 40 Kaiapo Rd. There was light superficial hydrocarbon staining (c.30m²) around the diesel tank and a test pit dug by Geoscience Ltd Staff during their site investigation on 19 January 2022 found that the impact was superficial and limited to the top 50mm of the soil profile. No evidence of a stock dipping or spray race operations were seen by Geoscience Ltd staff at 40 Kaiapo Rd.
 - There was no evident sign of significant widespread contamination over the remainder of the site. The absence of odour during the site inspection is consistent with there being no obvious indications of gross contamination at the site.
- It is more likely than not that **HAIL A.8: Livestock dip or spray race operations** occurred in the vicinity of the stockyards in the north of 37 Kaiapo Rd (but did not result in significant contamination, refer below). Furthermore, it is also considered more likely than not that **HAIL I: Any land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment** occurred in the vicinity of sample location R01 in the north of 37 Kaiapo Rd. This area of site is considered to be a **“piece of land”** under NES legislation.

Soil Sampling

- 57 surface level soil samples were collected on a 30m grid basis from across the subdivision site of 15 Kaiapo Rd, these were composited by the Laboratory into 15 composite samples and analysis undertaken for cadmium.
 - All samples were within SCS for a rural residential land use.
- 19 surface level soil samples were collected on a 20m grid basis from across the run-off paddocks adjacent the stockyards and woolshed on 37 Kaiapo Rd. The samples were analysed for a suite of metals. Additionally, samples were composited by the Laboratory into 5 composite samples and analysis undertaken for persistent pesticides.
 - Arsenic and lead concentrations in sample R11 exceeded SCS guidelines for a rural residential use.
 - Arsenic, copper, lead and zinc concentrations in sample R11 exceed environmental guidelines and Class A landfill waste acceptance criteria (WAC).
 - All remaining samples were within SCS for a rural residential land use.
- 15 targeted samples were collected from the stockyard and woolshed area of 37 Kaiapo Rd. These samples were analysed for a suite of metals and persistent organochlorine pesticides.
 - All samples were within SCS guidelines for a commercial land use.
- Geoscience Ltd collected 28 samples from 7 paddocks (4 samples per paddock) at 40 Kaiapo Rd where uniform application of fertilisers would have been undertaken, targeting flat areas where accumulation could occur. Samples were composited by the laboratory and analysed for cadmium.
 - All samples were within SCS for a rural residential land use.
- From the data available, it appears that soils within the vicinity of sample location R11 (situated in the run off paddock) are affected by elevated arsenic and lead concentrations above SCS guideline values for a residential land use, these soils are also affected by arsenic, copper, lead and zinc concentrations above environmental guidelines and Class A Landfill WAC.
- The source(s) of the contamination is not confirmed, however the most likely source of elevated arsenic, copper, lead and zinc at sample R11 is considered to be associated with items that may have historically been stored in this location.
- A Remediation Action Plan or Site Management Plan is likely to be required for this very limited area.
- As contaminants are above applicable criteria, it is considered likely that the District Council will require a **Restricted Discretionary Consent** in the piece of land area. This will include provision of a Remediation Action Plan or Site Management Plan, followed by a Validation Report.
- The remaining areas of the site **are not** considered to be a "Piece of Land" under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply.

- For the avoidance of doubt, it is highly unlikely the proposed residential use on the remainder of the site will present a risk to human health.
- Due to the nature of this investigation, it is not possible to detail the full extent of contamination at the site and neighbouring sites, and there remains a possibility that the site may have been impacted by previous site activities to a degree greater than apparent from results reported herein.
- The extent of any contamination at the site beyond the area of focus for this report and neighbouring sites is unknown at this stage.

Recommendations

The advice of a planner should be sought, or contact made with the District and Regional Councils, prior to undertaking any earthworks at the site, to ensure all rules are complied with.

Based on the results of this investigation, the vast majority of the site is suitable for the proposed low density residential use.

Geohazard Environmental Ltd recommend to Breda Investments Ltd that a further assessment of the site be conducted to better constrain the nature, extent, and impact contaminants detected in soil samples taken from the site, in accord with the MfE Guidelines for the Management of Contaminated Land.

It is envisaged that the assessment would comprise of the following:

- Soil sampling at surface and depth in the vicinity of sample location R11, refer to Appendix B drawing No. 002.
- Preparation of a Remediation Action Plan or Site Management Plan.

1.0 INTRODUCTION

1.1 Background and Objectives

Historically, the site at 15, 37 and 46 Kaiapo Road, Taupo has been used for grazing purposes. A zone change is planned to allow for a mixed use (predominantly rural residential) subdivision. Breda Investments Ltd requested that Geohazard Environmental Ltd investigate the site to determine whether environmental contamination might be present. The Client's brief specifically included field testing to enhance confidence in results. The primary deliverable of the work is this Report, which includes conclusions as to the site's disposition with respect to known or potential environmental contamination, and as appropriate, recommended steps needed to ensure that contaminant risk is mitigated for end-users of the site.

1.2 Scope of Work

Consistent with the MfE Guidelines for reports of potentially contaminated land, the following scope of work was undertaken:

- (i) Review of all relevant information, including searching for any previous reports pertaining to 15, 37 and 40 Kaiapo Road, Acacia Bay, Taupō. Sources were as follows:
 - Taupō District Council property file records.
 - Waikato Regional Council property file records.
 - Historical Certificates of Title.
 - Historical aerial images.
 - Geohazard Environmental Ltd Preliminary Site Investigation dated December 2021 (ref.: 211003).
 - Geoscience Ltd Limited Detailed Site Investigation dated February 2022 (ref.: REP-H0180/DSI/FEB22/REV1).
 - Cheal Consultants proposed subdivision plan dated July 2022 (ref.: 220205-SK001).
- (ii) Inspection of the site to assess its present state and any indications of potentially contaminating activities that have taken place historically or are currently occurring at the site.
- (iii) Preparation of this report, which includes all relevant information (collected from above), and complies with relevant reporting guidelines (MfE, 2021). Herein, this report will assess the following:
 - Whether previous and/or current on-site activities had or have the potential to cause on-site contamination.
 - The likely nature of any contamination.
 - The risks to future site users from any contamination.
 - The requirement for further on-site investigations to define the extent of any contamination.

1.3 Limitations

Geohazard Environmental Ltd has performed services for this project in accordance with current professional standards for environmental site assessments. No guarantees are either expressed or implied. This report does not attempt to fulfil the requirements of legal due diligence.

There is no investigation that is thorough enough to preclude the presence of materials at the site that presently, or in the future, may be considered hazardous. As regulatory criteria are subject to change, contaminant concentrations present and considered to be acceptable may, in the future, become subject to different regulatory standards that cause them to become unacceptable for existing or proposed land use activities.

Any recommendations, opinions or findings stated in this report are based on circumstances, facts and regulatory criteria as they existed at the time that Geohazard Environmental Ltd performed the work and on data obtained from the investigations and site observations as detailed in this report. Opinions and judgements expressed in this report, which are based on an understanding and interpretation of current regulatory standards, should not be construed as legal opinions. This report and the information it contains have been prepared solely for the use of Breda Investments Ltd. Any reliance on this report by other parties shall be at such party's own risk. Notwithstanding the above, the report may be used by Local and Regional Authorities for the purposes of their duties under the Local Government Act 2002, with the express permission of The Client.

2.0 SITE OVERVIEW

2.1 Site Identification

The Site is comprised of 3 land parcels located in Kaiapo Road, Acacia Bay, Taupō as listed below. Figure 1 illustrates the general locale of the site. The combined land parcel site is 3,242,720m² (c.324.2ha) in size.

- 37 Kaiapo Road, Acacia Bay, Taupo. The site is listed on Taupō District Council files as Valuation ID: 0738353813. The property is legally described on the Taupo District Council Website as Lot 2 DP 337255 and the Land parcel area is 1,055,531m² in size. It is noted that the LINZ website indicates that this site is legally described as Lot 2 DP 337255 and Lot 12 DP 582081.
- 40 Kaiapo Road, Acacia Bay, Taupo. The site is listed on Taupō District Council files as Valuation ID: 0738354102. The property is legally described as Lot 1 DP 410435. The land parcel site is 2,187,189m² (c.218.7ha) in size.

In this report, reference to the site constitutes the three land parcels.



Figure 1: Map View of the Site Location in Relation to Taupō.

In Figure 2, the area located inside the red box is the site under investigation, the yellow lines indicate the proposed Neighbourhood Centre zone, and the cyan lines indicate the natural hazard areas.

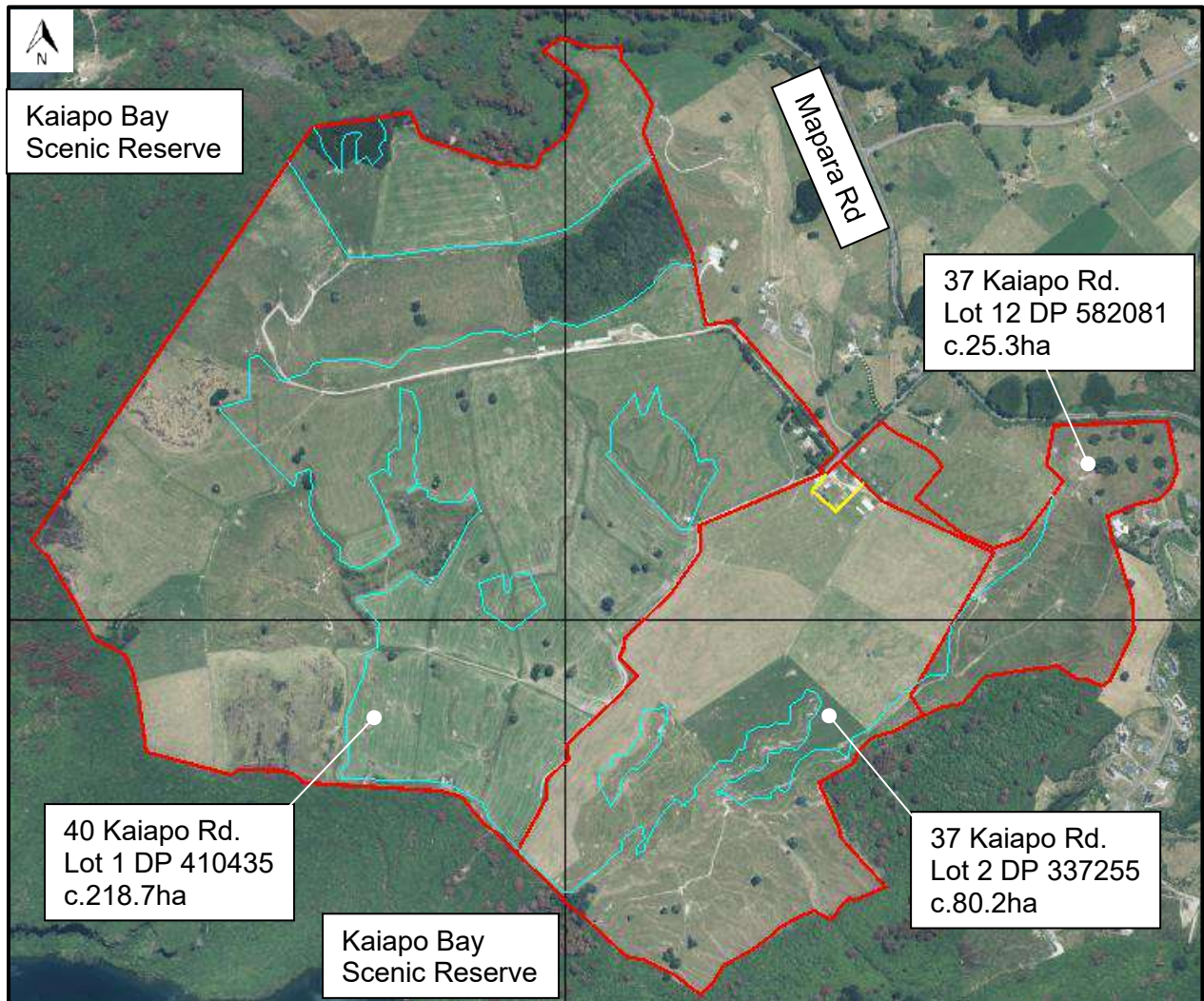


Figure 2: The Site at 37 Kaiapo Rd (Lot 2 DP337255 and Lot 12 DP582081) and 40 Kaiapo Rd (Lot 1 DP410435), Acacia Bay, Taupō.

2.2 History of Site Ownership and Use

The site history is reviewed to give an indication of potential contaminants at the site. This includes review of past ownership, council file review, historical photo review, and where possible discussions with occupiers. Hazardous Activities and Industries List (HAIL) codes are given where appropriate.

2.2.1 Historical Certificates of Title

Historical Certificates of Title (CT) are used to give an indication of the occupation of landowners. Whilst not definitive that an activity did occur, in many cases it can be reasonably assumed that the owner's occupation correlated with site use. This report uses the terminology "(?)" to indicate if text is unclear or illegible.

It is noted that since the initial CSI was issued in May 2023, this property has been subdivided and part amalgamated with 37 Kaiapo Rd, the updated Certificates of Title #

1087741 had not been received at the time of this revision and thus this section of the report has not been updated and still includes reference to 15 Kaiapo Rd.

DPL (Deferred Payment Licence) 20D/673 for Part Section 9 Block IV Tuhingamata East Survey District (214.7869ha) was issued on 13 March 1975 between Her Majesty the Queen and John Alan Johnson (**farmer**) and Ailsa Elizabeth Johnson. The Lessee agrees that for the purpose of soil conservation to keep certain areas (defined by the Lessor & Waikato Valley Authority) free from grazing and noxious weeds and to carry out further planting of trees as deemed necessary and to allow access to these areas to enable remedial soil conservation measures. A statutory land Charge under the Rural Housing Act 1939 was entered on 17 August 1976. Under Sec 25(1)(a) State-Owned Enterprises Act 1986 **Landcorp Investments Limited** is registered as the licensor on 7 March 1990. Fee simple was acquired and CT 45C/870 was issued. The property is subject to:

- Section 3 Petroleum Act 1937
- Section 8 Atomic Energy Act 1945
- Section 3 Geothermal Energy Act 1953
- Sections 6 & 8 Mining Act 1971
- Sections 5 & 261 Coal Mines Act 1979

CT 45C/870 was issued on 7 March 1990 for Part Section 9 Block IV Tuhingamata East Survey District (214.7869ha) to Landcorp Investments Limited. This was subsequently subdivided on 07 March 1990 and CT45C/871 for Lot 1 DPS 52742 (later Lot 1 DP 410435) was issued to **Stockdove Holdings Ltd** and CT45C/875 for the residue was transferred to John Alan Johnson (**farmer**) and Ailsa Elizabeth Johnson with equal shares.

CT SA45C/872 for Part Section 9 Block IV Tuhingamata East Survey District (150.9019ha) was issued on 7 March 1990 to John Alan Johnson (**farmer**) and Ailsa Elizabeth Johnson with equal shares. This was subdivided on 7 May 1993 and CT 52B/110 issued for Lot 1 DPS 64757 and CT 52/111 issued for the residue.

CT SA52B/111 for Part Section 9 Block IV Tuhingamata East Survey District (115.8037ha) was issued on 7 May 1993 to John Alan Johnson (**farmer**) and Ailsa Elizabeth Johnson with equal shares. John Alan Johnson share was transferred to Ailsa Elizabeth Johnson and James Sinclair Veitch on 19 February 2001. This was transferred to Colin Alfred Carran and Patricia Anne Carran on 26 April 2004 and then subdivided on 24 April 2007 when CT152831 (Lot 1 DP 337255) and CT152832 (Lot 2 DP 337255) were issued. The property became subject to the Section 232 Resource Management Act 1991 on 9 September 2003.

15 Kaiapo Road

CT152831 was issued 24th April 2007 and lists Kaiapo Bay Limited as Proprietors, this was transferred to Breda Investments Ltd on 30 June 2021.

- Easement Instruction 847525.1 to convey electricity was created 28.04.2010.

37 Kaiapo Road

The documents available for the site indicate that CT 152832 for Lot 2 DP 337255 was issued 24th April 2007 and lists Kaiapo Bay Limited as Proprietors.

- Easement Instruction 847525.1 to convey electricity was created 28.04.2010.

40 Kaiapo Road

The titles for the current boundaries formed by a subdivision of Lot 2 DP 52707 and Lot 1 DP 5244742 were issued on 20 February 2009. The original registered owners are listed as Kaipō Yuki Company. This was transferred to E.F. Deadman Limited on 13 March 2009.

- Easement Certificate H937516.10 to convey water and electricity was created 7 March 1990.
- Easement Certificate H937516.10 for a right of way was created 7 March 1990.

2.2.2 Taupō District Council Files

An updated Property file had not been received at the time of writing this report, thus this section has not been updated since the original report.

15 & 37 Kaiapo Road

A Controlled Activity consent was issued on 9 July 2004 for a proposed subdivision was applied for, this involved parts of both Lot 1 and Lot 2 of DP 337255. All conditions of the subdivision were certified as being complete on 8 August 2009. The subdivision consent conditions 6-9 were cancelled in 2005.

In February 2008 a Code of Compliance Certificate was issued for building consent 050712 for a bathroom extension and alteration for a building constructed in 1970.

In August 2015 a 5-year extension on the lapse date of the subdivision Resource Consent RM100167A to November 2020 was granted.

In November 2010 Subdivision consent was granted for 11 new lots from 2 existing lots (ref.: RM100167).

In May 2018 an application for Land use and subdivision consent for a non-complying subdivision was lodged. This application was declined on 30 January 2019. An appeal against this decision was lodged with the Environment Court on 15 February 2019, the appeal was withdrawn on 24 April 2019.

In October 2019 an application for Resource Consent for a rural residential subdivision on 15 and 37 Kaiapo Road (Lots 1 and 2 DP 337255) was lodge by Boffa Miskell. The application included an assessment of Environmental Effects for the Kaiapo Bay Cluster Area Subdivision prepared by Boffa Miskell was lodged.

In May 2020 subdivision Consent RM190302 was approved.

40 Kaiapo Road

A review of the property file conducted by Geosciences Limited for their 11 February 2022 DSI found that the property file contained several resource consent applications for subdivision dated in 1988, 2007 and 2011 with only the 1988 application realised to create a 'rural retirement block.'

The 1988 application detailed the parent lot being used for raising deer, goat, sheep and beef, with a woolshed and rural farm airstrip located within the parent lot.

2.2.3 Waikato Regional Council Files

An updated file from WRC had not been received at the time of writing this report., however, no new information is expected.

In an email dated 7 February 2023 regarding the 15, 37 and 40 Kaiapo Road, The Waikato regional Council states "*The green point above (LUI12383) appears on the Land Use Information Register with a classification of 'Unverified HAIL' due to past and current land use for HAIL activity 'A8. Livestock dip or spray race operations' associated with a potential sheep dip.*" This point is shown as being located in the north of 37 Kaiapo Road in the vicinity of the woolshed and stockyards.

15 Kaiapo Road

The Waikato Regional Council noted in an email dated 9.11.2021 that:

*"I can confirm that this property **does not** currently appear on the Land Use Information Register".*

37 Kaiapo Road

The Waikato Regional Council noted in an email dated 30 November 2022 that they "can confirm that this site **does** appear on the Land Information Register....as LUI12383"

LUI12383 is listed with a potential Hazardous Activities and Industry List (HAIL) of **HAIL A.8: Livestock dip or spray race operations** and a classification of "Unverified HAIL".

40 Kaiapo Road

40 Kaiapo Road is not specifically mentioned in any email received by Geohazard Environmental Ltd from The Waikato Regional Council in regard to the Land Use Information Register.

The Waikato Regional Council shows the following Resource Consents within 500m of the site:

15 Kaiapo Road

On site:

- Land Use Consent 124585.01.04 to "Use land within the Lake Taupo Catchment for nitrogen leaching activities" was issued on 8 June 2012 with an expiry date of 31 July 2036. A review of this consent was lodged on 06 November 2020, however no decision has been made, the decision was due on 17 May 2021.

Nearby:

- Discharge Permit 133881.01.01 to "discharge secondary treated domestic wastewater to ground from an advanced wastewater treatment system at 45 Highland Drive, Acacia Bay, Taupo." This was issued on 1 October 2014 with an expiry date of 30 September 2029. This is located c.300m southeast of the east boundary of 15 Kaiapo Rd.
- Land Use Consent 120302.01.01 "Discharge reduced nitrogen between 2 proposed new lots as part of the subdivision of 8580m² property. (4.8kgN/ha/yr per lot)." This was issued on 4 November 2009 with an expiry date of 1 July 2034. This is located c.315m east of the east boundary of 15 Kaiapo Rd.

37 Kaiapo Road

Nearby:

- Discharge Permit 140509.01.02 to "discharge up to 20,500 litres per day of treated domestic effluent to land in the Lake Taupo catchment in association with Stage III of the Grandview Estate subdivision." This was issued on 27 May 2019 with an expiry of 31 May 2039. This is located c.300m east of the east boundary of 37 Kaiapo Rd.
- Discharge Permit 140721.06.01 to "discharge of treated domestic wastewater to land, Lot 31, approximately 2470m², 159 & 161 Highland Drive, Acacia Bay, Taupo." This was issued on 16 September 2019 with an expiry of 16 September 2039. This is located c.430m east of the east boundary of 37 Kaiapo Rd.
- Discharge Permit 140721.05.01 to "discharge of treated domestic wastewater to land, Lot 310 approximately 2510m², 159 & 161 Highland Drive, Acacia Bay, Taupo." This was issued on 16 September 2019 with an expiry of 16 September 2039. This is located c.470m east of the east boundary of 37 Kaiapo Rd.

40 Kaiapo Road

On site:

- Land Use Consent 124174.01.03 to “Nitrogen Leaching Farming Activities within the Lake Taupo Catchment” was issued on 8 February 2012 with an expiry date of 31 July 2036.
- Land Use Consent application APP145363 was lodge on 13 January 2023 for “Earthworks exceeding 3m within a High-Risk Erosion Area to construct public and private roads for a 39 lot subdivision” A decision is due on 15 February 2023.

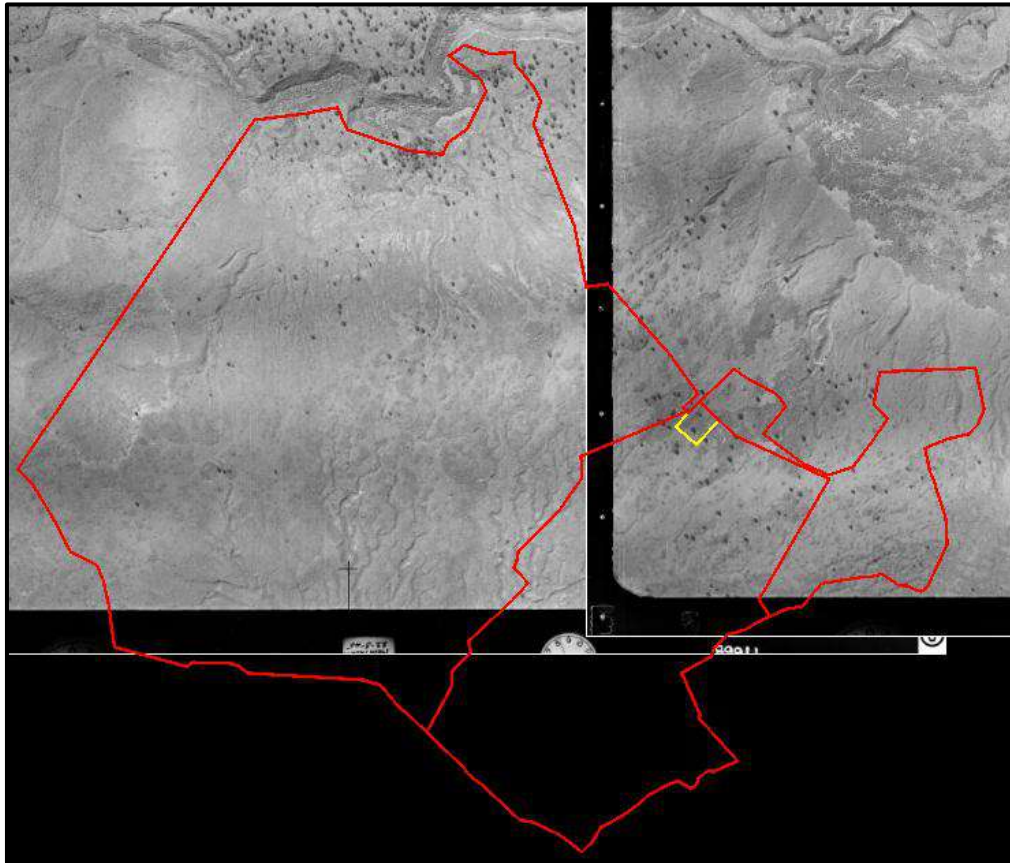
Nearby:

- Land Use Consent 970936.01.01 to “Construct a bridge over the Mapara Stream” was issued on 21 July 1997 with an expiry date of 1 July 2032. This is located c.480m northwest of the north boundary of 40 Kaiapo Rd

2.2.4 Historical Aerial Images

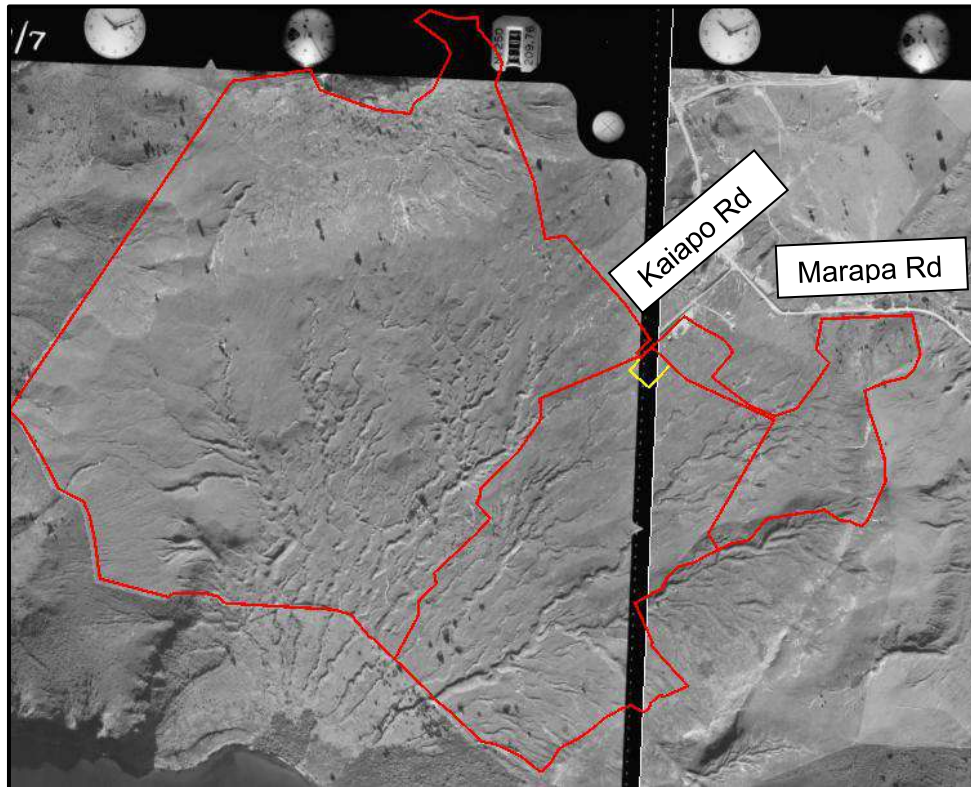
Aerial images are reviewed to present a snapshot in time and give an indication of what activities may have been undertaken at the site.

The aerial images dated 22 March 1945 (below) do not show the south of the site, however they do indicate that the remainder of the site does not contain any structures and Kaiapo and Mapara roads have not yet been constructed. The north of the site is marked by a river channel running from east to west towards Lake Taupō and a dendritic network of flow paths covers the south of 40 Kaiapo Road. The west and north of 37 Kaiapo Road appear to contain some scrub cover. A fault scarp with gully erosion is visible to the north of 37 Kaiapo Road.

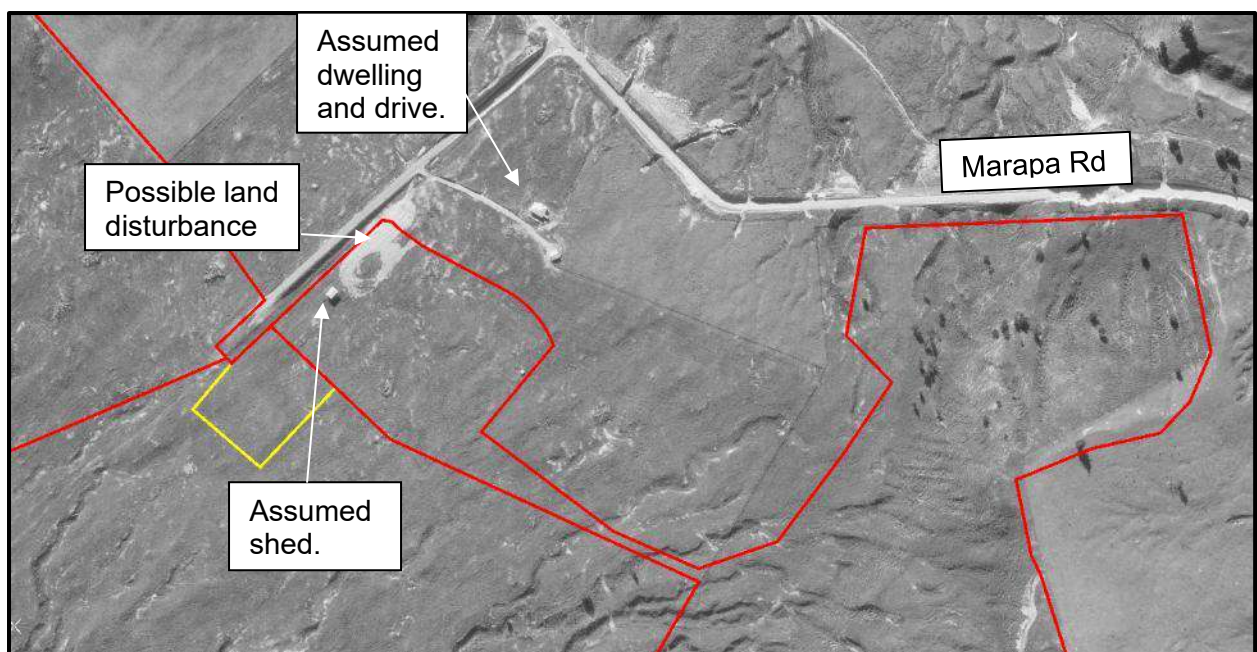


Historical Aerial Image 1: 1945 (Image Ref.:SN178 1084/79 and 81, Courtesy of Retrolens)

The aerial image dated 23 April 1963 indicates that Kaiapo and Mapara Roads have been established to the north of the site. Overland flow paths appear more deeply incised and run generally from north to south towards Lake Taupō. Fence lines and the clearance of scrub indicate that the site is now used for pastoral farming. Land disturbance has occurred and a structure assumed to be a shed is now present in the north of the 37 Kaiapo Road land parcel. Drive access to the neighbouring 15 Kaiapo Road is now present from Kaiapo Rd, and a structure assumed to be a dwelling is present in the north of the site.



Historical Aerial Image 2: 1963 (Image Ref.:SN1394 3192/7 and 9, Courtesy of Retrolens)

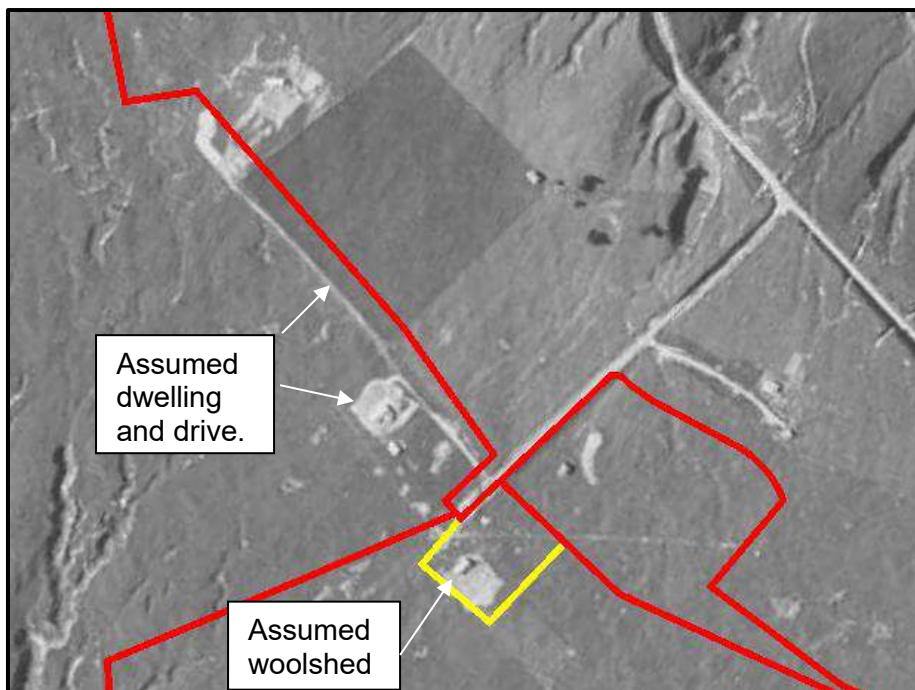


Historical Aerial Image 3: 1963 (Image Ref.:SN1394 3192/9, Courtesy of Retrolens)

The aerial image dated 25 October 1967 indicates that a drive has been established along the northeast boundary of 40 Kaiapo Rd from Kaiapo Rd. A structure assumed to be a dwelling is present in the northeast corner of 40 Kaiapo Rd (**HAIL E.1 and HAIL I**) and an assumed woolshed is present in the northern corner of 37 Kaiapo Rd (potential **HAIL A.8**). The south and west boundaries appear to retain bush cover and an escarpment is visible in the north and east.

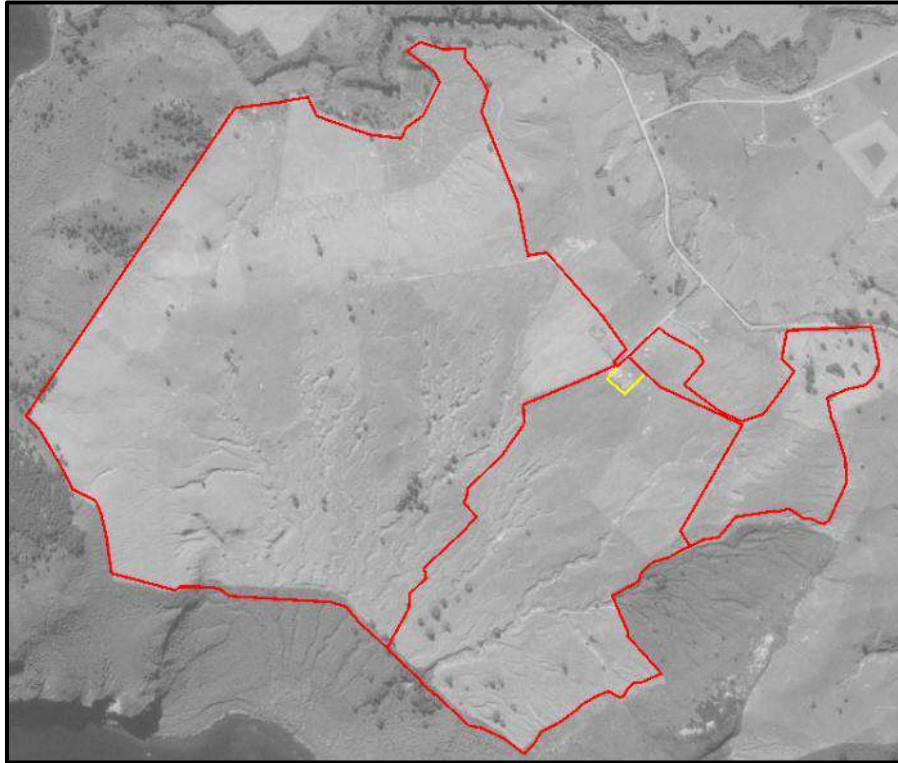


Historical Aerial Image 4: 1967 (Image Ref.:SN3005 E/1, Courtesy of Retrolens)

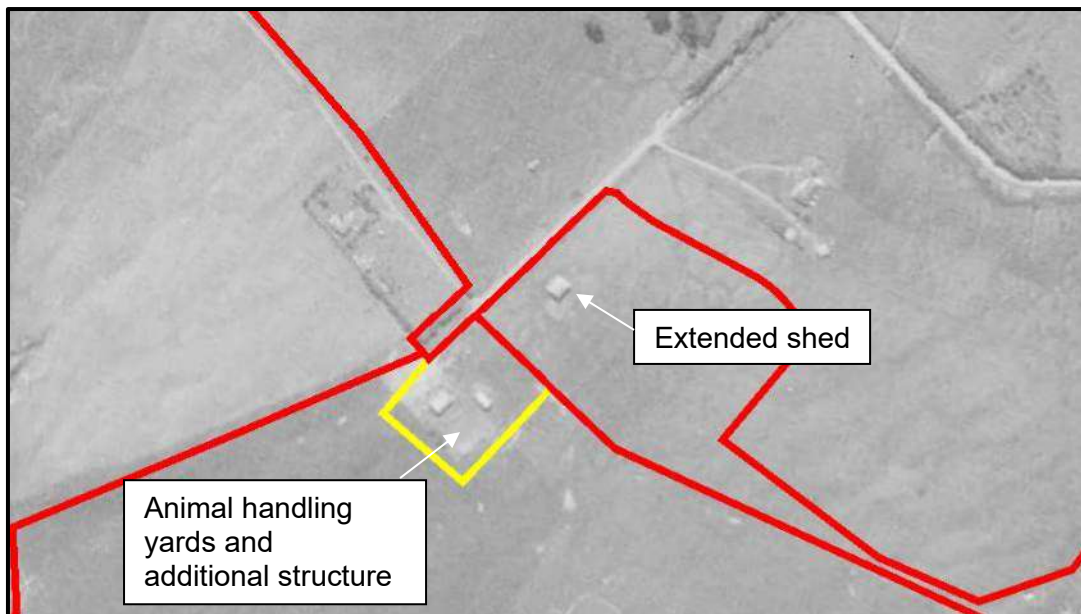


Historical Aerial Image 5: 1967 (Image Ref.:SN3005 E/1, Courtesy of Retrolens)

The aerial image dated 14 April 1979 show that the assumed shed on 37 Kaiapo Rd has been extended and that a structure (possible garage/shed) has been constructed in the curtilage of the dwelling (**HAIL E.1** and **HAIL I**). Animal handling yards (potential **HAIL A.8**) and an additional structure have been constructed in the vicinity of the assumed woolshed in the north of 37 Kaiapo Rd. Trees and bush have begun to be established along the eastern, western and southern boundaries.

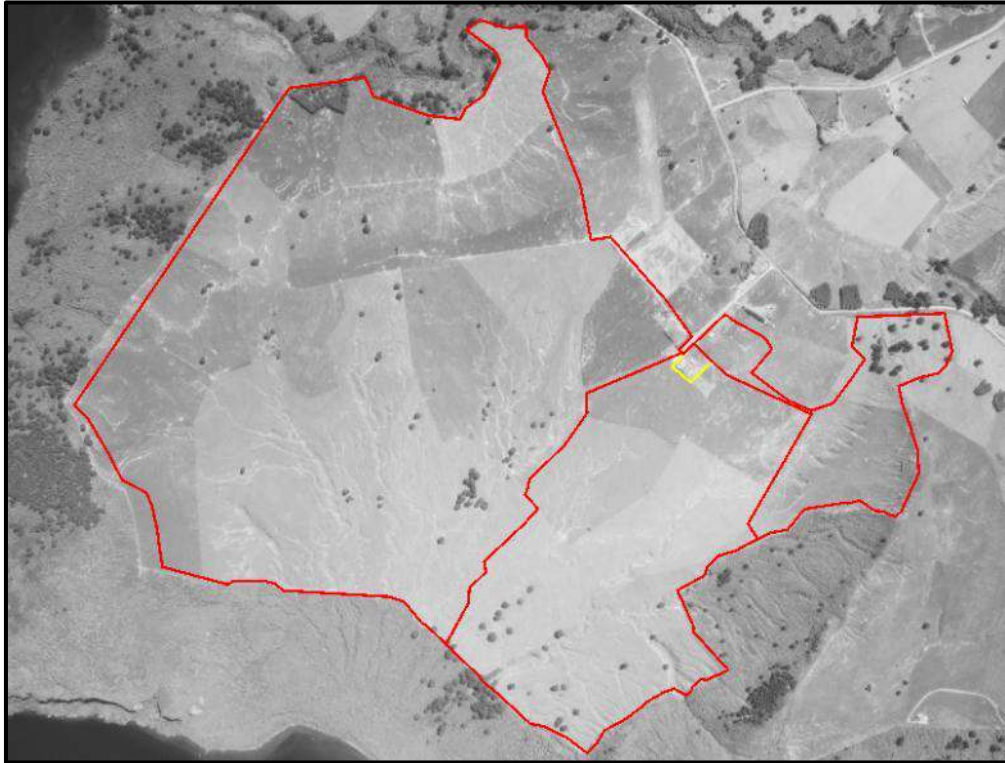


Historical Aerial Image 6: 1979 (Image Ref.:SN5410 D/2, Courtesy of Retrolens)



Historical Aerial Image 7: 1979 (Image Ref.:SN5410 D/2, Courtesy of Retrolens)

The aerial image dated 21 November 1986 indicates that the site has likely been resown. A farm track now extends across the north of 40 Kaiapo Rd.



Historical Aerial Image 8: 1986 (Image Ref.:SN8687 B/14, Courtesy of Retrolens)



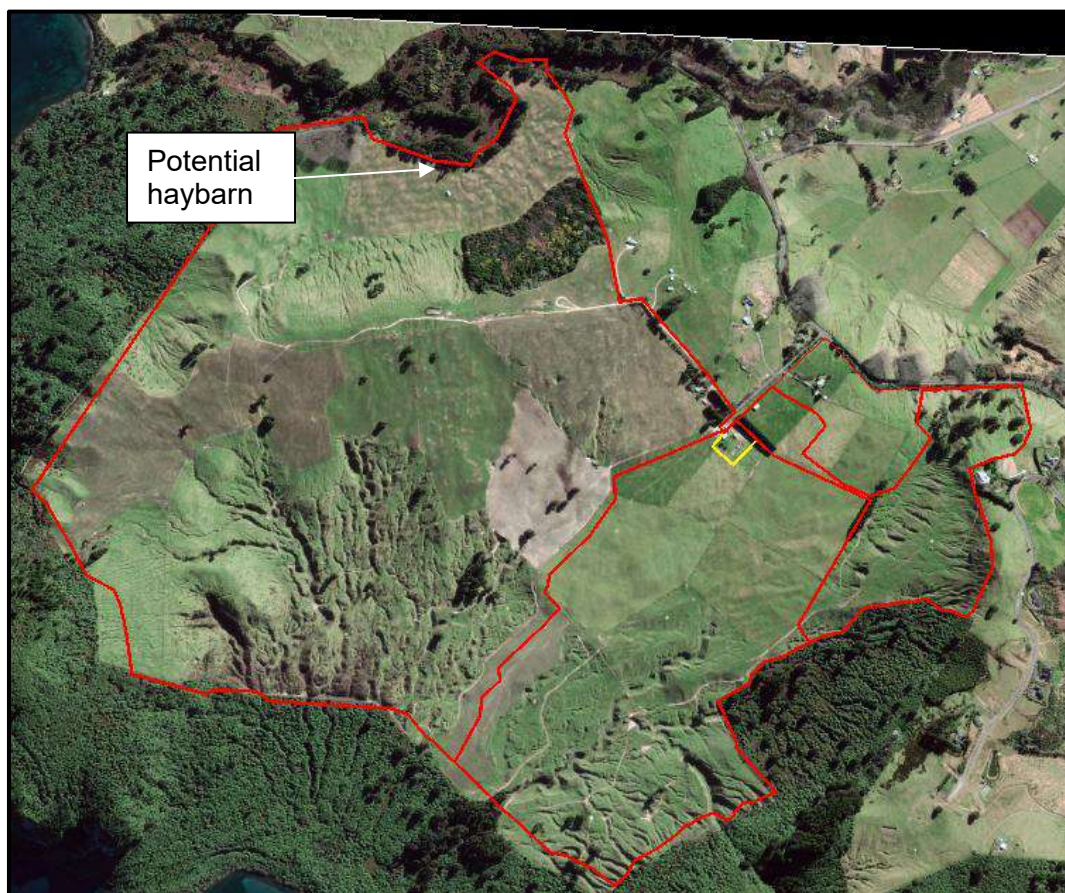
Historical Aerial Image 9: 1986 (Image Ref.:SN8687 B/14, Courtesy of Retrolens)

The aerial image dated January 2008 indicates that an area in the north of 40 Kaiapo Rd has been established in scrub or bush. Land disturbance (likely recontouring) has occurred along the western boundary of 37 Kaiapo Rd. A portion of the eastern boundary of the site is now bush clad.



Historical Aerial Image 10: 2008 (Image Courtesy of Google Earth Pro)

The aerial image dated August 2014 indicates that the site remains predominantly in pasture. The land disturbance in along the western boundary of 37 Kaiapo rd. has been established in pasture. An area adjacent the east boundary of 40 Kaiapo Rd appears to have been cleared. A potential haybarn is now located north of the centre of 40 Kaiapo Rd and an assumed silage pit and stockyards have been erected adjacent the farm track. Kaiapo Bay Scenic Reserve is now well established along the eastern, western, and southern boundaries.



Historical Aerial Image 11: 2014 (Image Courtesy of Google Earth Pro)



Historical Aerial Image 12: 2014 (Image Courtesy of Google Earth Pro)

The aerial image dated February 2022 shows that the overland flow routes are less obvious in the south of 40 Kaiapo Rd and that potentially earthworks have been undertaken since the previous image.

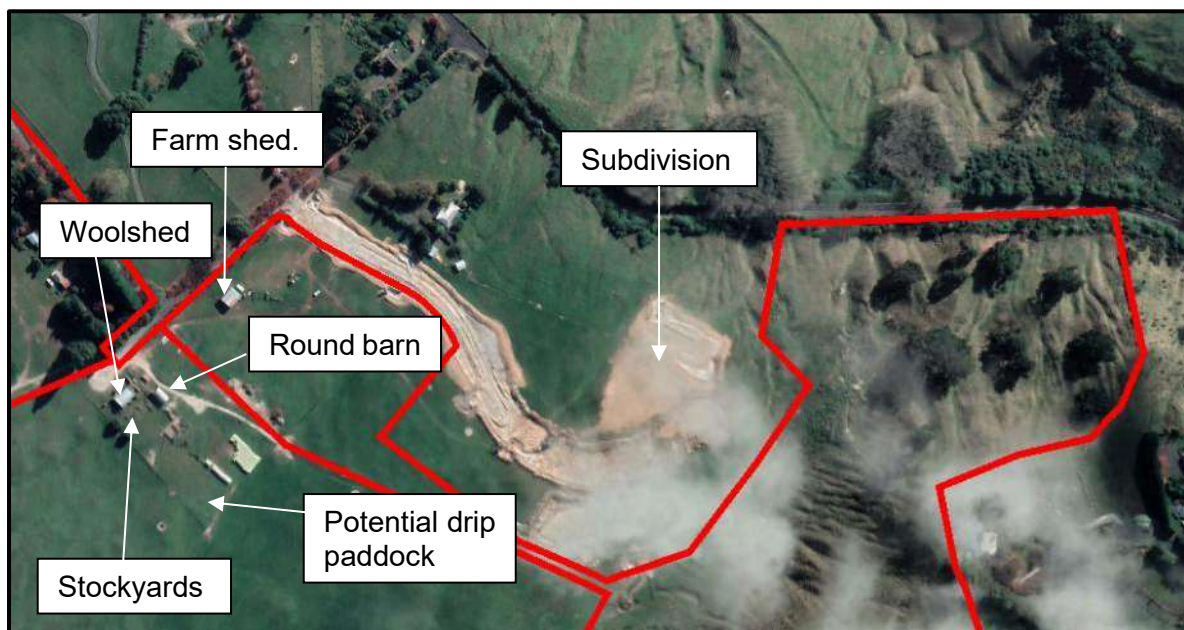


Historical Aerial Image 13: February 2022 (Image Courtesy of Google Earth Pro)

Although there is cloud cover in the aerial image dated May 2022 no significant changes on 37 and 40 Kaiapo Road appear to have occurred. A subdivision has begun north of 37 Kaiapo Rd.



Historical Aerial Image 14: May 2022 (Image Courtesy of Google Earth Pro)



Historical Aerial Image 15: May 2022 (Image Courtesy of Google Earth Pro)

2.3 Site Owner Information

The landowner provided information regarding the fertiliser regime for the Geohazard Environmental Ltd PSI dated December 2021. On average, 200 to 250kg/ha per year is applied to site soils. The last application was Balance “Special Mix”, with 23-29% phosphorus. In New Zealand, phosphate fertilisers are regarded as the dominant source of anthropogenic cadmium on farmed land, and the main reason for accumulation of this metal.

40 Kaiapo Rd

During a site inspection undertaken by Geoscience Ltd meet with the current owner Mr Stuart Deadman, who provided further information regarding the site history.

- Mr Deadman leased the site from an overseas owner in 1998 and then purchased the property in 2008. Prior to the overseas ownership it is understood that the land was part of a larger Land and Survey Government block under a leasehold framework. The block was subdivided to form the current boundaries.
- Since 1998 it has been used for cut and carry feedstock production and beef cattle.
- 800kg/ha of Serpentine 25k fertilizer has been applied annually to suitable parts of the site (typically the gently sloping and contoured areas). All application have been undertaken by a contract and supply and thus no stockpiles have been formed on site since 1998.
- The stockyards were constructed in 2010 and although contouring (tilling) undertaken as seen in aerial images from 2008 no fill was brought onto site.
- No farm dump locations or current or historic potential soil contaminating activities on site are known to Mr Deadman.
- No Groundwater bores are on site, all stock and domestic water is sourced from the local municipal supply. Although a historical bore was noted on the southern boundary it could not be located during discussions or site inspections and was assumed to be either on the adjoining property or overgrown.
- The current dwelling is occupied by the farm manager and this was to be retained in the subdivision.

Stuart Deadman reaffirmed much of this during a meeting with Geohazard Environmental Ltd staff on 08 February 2023. He added that:

- Contouring for cut and carry cropping (swede and lucerne) had taken place over the past c.30years.
- He has no knowledge of a potential sheep dip on site and that any sheep dip on the property was likely a portable one.

2.4 Previous Investigations

Geohazard Environmental Ltd undertook a Preliminary Site Investigation dated December 2021 (ref.: 211003) for 15 Kaiapo Rd (Lot 1 DP 337255).

- Field sampling for cadmium was undertaken on a 30m grid basis across the proposed subdivision site at the time of writing the report, samples were composited by the laboratory and the results are included in section 4.3.1 of this report. The composites are representative of the two different soil type present on the subdivision site.
- The report found that *"The site is not considered to be a "Piece of Land" under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply."* And that for the avoidance of doubt, it is highly unlikely the proposed rural-residential use will present a risk to human health.

Geoscience Ltd Limited Detailed Site Investigation dated February 2022 (ref.: REP-H0180/DSI/FEB22/REV1) for 40 Kaiapo Rd (Lot 1 DP 410435).

- A site investigation identified a small isolated area impacted by diesel refuelling, the report found that the identified hydrocarbon staining was aesthetic in nature rather than representative of gross contamination.
- Field sampling for cadmium was undertaken for this report and the results are included in section 4.3.1 of this report. Samples were collected from the paddocks where it was clear uniform application of fertilizers would have occurred and limited to the flat areas where accumulation would occur. The samples were composited by the lab into 7 composite samples comprised of 4 subsamples.
- The report found that *"The site is not considered to be a "Piece of Land" under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply."* And that for the avoidance of doubt, it is highly unlikely the proposed rural-residential use will present a risk to human health.

2.5 Current and Future Use

The site currently supports undeveloped grazing land with a woolshed (37 Kaiapo Rd), 2 sets of animal handling yards and auxiliary buildings. It is understood that the site is planned to be subdivided and redeveloped for mixed, predominantly rural-residential use.

2.6 Geology and Hydrology

2.6.1 Geology

The geology of the site is mapped by GNS as 4 geological units:

- The majority of the site is mapped as Oruanui Formation Ignimbrite (Taupo group) of Taupo Volcanic Centre from the Late Pleistocene (0.027Ma) and described as *"Non-welded ignimbrite and phreatomagmatic fall deposits, and reworked ignimbrite."*
- The north of 15 Kaiapo Rd (Lot 1 DP 337255) east of the fault zone is mapped as OIS6-OIS4 (Middle – Late Pleistocene) lake deposits and described as *"Lacustrine pumice-bearing sandy or clayey silt"*.

- The south of 15 Kaiapo Rd (Lot 1 DP 337255) east of the fault zone is mapped as undifferentiated Taupo Group Middle Pleistocene rhyolite of Taupo Volcanic Centre and described as “*rhyolite lava variably with lesser pumice and breccia as a carapace*”.
- The south of 37 Kaiapo Rd (Lot 2 DP 337255) and the southwest and northwest of 40 Kaiapo Rd (Lot 1 DP 410435) is mapped as Taupō Pumice Formation of Taupō Volcanic Centre from the Holocene and is described as “*Primary, non-welded ignimbrite and reworked deposits from the 181 AD Taupo eruption; very low density pumice.*”

GNS indicates that the site is situated between faults which are part of the north-northeast trending Taupō Fault Belt (TFB), the nearest of these faults are:

- The Kaiapo Fault which is an active normal fault which crosses the east of 15 Kaiapo Rd (Lot 1 DP 337255) and follows the eastern boundary of 37 Kaiapo Rd (Lot 2 DP 337255).
- The Waikaipo Fault which is an active normal fault located c.750m northwest of the northern boundary of 40 Kaiapo Rd (Lot 1 DP 410435).

2.6.2 Topography

The topography of the site forms a ridgeline at c.500m above sea level (asl) which curves from the northeast to the southwest of the site around a depression which falls towards Lake Taupō, dropping to a height of c. 390m asl at the southern boundary c.1km distant. To the north of the ridgeline the land slopes down to c.400m at the northern boundary c.600m distant. Beyond the southwest corner the land rises steeply to a high point c.640m asl. In the northeast and east of 15 Kaiapo Rd the Marapa Escarpment slopes down towards the west at angles of up to c.30°. Beyond the eastern site boundary, the land rises steeply to a high point of c.640m.

2.6.3 Soils

The dominant soil at site is mapped on Landcare Research S-map site as being Mangatepopo_8a.1 of the Mangatepopo family with an area in the north of the site (40 Kaiapo Rd) being mapped as Orua_12a.1 of the Orua family. These are both Podzolic Orthic Pumice Soil, these well drained soils are capable of storing large amounts of water are sandy or gravelly soils dominated by pumice or pumice sand with a high glass content. The Mangatepopo_8a.1 topsoil typically has a loam texture and are moderately stony with a sandy subsoil. The Orua_12a.1 topsoil typically has a loam texture and are stoneless with a sandy subsoil.

An area in the south of the site is mapped on Landcare Research S-map site as being Taupō_27b.2 of the Taupō family. This is an Immature Orthic Pumice Soil, these well drained soils are capable of storing large amounts of water are sandy or gravelly soils dominated by pumice or pumice sand with a high glass content. The Taupō_27b.2 topsoil typically has a sand texture and is moderately stony with a sandy subsoil.

2.6.4 Hydrology

The site is within the Lake Taupō and surrounds catchment management zone.

Lake Taupō is located c.430m southwest of the southern site boundary and c.520m west of the western site boundary. Marapa Stream flows along the northern boundary of 40 Kaiapo Rd (Lot 1 DP 410 435) and into Lake Taupō at Whakaipo Bay.

The site drains via overland flow and soakage. Overland flow follows the contours of the site forming a dendritic network as it flows south of the ridgeline into Lake Taupō and north into Marapa Stream.

In Figure 3 below the red lines indicate the site boundaries, the dark blue lines indicate overland flow paths and the orange lines are contour lines.



Figure 3: Site Contours and Flow Paths (image courtesy of Waikato Regional Council GIS).

Although there are no groundwater abstraction bores recorded as being on site a bore was observed (now abandoned) during a site visit undertaken for the Geohazard Environmental PSI dated December 2021. The nearest groundwater abstraction bores are:

- Well No. 72-1010 is located c.670m northeast of the site, the bore is shown on the Waikato Regional GIS system as being 8m deep and drilled in December 2001.
- Well No. 68-252 is located c.1km east of the site, the bore is shown on the Waikato Regional GIS system as being 88m deep and drilled in January 1994.
- Well No. 68-1002 has no details recorded against it.

2.6.5 Hazards

The Waikato Regional Hazards Portal indicates Fault Avoidance Zones associated with 37 Kaiapo Rd.

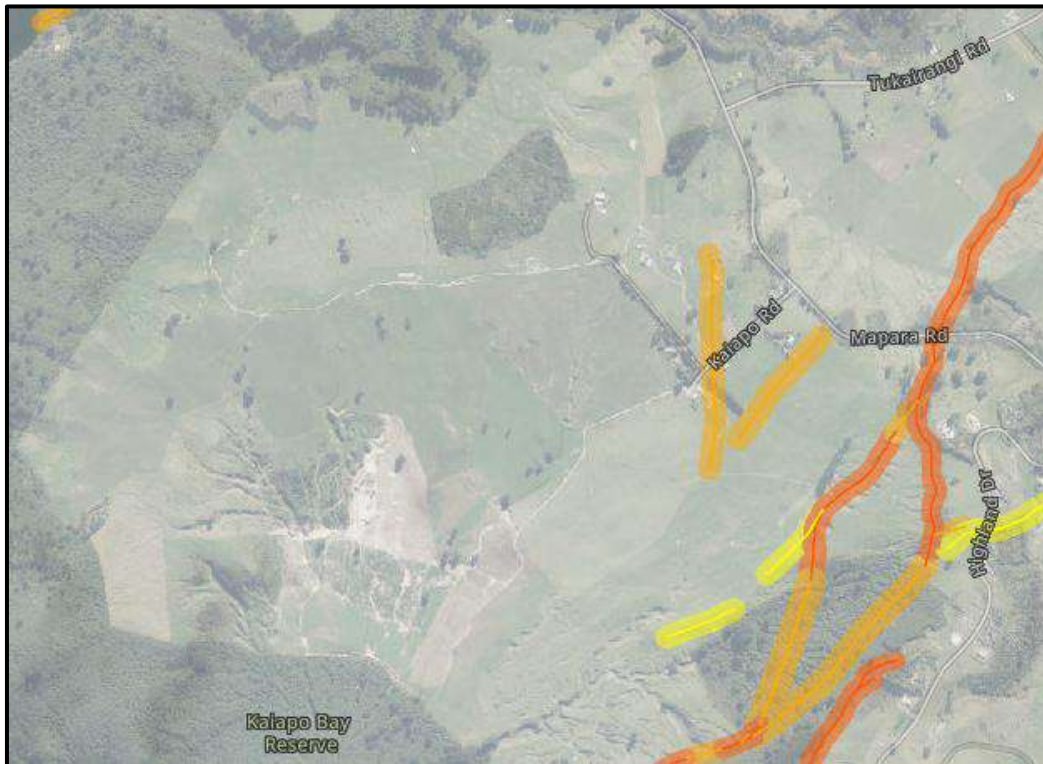


Figure 4: Fault Avoidance Zones (image courtesy of Waikato Regional Council GIS).

2.7 Land Use Capability (LUC)

The Land Use Capability (LUC) Classification is defined as a “*systematic arrangement of different kinds of land according to those properties that determine its capacity for long-term sustained production.*” This assessment is based on the Land resource Inventory (LRI) and is an assessment of 5 physical factors critical for long term sustainable land use, these are

- Rock type
- Soil
- Slope angle
- Erosion type and severity
- Vegetation cover

The LUC has three components – LUC Class, LUC Subclass and LUC Unit. Figure 5 below describes and indicates the relationship between these:

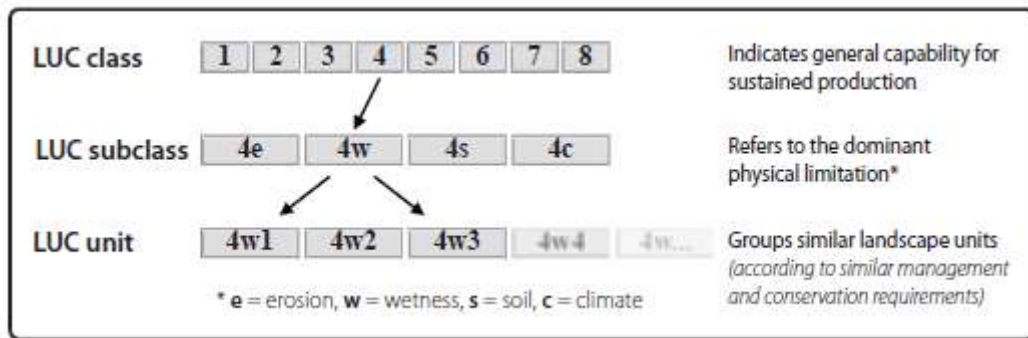


Figure 5: Components of the Land Uses Capability Classification (courtesy of Land Use Capability Survey Handbook 3rd Edition).

NZLRI has assessed the land over the majority of the site as having a LUC of 6e10 and an areas in the north of the site (15 and 40 Kaiapo Rd) as having a LUC of 6e9 and an area in the south of the site as having a LUC of 4s4 where:

- A LUC Class of 6 indicates the site general suitability as pastoral or forestry land. Class 6 land is not suitable for arable use and has slight to moderate physical limitations and hazards under a perennial vegetative cover. Class 6 land is suitable for grazed pasture, tree crops and/or forestry and sometimes vineyards.
- A LUC Class of 4 indicates the site general suitability as multiple use land. Class 4 land has severe physical limitations to arable use which substantially reduces the range of crops which can be grown, and/or make intensive soil conservation and management necessary. Class 4 land is suitable for occasional cropping, pasture, tree crops or production forestry, vineyards and berry fields.
- A LUC Subclass of 6e indicates the sites main physical limitation is “erosion – where susceptibility to erosion is the dominant limitation.”
- A LUC Subclass of 4s indicates the sites main physical limitation is “soil – where the major restriction or hazard to use is within the rooting zone. This can be shallow profile, stoniness throughout the profile, subsurface pans, rock outcrops, low soil water holding capacity, low fertility (where this is difficult to correct), poor soil texture and structural conditions, salinity or toxicity.”
- The Waikato Region LUC extended Legend indicates that the management required for a LUC Unit of 6e9 is contouring, pair plant willows in gullies and block plant more severely eroded gullies.
- The Waikato Region LUC extended Legend indicates that the management required for a LUC Unit of 6e10 is open planting poplars.
- The Waikato Region LUC extended Legend does not include management methods for a LUC Unit of 4s4.

2.8 Climate

Rainfall has a defined seasonal variation with c.31% of rain falling during the winter months of June -August and c.22% falling in the summer months from December to February. The number of rain days (greater than 0.1mm of rain) annually is 160 and the number of wet days (greater than 1mm of rain) annually is 112. According to the National Climate Database, annual statistics

normalised (average) for a given 30 year period (1981 – 2010) recorded at a station in Taupō were as follows:

Table 1: Average Climate Recorded over 1981 - 2010 at Taupō Aws

Description	Station	From - To	Annual
Total Rainfall (mm)	1858	1981 – 2010	960.1
Mean Air Temperature (Celsius)			11.7
Mean Daily Maximum Air Temperature (Celsius)			16.7
Mean Daily Minimum Air Temperature (Celsius)			6.8

2.9 Additional Site Information

Additional details concerning the site's present disposition are summarised in Table 2 below.

Table 2: Summary of Additional Site Information

Ownership	– The original occupier of the land is listed as a “farmer” – The original Legal Description of the site is “Part Section 9 Block IV Tuhiangamata East Survey District” dated 1975.
Zoning/Classifications	– All land parcels on the site are zoned “General Rural Zone” in the Taupō District Plan
Easements	– Easement for a right of way and to convey electricity and water is on the Certificates of Title.
Building Consents / Permits	– The Taupō District Council property files were reviewed on 15 November 2021 and 31 January 2023 by Geohazard Environmental staff. The property files contained a building permit for a bathroom extension to a dwelling constructed in 1970.
Resource Consents	– The Taupō District Council property files were reviewed on 15 November 2021 and 31 January 2023 by Geohazard Environmental staff. The property files contained resource consent applications for subdivisions dated 2004, 2010, 22018 (withdrawn) and 2020 (approved). – A review of the property file conducted by Geosciences Limited for their 11 February 2022 DSI found that the property file contained several resource consent applications for subdivision dated in 1988, 2007 and 2011 with only the 1988 application realised to create a ‘rural retirement block’. – Landuse Consents have been issued for 15 and 40 Kaiapo Rd.
Underground / Aboveground Storage Tanks	– None identified.
Additional Features	– Active normal faults with moderate (1-5mm/yr) slip rates cross the east of the site and to the northwest of the site.

2.10 Summary of Desktop Information

- Aerial images indicate that from at least 1945 the site was assumed undeveloped grazing land. By 1963 Marapa and Kaiapo roads had been established, and a shed had been erected in the north of 37 Kaiapo Rd. BY 1967 a dwelling had been constructed on 40 Kaiapo Rd and a woolshed erected on 37 Kaiapo Rd.
- In 1975 the wider land parcel was leased by the Crown to a **farmer**. Who agreed that for the purpose of soil conservation to keep certain areas free from grazing and noxious weeds and to carry out further planting of trees as deemed necessary and to allow access to these areas as required.
- A statutory land Charge under the Rural Housing Act 1939 was entered on 17 August 1976.
- Aerial images indicate stockyards were erected in the vicinity of the woolshed on 37 Kaiapo Rd by 1979.
- Under Sec 25(1)(a) State-Owned Enterprises Act 1986 **Landcorp Investments Limited** became registered as the licensor on 7 March 1990 and fee simple acquired.
- In March 1990 the wider land parcel was subdivided and CT45C/871 for Lot 1 DPS 52742 (later Lot 1 DP 410435) was issued to **Stockdove Holdings Ltd** and CT45C/875 for the residue was transferred a **farmer**.
- The residue was subdivided in May 1993 and then further subdivided in Lot 1 and 2 DP 337255 in April 2007.
- Aerial images indicate that by 2008 land disturbance (likely tilling for recontouring) had been undertaken on 37 Kaiapo Rd and that a bush block had been established in the north of 40 Kaiapo Rd. By 2014 a haybarn had been constructed and land disturbance (likely tilling for recontouring) undertaken on 40 Kaiapo Rd.
- A subdivision consent was issued 2020 for a subdivision on 15 Kaiapo Rd, it is noted that an area of 15 Kaiapo Rd was amalgamated into 37 Kaiapo Rd between 2023 and 2026.
- Landuse consents have been issued for 15 and 40 Kaiapo Rd.
- The Waikato regional Council lists 37 Kaiapo Rd as LUI12383, a site where HAIL Activities have been undertaken (HAIL A.8).

3.0 SITE CONDITION AND SURROUNDING ENVIRONMENT

3.1 Site Inspection

A site inspection of a proposed subdivision site on 15 Kaiapo Rd of c.5.9ha was undertaken by Geohazard Environmental Ltd staff on 01 November 2021, this included an area later to be amalgamated into 37 Kaiapo Rd and form part of the site of this investigation. A site inspection of 40 Kaiapo Rd was undertaken by Geoscience Ltd staff on 19 January 2022. The entire site area of c.335ha was viewed from 3 vantage points and a site walkover of the area surrounding the woolshed undertaken on 8 February 2023, Geohazard Environmental Ltd staff returned to site on 20 February to collect soil samples from the woolshed and stockyard area. The inspection by Geohazard Environmental Ltd staff was conducted to examine the site and observe any evidence of contamination. Specific points noted are conditions at the site boundaries and visible signs of contamination or odours that might suggest contamination. A cursory inspection of factors that relate to site geology and hydrology is also performed to ensure consistency with what is known of the surrounding area. An overall picture of the site geology and hydrology is useful in assessing the transport potential of contaminants to or from the site.

3.2 Conditions at Site Boundaries

Conditions at the site boundaries are as described below:

- North** – Grazing land to the west and a residential subdivision and Kaiapo and Marapa Roads in the east.
- East** – Residential development in the north and DOC bushland in the south.
- South** – DOC bushland.
- West** – DOC and Iwi bushland.

There are post and wire fences along all site boundaries.

The land slopes away from the south and west boundaries towards Lake Taupō and north towards Marapa Rd at the northern boundary. This is likely to form a barrier from any offsite contaminants migrating to the site. Any contaminants onsite may migrate off site downslope to the north south and west.

The land slopes towards site from the east, this will not prevent migration of any contaminants onto the site but may prevent migration off site in this direction.

3.3 Visible Inspection, Signs of Contamination and Odours

37 Kaiapo Rd – Northern Area (formerly part of 15 Kaiapo Rd)

During the site investigation conducted on 01 November 2021 the ground surface of the subdivision site was in pasture, in good condition. There were no noticeable bare patches. No remnants of any structures were observed during the site walkover.

The site appeared to be a typical pastoral farm, historically used for sheep and beef.

From visible indications, there is no evident sign of contamination at the site. However, in the southwest and southeast corners of the subdivision site trees had been felled and the slash burnt. A concrete tank and fencing wire was observed in the southeast corner. The house and sheds located in the west of the subdivision area (proposed Lots 1 and 12) appear to be in good order.

The absence of odour was consistent with there being no obvious indications of gross contamination from site inspection.

During the subsequent site visit undertaken on 8 February it was noted that earthworks and fencing for subdivision had been carried out and a road now accessed the subdivision site from Kaiapo Road.

The Marapa Escarpment is in the east of the site and slopes steeply with deep gullies down towards the subdivision.

A shed is in the west near Kaiapo Road, this is currently used as a wood store.

The pasture was observed to be in good condition with no noticeable bare patches.

37 Kaiapo Rd (Lot 2 DP337255)

A corrugated iron woolshed, containers (in good condition), stockyards (older sheep yards and newer cattle yards), a round barn and vehicle access are in the northern corner of 37 Kaiapo Road. A small amount of timber, plastic piping and potted trees were stored in and around the stockyards. Wire fencing and a pile of dirt and bark were in the paddock behind the round barn.

Discussions with Phil Dykzeul indicated that retention pipes had been installed at the head of the gullies prior to 2021 when Breda Investments Ltd purchased the property. These were installed to prevent further gully head erosion and are working well.

The ground surface at the area of the site investigated is in pasture, in good condition. There were no noticeable bare patches.

The potential for ground contamination from sheep dip use and runoff paddocks was confirmed via visual cues of the woolshed and stockyards. However, no evidence of a sheep dip was observed.

The absence of odour during the site inspection is consistent with there being no obvious indications of gross contamination at the site.

40 Kaiapo Rd (Lot 1 DP410435)

The site inspection undertaken by Geoscience Ltd found the site to comprise of pasture and lucerne for cut and carry feedstock with small amounts of beef cattle on site.

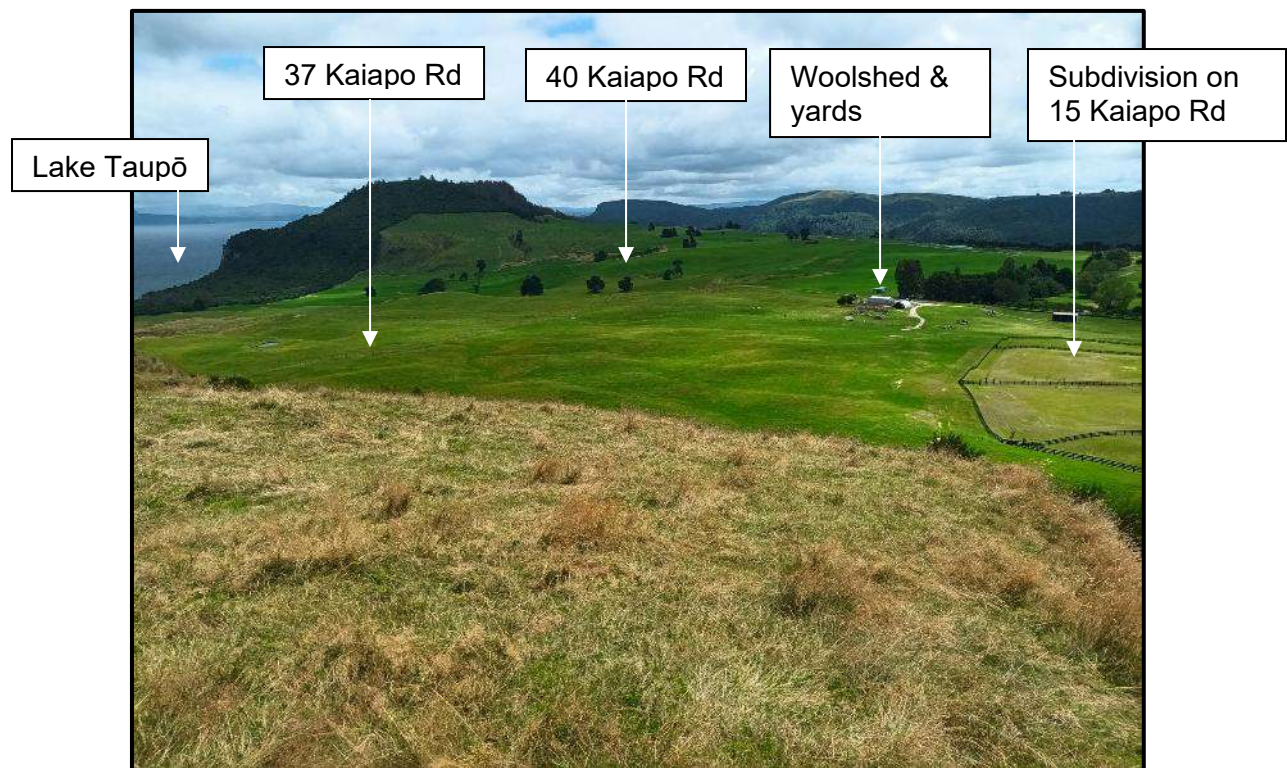
The areas of earthworks visible in aerial images were back in pasture and lucerne and no evidence of fill was found on site. Test pits dug in these areas found <100mm of topsoil over natural pumice formations. Parts of the dendritic overland flow network were visible outside of the earthworked areas.

Stockyards and holding pens with a 200-300litre above ground diesel tank were located 150m west of the eastern boundary of 40 Kaiapo Rd. There was light superficial hydrocarbon staining (c.30m²) around the diesel tank and a test pit found that the impact were superficial and limited to the top 50mm of the soil profile. No evidence of a stock dipping or spray race operations were seen.

At the time of the site visit by Geohazard Environmental on 8 February 2023 some of the gentle sloping paddocks were planted in lucerne for cut and carry, Stuart Deadman advised that

paddocks are rested for a year after a season of growing lucerne. Gullying was observed on some of the steeper slopes.

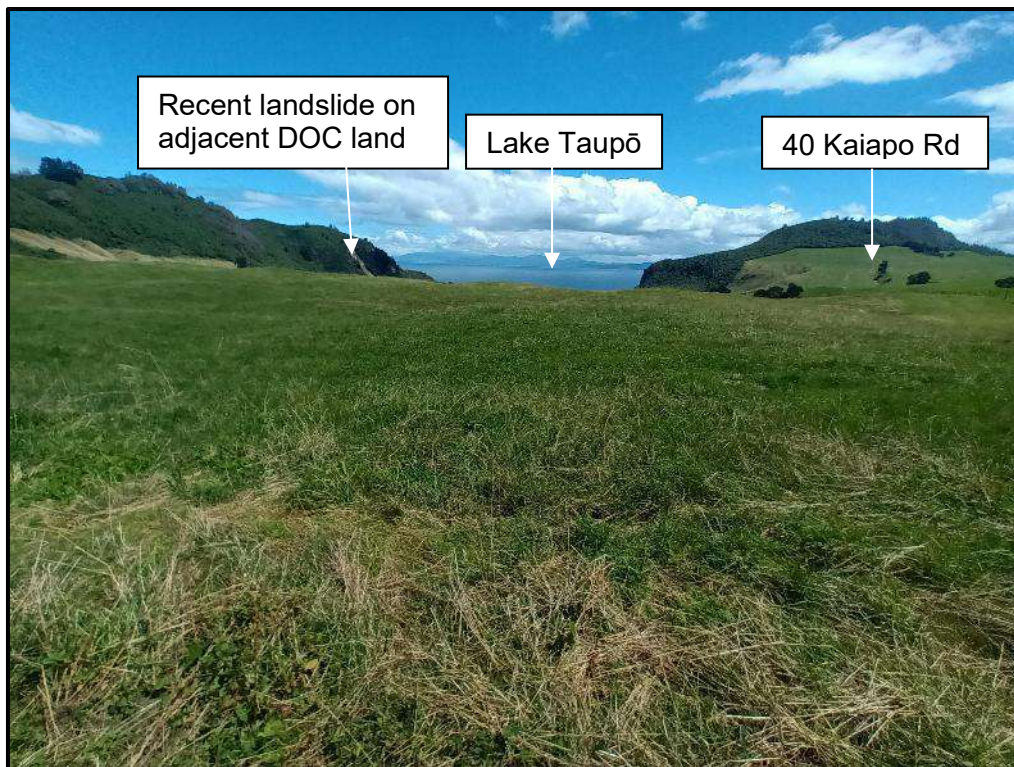
Photographs below show the general nature of the site.



Photograph 1: The Site Viewed from the Top of the Marapa Escarpment.



Photograph 2: View South from Ridgeline on 40 Kaiapo Rd

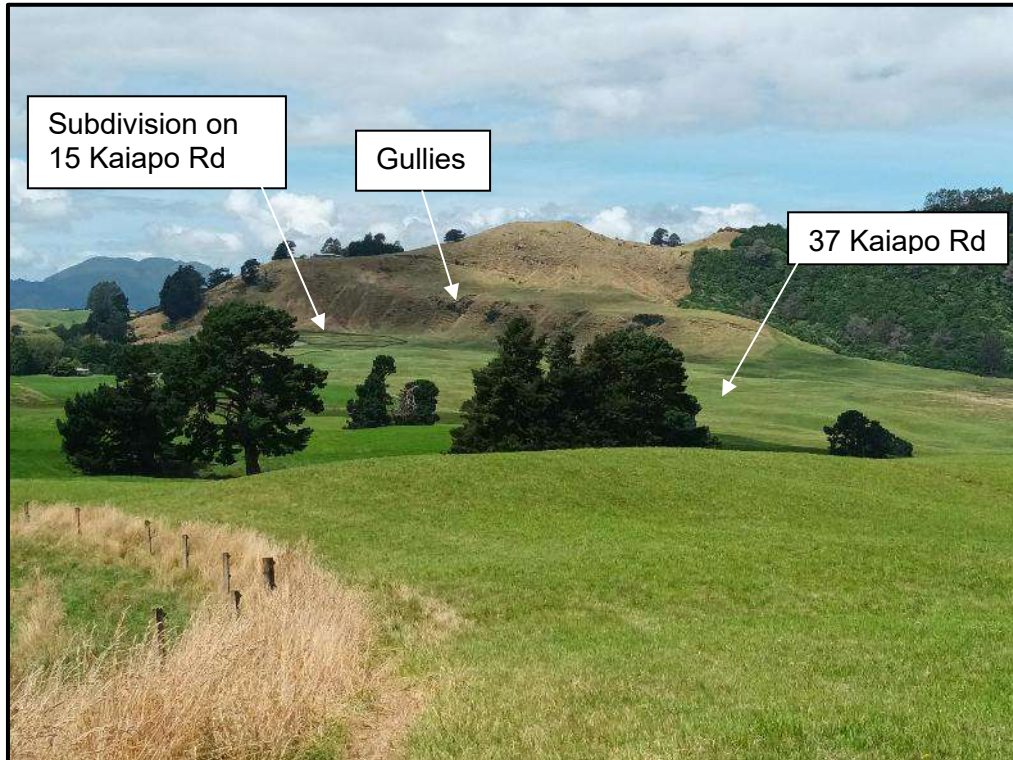


Photograph 3: View South From the Woolshed on 37 Kaiapo Rd.

37 Kaiapo Rd – Northern Area (formerly part of 15 Kaiapo Rd)



Photograph 4: Subdivision on the adjacent 15 Kaiapo Rd as Viewed from the Escarpment.



Photograph 5: Marapa Escarpment as Viewed from 40 Kaiapo Ridgeline.



Photograph 6: The Marapa Escarpment in the east of 15 Kaiapo Rd (Nov 2021).



Photograph 7: The Marapa Escarpment in the northeast of 37 Kaiapo Rd (Nov 2021).



Photograph 8: Felled Trees and Slash Burn, Southwestern Boundary of 15 Kaiapo Rd (Nov 2021).



Photograph 9: Slash Burn, Concrete Water Tank and Fencing Wire on 15 Kaiapo Rd (Nov 2021).

37 Kaiapo Rd



Potential
runoff
paddock

Photograph 10: Wire Fencing and Piles of dirt and bark behind the Round Barn.



Photograph 11: Container, Stored Timber and Stockyards.



Photograph 12: Plastic Piping Stored near in the Stockyards.



Photograph 13: Potted Trees Stored Beside the Woolshed.



Photograph 14: Sheep Stockyards with Cattle Stockyards Beyond.



Photograph 15: Sorting Race Within the Sheep Yards.



Photograph 16: Cattle Stockyards with Sheep Stockyard Beyond.

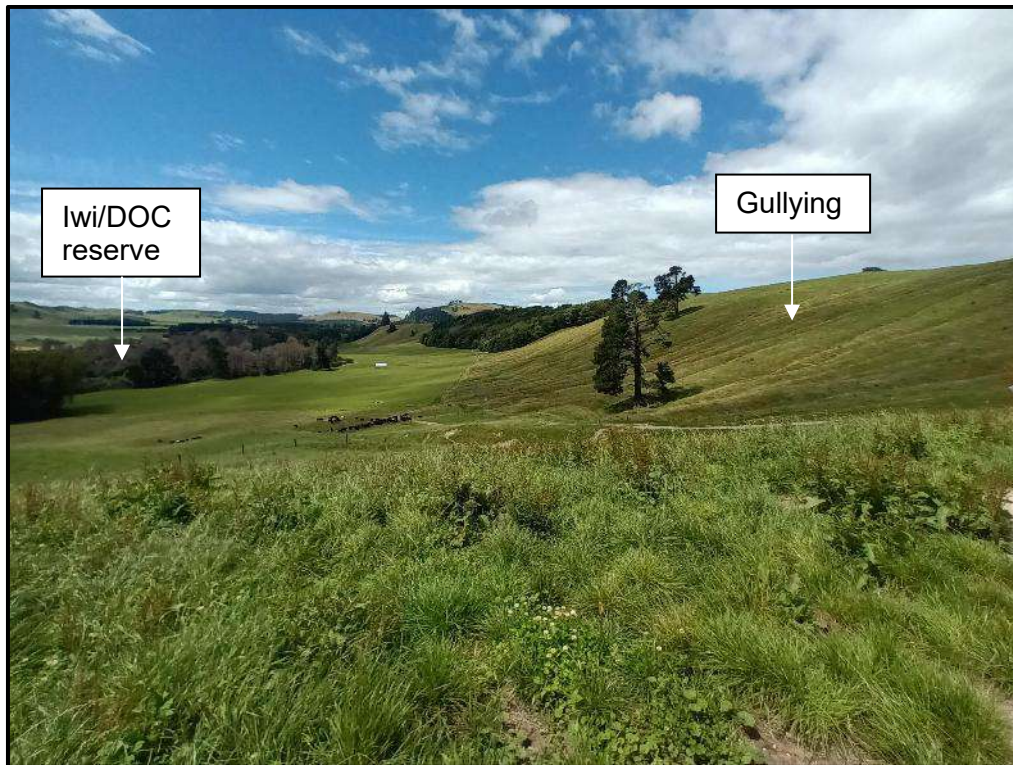


Photograph 17: Cattle Stockyards.



Photograph 18: Round Barn.

40 Kaiapo Rd



Photograph 19: Steep North Facing Slope with Gullying on 40 Kaiapo Rd.



Photograph 20: Paddock where Superphosphate has been applied at 40 Kaiapo Rd (image from GeoScience Ltd DSI).



Photograph 21: Paddock where Superphosphate has been applied Stockyard Constructed in 2010 on 40 Kaiapo Rd (image from GeoScience Ltd DSI).



Photograph 22: Above Ground Fuel Tank at 40 Kaiapo Rd (image from GeoScience Ltd DSI).



Photograph 23: Light Hydrocarbon Staining at 40 Kaiapo Rd (image from GeoScience Ltd DSI).



Photograph 24: Lower Terraces, used for Lucerne at 40 Kaiapo Rd (image from GeoScience Ltd DSI).



Photograph 25: Residual Dendritic Overland Flowpaths on 40 Kaiapo Rd (image from GeoScience Ltd DSI).



Photograph 26: Northern Side of the Ridge Showing the Steep Slope Towards Whakaipo Bay at 40 Kaiapo Rd (image from GeoScience Ltd DSI).



Photograph 27: View North Towards the Central Ridge from Lower Terrace Showing Clear Differentiation Between Cut and Carry Areas and Areas of Limited Access on 40 Kaiapo Rd (image from GeoScience Ltd DSI).

3.4 Summary of Potential Contamination Risks Identified

The site history and site walkover information are combined to identify potential contamination risks.

Table 3, below outlines typical contaminants found on land uses similar to the site. It does not imply some or all the contaminants will be found on site.

Table 3: Contaminants on Similar Sites

Activity or Industry	Possible Contaminants	Possible Locations	Possible Vertical Extent	Notes
Fill material	Pesticides, metals, hydrocarbons, asbestos	Elevated concentrations within the fill material.	All fill material may be affected. Deeper soils may also be affected by downward migration of contaminants.	Areas of land disturbance are on site, however no fill was detected in these areas.
Dwellings constructed prior to 2000	Asbestos, lead	Elevated concentrations around dwellings.	Surface soils (0.0 to 0.1m) likely to be affected if building materials have been damaged or lead based paint used. Deeper soils may be affected where ploughing has occurred. Deeper soils may be affected by point-source spills etc.	The areas in which dwellings are currently located are not affected by the proposed subdivision.
Pastoral Farming	Pesticides, metals	Elevated concentrations in and around sheds, near water supplies (mixing chemicals), animal holding yards and dips. Lower or residual levels across paddocks from fertiliser and pesticide broadcast application.	Surface soils (0.0 to 0.1m) likely to be affected by surface application of pesticides. Deeper soils may be affected where ploughing has occurred. Deeper soils may be affected by point-source spills etc.	Farm sheds are present on site. Animal handling yards are present on 37 and 40 Kaiapo Rd. Possible sheep dip site present on 37 Kaiapo Rd in the vicinity of the Woolshed. Cadmium likely to be most common contaminant if fertiliser use was extensive.
	Hydrocarbons	Fuel storage areas, sheds and workshops on farm	Deeper soils (to groundwater) may be affected by downward migration of hydrocarbons.	Diesel fuel tank present on 40 Kaiapo Rd with superficial hydrocarbon staining.

3.5 Initial Conceptual Site Model

An initial Conceptual Site Model (CSM) is developed to understand how potential contaminants in soils may interact with receptors such as end users or the environment. The initial Conceptual Site Model is updated as more information regarding a site comes to hand, e.g. soil sample results.

Decisions regarding soil sample numbers and locations are partly driven by the CSM.

Table 4 below shows the Initial CSM for this site.

Table 4: Initial Conceptual Site Model

Source	Receptor	Pathway	Pathway Complete?
Cadmium from fertilizer use on grazing land. HAIL category I: Any land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.	Construction workers	Dermal contact	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Cadmium may be present at a level that poses a risk to human health with a change in land use to rural residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Potentially Complete Pathway – Cadmium may be present at a level that poses a risk to human health with a change in land use to rural residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – It is unlikely that cadmium migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
Stockyards and potential sheep dip and run off paddock. HAIL category A.8: Livestock dip or spray race operations	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses.	Incomplete Pathway – Cadmium will generally remain in the surface soils on the site.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Cadmium will generally remain in the surface soils on the site.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Potentially Complete Pathway – The site and surrounding area is a highly modified ecosystem. However, cadmium exceedances may impact on species and how they function on the site.
	Construction workers	Dermal contact	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible for contaminants associated with HAIL A.8.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use from production land to rural residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use to rural residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	

Source	Receptor	Pathway	Pathway Complete?
	General public	Dermal contact	Incomplete Pathway –It is unlikely that contaminants associated with HAIL use would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses.	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to surface water.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway –The types of contaminants associated with HAIL use are unlikely to migrate to groundwater.
Above ground bulk fuel storage tank on 40 Kaiapo Rd HAIL category A17: Storage tanks or drums for fuel, chemicals or liquid waste	Construction workers	Dermal contact	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible for contaminants associated with HAIL A17.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use from production land to rural residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use to rural residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway –It is unlikely that contaminants associated with HAIL use would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses.	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to surface water.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to groundwater.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Potentially Complete Pathway – The site and surrounding area is a highly modified ecosystem. However, contaminant exceedances may impact on species and how they function on the site.

4.0 DISPOSITION OF SITE CONTAMINATION

The disposition of any contamination at site must be confirmed with results from field sampling and analysis, and, for contaminated land, these results must be evaluated against soil guideline values (SGV), also known as soil contaminant standards (SCS). This section summarises appropriate SCS for the site, followed by Geohazard Environmental Ltd review of readily available information concerning the disposition of site contamination.

4.1 Basis for Soil Contaminants Standards (SCS)

SCS is a first stage screening value that provides the concentration of a contaminant in soil to which people (and/or ecological receptors) on or near a site can be exposed without creating an unacceptable level of risk to health. For the protection of human health, SCS are derived by defining a critical receptor (e.g. a child of a certain age and weight) and defining tolerable daily intake for a particular contaminant. Then, using assumptions regarding exposure (e.g. amount, duration, pathway), the soil concentrations that would equal the tolerable daily intake are calculated. Exposure pathways reflect how people are exposed to contaminants.

SCS are based on generic exposure scenarios based on use. An exposure scenario is a combination of exposure pathways typical of a particular activity or use in which exposure to soil contaminants is likely to occur; an activity could be, for instance, a child playing in a residential area. The intent is to estimate the intake of a contaminant for each particular scenario. For simple risk assessment, generic use scenarios are used, with a standard combination of exposure pathways for each scenario. The generic use scenarios used for the SCS are intended to be typical of the great majority of situations in which New Zealanders may be exposed to soil contaminants.

The site investigated here is classed as General Rural Zone by the Taupō District Council, and also considering the site's proposed predominantly low density residential use, the residential or Rural/lifestyle block use scenario, described in Table 5 below, is most relevant to most of the site. An area in the north of 37 Kaiapo Rd is proposed to be a Neighbourhood Centre Zone, the Commercial use scenario, described in Table 5 below, is most relevant to this area the site. As a result, based on the MfE Guidelines, any results should be assessed against SCS given for this scenario. There are both more conservative and more liberal standards that could be applied; however, the one presented is appropriate both to the use classification of the site based on the information available.

Table 5: Use Scenario Most Relevant to this Report.

Parks / Recreational	Covers exposure at public and private green areas and reserves that are used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Residential	Covers standard residential lots for single dwelling sites with gardens, including home-grown produce consumption (up to 10 %).
Rural/ lifestyle block	Rural residential use, including home-grown produce consumption. Applicable to the residential portion of farms, but not productive parts of agricultural land.
Industrial / Commercial	Commercial / industrial sites with varying degrees of exposed soil.

SCS in this report, tabulated in Section 4.2.1, are taken from the National Environmental Standards (NES) and New Zealand Ministry for the Environment (MfE) wherever possible. In some cases, the MfE has not developed a specific SCS for some contaminants under some use scenarios. When MfE values are unavailable, guideline values from reputable sources such as

the Australian National Environmental Protection Council (NEPC) are used, according to acceptable SCS sources and the hierarchy of use for these sources that is specified by the MfE (2007).

The NES for contaminated land was introduced in order to address a legacy of soil contamination in New Zealand that has resulted from the use, and improper storage and disposal, of chemicals in industry and agriculture.

The NES controls apply to “Land use change, subdivision, and disturbance of any land where, according to the best information available to the local authority, there has been a facility on the land, or a hazardous activity carried out on the land that may have involved the intentional or accidental discharges of hazardous substances that could now be a risk to human health”. Hence the NES is applicable to the present site due to the proposed use change. The NES contains SCS, and where present these supersede those previously published in MfE industry-specific guidelines.

4.1.1 Background Levels

The NES defines background as “natural background” levels. Background soil concentration predictions were developed by Landcare Research from geostatistical analysis of trace element data from regional councils, national soils database and GNS Science identifying associations with geological parameters adapted from the GNS Science QMAP geological map dataset. The applicable guidelines are shown in the tables in Section 4.2.1 below. Background levels are particularly relevant when considering whether soils are suitable for disposal as cleanfill.

Background soil concentrations are specifically mentioned in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012) which is implemented by District and City Councils.

The Waikato Regional Council presents “background” trace elements data for selected elements in soil of the Waikato region. The most common method of estimating natural background values is sampling soil at native reserve sites where no direct human use has occurred (i.e. well removed from urban areas and fertilised land). This approach is applicable in New Zealand where we have experienced negligible atmospheric inputs of trace elements to soil.

Soil samples from 38 sites were reportedly chosen to represent background concentrations for the Waikato region. Their soil types represented the most common in the region but did not include peat soils (as these have quite different properties). Each sample was reportedly analysed for acid recoverable trace element content (except for total fluorine) and the 95th percentile was calculated for each element to give an upper limit for the natural range of concentrations (see Table 5 below).

4.1.2 Environmental Protection Guidelines

In addition to human health standards, Regional Council typically requires that contaminants be assessed against guidelines for the protection of the environment. The applicable guidelines are shown in the tables below. The environmental guideline values used in this report are:

- An implementation framework for ecological soil guideline values (Landcare Research 2023).
- Interim Environmental Guidelines as required.

The Eco SGV have been used as they have been developed as a nationally consistent method for assessing the ecological impact of contaminants in soil.

The Interim Environmental Guidelines have been used where no published Eco SGV is available and are based on the now defunct Auckland Council District Plan.

4.2 Field Sampling and Analysis

For this CSI, the Client's brief specifically entailed conducting field sampling and analysis, and this provides an evidentiary basis for determination of the disposition of contaminants at the site.

There has been no confirmed HAIL (Hazardous Activities and Industries List) associated site uses that Geohazard Environmental Ltd has discovered, and there are many contaminants for which analysis could have been performed. However, contamination consistent with sheep dip operations is of concern in the stockyard and woolshed areas given the history of animal handling facilities in the area, and analysis was requested for a suite of metals and persistent pesticides since they represent contaminants that might be anticipated to be present based on the limited historical information on the site and Geohazard Environmental Ltd.'s knowledge of contaminated sites in the area.

15 Kaiapo Rd

Cadmium is identified as the primary contaminant of concern on pastoral land, as there are no sheds or animal handling yards noted in the site history.

Soil samples were collected on a 30m grid basis from the subdivision site, in line with Ministry for the Environment guidelines.

Samples were collected using a hand auger or trowel. The hand auger/trowel was cleaned between each sample location using Decon90 (a non-phosphate laboratory grade detergent) and deionised water. Samples were placed into laboratory supplied jars and placed into a chillibin. Samples were couriered to Analytica Laboratories in Hamilton under Chain of Custody documentation.

Samples were composited by the laboratory, with composites created of no more than four sub-samples. The composites were selected to be representative of the two soil types identified at the site, and each composite generally reflective of a proposed lot. The objectives of the sampling was to determine an overall indication of cadmium concentrations. Composite sampling is appropriate for this objective.

37 Kaiapo Rd

Soil samples were collected on a 20m grid basis in the potential run off paddock adjacent the stockyards, in line with Ministry for the Environment guidelines.

Targeted samples were collected around the woolshed and stockyards.

In addition, the samples collected from the paddock were composited (mixed) in the laboratory and analysed for a suite of persistent pesticides. The purpose of taking composite samples, i.e. samples that represent a mixture of several sub-samples taken from different locations, is to reduce needless laboratory expense – if contamination is present at high levels, even if some of the sub-samples are uncontaminated, the resulting sample will still reflect the presence of the contaminated sub-samples that went into the composite.

Samples were collected using a trowel. The trowel was cleaned between each sample location using Decon90 (a non-phosphate laboratory grade detergent) and deionised water. Samples were placed into laboratory supplied jars and placed into a chillibin. Samples were couriered to Analytica Laboratories in Hamilton under Chain of Custody documentation.

40 Kaiapo Rd

“GSL considered that the primary risk of soil contamination is from cadmium impurities and is likely concentrated in a uniform distribution across the areas of the site heavily utilised for cut and carry farming operations. A systematic soil sampling regime utilising composite soil samples from the surficial (0 – 75mm) horizon was considered the most applicable method for assessing potential impacts.”

GSL collected 4 individual samples from each of 7 paddocks where uniform application of fertilizers would have been undertaken, targeting flat areas where accumulation could occur.

Samples were composited by the laboratory, with composites created of four sub-samples collected from each paddock.

Samples were collected with a foot corer and placed into individually labelled sample bags. The foot corer was cleaned between sample locations with a soft soap solution in accordance with GSL internal quality procedures and in accordance with CLMG No.5 *Site Investigation and Analysis of Soils*.

4.2.1 Soil Description

The surface soils of the area of site investigated were a dark brown with a loamy texture.

4.3 Results

Some contaminant concentrations exceed guideline values. Per MfE Guidelines, all results reported herein that exceed SCS are highlighted; this report uses grey highlighting to emphasise any results over guideline values.

4.3.1 Metals

This section includes sites that are outside of the development, but included here for completeness.

The results from cadmium testing undertaken by Geohazard Environmental Ltd for their PSI dated December 2021 are shown in Table 6 below.

All results are below SCS guidelines for a rural residential use.

Table 6: Results from Analysis for Metals (all results in mg/kg).

Sample	Cd
Composite A (HA01, HA02, HA04, HA05)	0.38
Composite B (HA07, HA08, HA10, HA11)	0.44
Composite C (HA13, HA14, HA15, HA16)	0.505
Composite D (HA17, HA18, HA19, HA20)	0.50
Composite E (HA22, HA23, HA24, HA25)	0.541
Composite F (HA28, HA29, HA30, HA31)	0.30
Composite G (HA03, HA06, HA09, HA12)	0.49
Composite H (HA21, HA26, HA27, HA32)	0.523
Composite I (HB01, HB02, HB04, HB05)	0.46
Composite J (HB07, HB08, HB10, HB11)	0.32

Sample	Cd
Composite K (HB03, HB06, HB09, HB12)	0.47
Composite L (HB15, HB16, HB19)	0.517
Composite M (HB13, HB17, HB20)	0.23
Composite N (HB14, HB18, HB21)	0.47
Composite O (HB22, HB23, HB24, HB25)	0.44
SCS (Rural residential)	0.8 ^a
“U95pred” Predicted Background Soil Concentrations ^b	0.49
Environmental ^c	17
WRC Background ^d	0.22
Cleanfill Disposal Outside of High Risk Locations (If less than 2500m³) ^e	0.8
Class A Landfill WAC ^f	20

Cd - Cadmium

Values in bold exceed predicted background level.

- a) MfE 2012 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health,
- b) Landcare Research Limited (June 2016) Predicted Background Soil Concentrations.
- c) Landcare Research (June 2019) User Guide: Background Soil Concentrations and Soil Guideline Values For The Protection of Ecological Receptors (Eco SGVs) Consultation draft. Residential / Recreation Area.
- d) Regional Council Interim Environmental Guidelines
- e) Natural Background Soil Concentrations in the Waikato Region (Regional Council website, accessed 31/01/2019)
- f) Information Received from a Senior Resource Officer at Regional Council dated 30 July 2018.
- g) MfE 2004 Module 2 Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification

The results from cadmium testing undertaken by Geoscience Ltd for their Limited DSI dated February 2022 are shown in Table 7 below.

All results are below SCS guidelines for a rural residential use.

Table 7: Results from Analysis for Metals (all results in mg/kg).

Sample	Cd
SC1 (SC1a, SC1b, SC1c, SC1d)	0.18
SC2 (SC2a, SC2b, SC2c, SC2d)	0.18
SC3 (SC3a, SC3b, SC3c, SC3d)	0.20
SC4 (SC4a, SC4b, SC4c, SC4d)	0.21
SC5 (SC5a, SC5b, SC5c, SC5d)	0.46
SC6 (SC6a, SC6b, SC6c, SC6d)	0.35
SC7 (SC7a, SC7b, SC7c, SC7d)	0.31
SCS (Rural residential)	0.8 ^a
“U95pred” Predicted Background Soil Concentrations ^b	0.49
Environmental ^c	17
WRC Background ^c	0.22
Cleanfill Disposal Outside of High Risk Locations (If less than 2500m³) ^d	0.8
Class A Landfill WAC ^e	20

Cd - Cadmium

Values in bold exceed predicted background level.

- a) MfE 2012 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health,
- b) Landcare Research Limited (June 2016) Predicted Background Soil Concentrations.
- c) Landcare Research (June 2019) User Guide: Background Soil Concentrations and Soil Guideline Values For The Protection of Ecological Receptors (Eco SGVs) Consultation draft. Residential / Recreation Area.
- d) Regional Council Interim Environmental Guidelines
- e) Natural Background Soil Concentrations in the Waikato Region (Regional Council website, accessed 31/01/2019)
- f) Information Received from a Senior Resource Officer at Regional Council dated 30 July 2018.
- g) MfE 2004 Module 2 Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification

The results from analysis of samples for metals collected on 20 February 2023 are summarised in Table 8 below.

Samples numbers with an asterisk (*) are compared against the Commercial guidelines as they are in the likely town centre area.

- Arsenic and lead concentrations in samples R11 exceed SCS guidelines for the proposed use.
- Arsenic, copper, lead and zinc concentrations in sample R11 exceed Eco SGV trigger values and Class A landfill waste acceptance criteria (WAC).

Table 8: Results from Analysis for Metals (all results in mg/kg).

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
HA01*	68.3	0.13	<1.3	0.26	20	25.7	11	0.033	2.8	182
HA02*	4.6	0.074	1.8	0.18	8.5	10.2	8.8	0.027	1.8	88.5
HA03*	7.4	0.087	<1.3	0.077	9.3	8.58	13.8	<0.025	0.93	39.3
HA04*	3.3	0.058	<1.3	0.051	4.3	5.5	5.81	<0.025	0.89	36
HA06*	2.4	0.11	<1.3	0.2	3.9	5.9	5.25	<0.025	1.6	73
HA07*	2.5	0.073	2	0.12	3	7.2	4.1	<0.025	1.1	50.9
HA08*	3.2	0.1	1.3	0.16	4.3	7.2	5.4	<0.025	1.3	182
HA09*	2.1	0.087	<1.3	0.058	2.8	4.7	1.9	<0.025	0.67	40
HA10*	13.8	0.075	<1.3	0.1	37.2	18	3.2	<0.025	0.72	58
HA11*	5.1	0.088	<1.3	0.12	5.7	16.7	3.3	<0.025	0.8	27.9
HA12*	1.6	0.091	<1.3	0.064	2.4	4.5	2.1	<0.025	0.74	21
HA13*	3.1	0.053	<1.3	0.083	4.4	6.2	2.7	<0.025	0.69	34.5
HA14*	2.1	0.067	<1.3	0.19	4.3	9.55	4.1	<0.025	0.97	56.2
HA15*	1.2	0.078	<1.3	0.076	2.3	3.8	2	<0.025	0.76	23.5
R01	1.4	0.13	<1.3	0.15	2.3	5.4	2.4	<0.025	1.1	35.4
R02	2	0.11	<1.3	0.16	2.9	4.8	2.5	<0.025	2	27.4
R03	1.4	0.12	<1.3	0.12	2.6	5.6	2.1	<0.025	1.4	20.3
R04*	1.4	0.076	<1.3	0.0088	1.6	1.1	1.5	<0.025	0.75	10.5
R05*	3.7	0.11	<1.3	0.17	5.2	5.5	2.6	<0.025	1.3	35.8
R05	3.6	0.12	<1.3	0.17	5.1	5.5	2.6	<0.025	1.3	37
R06	2.3	0.089	<1.3	0.093	2.9	6.2	1.8	<0.025	0.99	22.4
R07	1.9	0.14	<1.3	0.15	3.1	8.67	2.4	<0.025	1.5	27.2
R08	2.4	0.13	1.4	0.19	3	7.4	2.4	0.054	1.5	40.6
R09	2.8	0.1	<1.3	0.19	3.7	6.6	2.4	<0.025	1.4	29.7

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
R10	2.4	0.15	<1.3	0.31	6.6	6.3	2.7	<0.025	2.7	28.4
R11	<u>180</u>	0.12	12	0.692	98	<u>174</u>	<u>1900</u>	<0.025	3.8	<u>322</u>
R12*	1.8	0.085	2.3	0.15	2.7	3.5	39	<0.025	1.4	21.5
R13	1.9	0.081	<1.3	0.091	2.7	3.5	2.2	<0.025	1.3	27.2
R14	2.9	0.15	1.4	0.27	4.3	7.2	2.9	<0.025	2.1	27.3
R15	2.6	0.13	<1.3	0.32	5.3	8.73	2.8	<0.025	2.8	45.9
R16	2.1	0.15	<1.3	0.072	2.3	2.7	2.4	<0.025	1.1	19.2
R17	2	0.15	1.5	0.23	2.7	5	3.8	<0.025	1.5	30.9
R18	1.9	0.13	1.3	0.33	3.3	6.6	3	0.035	1.6	25.3
R19*	1.9	0.12	<1.3	0.22	3.1	5	3.1	<0.025	1.3	24.5
SCS (residential)	20 ^a	60 ^b	>10,000 ^a	3 ^a	460 ^a	>10,000 ^a	210 ^a	310 ^a	400 ^b	7400 ^b
SCS (Commercial)	70 ^a	500 ^b	>10,000 ^a	1,300 ^a	6,300 ^a	>10,000 ^a	3,300 ^a	4,200 ^a	6000 ^b	400,000 ^b
Environmental (80%) ^c	60 ^d	-	15 ^d	12 ^d	400 ^d	190 ^d	900 ^d	0.75 ^c	105 ^c	285 ^d
Environmental (60%) ^c	150 ^d	-	17 ^d	35 ^d	660 ^d	330 ^d	2500 ^d	0.75 ^c	105 ^c	450 ^d
Predicted Background Soil Concentrations ^d	4.1	-	4.6	0.2	15.5	15.7	11.4	-	9.5	47.5
WRC Background ^f	6.8	-	6.7	0.22	30	25	20	0.23	7.6	53
Cleanfill Disposal Outside of High-Risk Locations (If less than 2500m³) ^g	17	-	15	0.8	56	120	78	1	33	175
Class A Landfill WAC ^h	100	200	400	20	100	100	100	4	200	200

As - Arsenic, Be - Beryllium, B - Boron, Cd - Cadmium, Cr - Chromium, Cu - Copper, Hg - Mercury, Pb - Lead, Ni - Nickel, Zn - Zinc
Cells highlighted in grey exceed SCS; bold text indicates value that exceed PBC; underlined text exceed environmental guidelines; text in italics exceeds Class A Landfill WAC; - indicates guideline not specified or not available.

- a) MfE 2012 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health,
b) National Environment Protection Council (NEPC) updated 2013. Guideline on Health-Based Investigation Levels and Ecological Investigation Levels. *=standard residential
c) Regional Council Interim Environmental Guidelines
d) Landcare Research (July 2023) An implementation framework for ecological guideline values. 80% and 60% trigger values.
e) Landcare Research Limited (June 2025) Predicted Background Soil Concentrations
f) Natural Background Soil Concentrations in the Waikato Region (Regional Council website, accessed 31/01/2019)
g) Information Received from a Senior Resource Officer at Regional Council dated 30 July 2018.
h) MfE 2004 Module 2 Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification

4.3.2 Persistent Pesticides

Results for persistent pesticides are presented in this section.

With regards to the composited samples analysed for a suite of persistent pesticides, latest guidance from the Ministry for the Environment advises that generally there is no requirement to adjust the SCS. Samples numbers with an asterisk (*) are compared against the Commercial guidelines.

All samples were within SCS for the relevant land use.

Table 9 below summarises results from analysis for detected pesticides.

Table 9: Results from Analysis for Detected Pesticides (all results in mg/kg).

Sample	Total DDT
HA07*	0.04
HA08*	1.3
HA15*	0.02
Composite A (R03, R04, R05, R06)	0.03
Composite B (R01, R02, R07, R08)	0.06
Composite C (R09, R10, R11)	0.03
Composite D (R12, R13, R18, R19)	0.02
Composite E (R14, R15, R16, R17)	0.06
SCS (residential)	70 ^a
SCS (Commercial)	1,000 ^a
Environmental (80%) ^c	4.8
Environmental (60%) ^c	11
Cleanfill Disposal Outside of High-Risk Locations (If less than 2500m ³) ^d	0.7
Class A WAC ^e	500

a) MfE 2012 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, \

b) US EPA 2009. Regional Screening Levels, Industrial Soil Table. It should be noted, guideline value relates to endrin only. Specific values for aldehyde and ketone were not available.

c) Landcare Research (July 2023) An implementation framework for ecological guideline values. 80% and 60% trigger values.

d) Information Received from a Senior Resource Officer at Regional Council dated 30 July 2018

e) MfE 2004 Module 2 Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification

4.4 Quality Control

The objectives of the sampling were to determine the concentration of contaminants across the site. The sample plan incorporated a grid-pattern in the paddock adjacent the yards to allow for statistical analysis.

Quality control included washing equipment between each sample location using laboratory grade detergent and deionised water and using fresh disposable gloves. Duplicate samples were collected.

4.4.1 Laboratory Quality Control

The laboratory undertook duplicate sampling on sample HA01 and R05. A typical data quality objective would be for a sample to be acceptable if the relative percent difference (RPD) for field duplicate samples is less than 30–50%, depending on the analyte. The RPD is calculated as:

$$\text{RPD} = \frac{(\text{Result No. 1} - \text{Result No. 2}) \times 100}{(\text{Mean result})}$$

For laboratory split samples, an RPD of 30-50% would typically be acceptable.

Table 10: Laboratory Duplicate Results

	HA01	HA01 (Laboratory Duplicate)	RPD
(As)	68.3	67.1	1.77
(Be)	0.13	0.13	0.00
(B)	<1.3	<1.3	-
(Cd)	0.26	0.25	3.92
(Cr)	20	19.5	2.53
(Cu)	25.7	26.2	1.93
(Pb)	11	10.8	1.83
(Hg)	0.033	0.03	9.52
(Ni)	2.8	2.3	19.61
(Zn)	182	183	0.55

Table 11: Laboratory Duplicate Results

	R05	R05 (Laboratory Duplicate)	RPD
(As)	3.7	3.6	2.74
(Be)	0.11	0.12	8.70
(B)	<1.3	<1.3	-
(Cd)	0.17	0.17	0.00
(Cr)	5.2	5.1	1.94
(Cu)	5.5	5.5	0.00
(Pb)	2.6	2.6	0.00
(Hg)	<0.025	<0.025	-
(Ni)	1.3	1.3	0.00
(Zn)	35.8	37	3.30

For this site, the laboratory quality control is considered adequate.

4.4.2 Field Quality Control

A duplicate sample was collected at location HA15, and labelled HA17, at R06 and labelled R20, and at R14 and labelled R21. The duplicate sample was submitted for analysis for a suite of metals.

A typical data quality objective would be for a sample to be acceptable if the relative percent difference (RPD) for field duplicate samples is less than 30–50%, depending on the analyte. The RPD is calculated as:

$$\text{RPD} = \frac{(\text{Result No. 1} - \text{Result No. 2}) \times 100}{(\text{Mean result})}$$

Table 12: Field Duplicate Results

	HA15	HA15 (Field Duplicate HA17)	RPD
(As)	1.2	1.2	0.00
(Be)	0.078	0.078	0.00
(B)	<1.3	<1.3	-
(Cd)	0.076	0.07	8.22
(Cr)	2.3	2	13.95
(Cu)	3.8	3.7	2.67
(Pb)	2	2.1	4.88
(Hg)	<0.025	<0.025	-
(Ni)	0.76	0.74	2.67
(Zn)	23.5	21	11.24

Table 13: Field Duplicate Results

	R06	R20 (Field Duplicate R06)	RPD
(As)	2.3	2.1	9.09
(Be)	0.089	0.085	4.60
(B)	<1.3	<1.3	-
(Cd)	0.093	0.078	17.54
(Cr)	2.9	2.5	14.81
(Cu)	6.2	5.2	17.54
(Pb)	1.8	1.8	0.00
(Hg)	<0.025	<0.025	-
(Ni)	0.99	0.86	14.05
(Zn)	22.4	20.1	10.82

Table 14: Field Duplicate Results

	R14	R21 (Field Duplicate R14)	RPD
(As)	2.9	2.8	3.51
(Be)	0.15	0.15	0.00
(B)	1.4	<1.3	-
(Cd)	0.27	0.23	16.00
(Cr)	4.3	3.5	20.51
(Cu)	7.2	5.8	21.54
(Pb)	2.9	2.8	3.51
(Hg)	<0.025	<0.025	-
(Ni)	2.1	1.3	47.06
(Zn)	27.3	23.6	14.54

For this site, the field quality control is considered adequate.

5.0 SITE CHARACTERISATION

5.1 Type of Environmental Contamination

The term contaminant refers to a substance that is not normally present in the environment. For this report however, the following operational definition is used: a contaminant is a substance that is present at levels that might cause harmful effects to humans or the environment. Therefore, this report does not consider whether or not the levels present are from natural sources or not, but only whether or not contamination is likely to, or does, exist above safe levels, i.e. SCS.

The results from analysis of samples taken at site indicate that contaminants are present at levels above SCS, and therefore, the site is contaminated with respect to the operational definition given above. Results of exceedances are summarised in Table 15 below.

Table 15: Summary of Environmental Contamination at Site.

Contaminant	SCS	Range of Exceedances
Arsenic (As)	17	1,059%
Lead (Pb)	160	1,188%

5.2 Extent of Environmental Contamination

From the data available, it appears that soils within the vicinity of sample location R11 (situated in the paddock) are affected by elevated arsenic and lead concentrations above SCS guideline values for a rural residential land use, these soils are also affected by arsenic, copper, lead and zinc concentrations elevated above environmental guidelines and Class A Landfill WAC.

The source(s) of the contamination is not confirmed, however the most likely source of elevated arsenic, copper, lead and zinc at sample R11 is considered to be associated with items that may have historically been stored in this location.

Additional soil sampling to further delineate the vertical and horizontal extent of the elevated arsenic, copper, lead and zinc is recommended as part of the proposed Remediation Action Plan/Site Management Plan (see Section 6).

The foregoing provides an assessment of the extent of the contamination at the site based on the information at hand, however it should not be regarded as definitive due to the preliminary nature of this investigation.

5.3 Potential for Degradation and Interaction

5.3.1 Arsenic

All rocks contain some arsenic. Some igneous and sedimentary rocks may contain higher arsenic concentrations. The sources of arsenic in soils are both geochemical and anthropogenic. Metallic arsenic is mainly used for strengthening alloys or copper and lead. Arsenic is used in semiconductor electronic devices. Arsenic compounds were historically used for the production of pesticides. Indiscriminate use of arsenic pesticides during the early to mid-1900s has led to extensive contamination of soils worldwide.

Arsenic is considered to be persistent in the environment, and unlikely to degrade at a rate that would be beneficial to occupiers. Inhalation and ingestion are the two routes of exposure. Long-term exposure to arsenic in drinking water is causally related to increased risks of cancer in the skin, lungs, bladder and kidney. Occupational exposure to arsenic by inhalation is causally associated with lung cancer. Arsenic can cause clastogenic damage in different cell types with

different endpoints in exposed individuals and in cancer patients. For point mutations, the results are largely negative. Arsenic can also inhibit degradation of any organics by adversely affecting microbial action in site soils if levels are high enough.

5.3.2 Lead

The general forms of lead that are released to the environment are ionic lead, lead oxides and hydroxides, and lead-metal oxyanion complexes. Inhalation and ingestion are the two routes of exposure, and the effects from both are the same. Lead accumulates in the body organs which may lead to poisoning or even death. The gastrointestinal tract, kidneys and central nervous system are also affected by the presence of lead. Children exposed to lead are at risk for impaired development, lower IQ, shortened attention span, hyperactivity and mental deterioration. Adults usually experience decreased reaction time, loss of memory, nausea, insomnia, anorexia and weakness of the joints when exposed to lead.

In general, plants do not absorb or accumulate lead. However, in soils testing high in lead, it is possible for some lead to be taken up. Higher concentrations are more likely to be found in leafy vegetables and on the surface of root crops. Since plants do not take up large quantities of lead, the lead levels in soil considered safe for plants will be much higher than soil lead levels where eating of soil is a concern. Most of the risk is from lead-contaminated soil or dust deposits on the plants, rather than from uptake of lead by the plant. Lead activity decreases with increasing soil pH.

Inorganic lead is generally considered to be relatively immobile in soil and has limited plant uptake. Because lead is strongly adsorbed to soil, it generally is retained in the upper layers of soil and does not leach appreciably into the subsoil and groundwater. Lead compounds may be transformed in the environment to other lead compounds; however, lead is an element and cannot be destroyed. Many anthropogenic sources of lead have been eliminated or strictly regulated due to lead's persistence and toxicity. Because lead does not degrade, these former uses leave their legacy as higher concentrations of lead in the environment.

5.4 Additional Risk Assessment

As some soil exceeded the soil contaminant standards, additional assessment of the paddock area has been undertaken to determine whether soils would be considered acceptable.

The 95% UCL gives an indication of the expected levels of contaminants across a given site. MfE guidelines outline a few conditions for use of statistical analysis, described below:

Table 16: Requirements for Statistical Analysis

Condition	Comment
A sufficient number of data points must be present to allow the analysis to be performed with accuracy (refer also to section 7.3.3). The number of data points will vary depending on the statistical test to be performed.	A minimum of 8-10 samples are required. Our dataset has 19 samples.
Statistics that rely on the assumption of a normal distribution should be performed only on data that is demonstrated to be normal.	Data appears to be normally distributed.
The data should be from the same statistical population (e.g., no inclusion of results representative of 'hotspots' in data sets used to calculate averages or means) (refer also to section 4 and section 7.4).	Samples collected on an approximate grid basis.

There must not be an over-representation of sample results that are below the laboratory limit of detection (refer to section 7.2.1).	No results are below laboratory detection limits.
---	---

As the sample contained concentrations of arsenic and lead, more than twice the SCS, the 95% UCL cannot be applied to this site. Remediation or Site Management is recommended.

5.5 Exposure Routes and Risks to Exposed Populations

For human health, exposure is the primary concern, and below we summarise ways by which exposure is most likely to occur:

- Surface soils (0-1 m)
 - Soil ingestion
 - Dermal contact (absorption through skin), and
 - Inhalation of soil, dust, or volatized contaminants.
- Sub-surface soils (> 1 m)
 - Water-borne migration of contaminants to surface during times of high rainfall (enabling exposure via all three routes above); and
 - Inhalation via diffusion of vapour-phase contaminants to the surface.

Of these exposure routes, ingestion and inhalation are likely because arsenic and lead were detected in site soils above SCS for a rural residential use.

The remaining exposure routes are less likely because arsenic and lead are unlikely to be absorbed through dermal contact.

Since there are contaminants at levels that exceed SCS, and there are exposure routes by which site users could be exposed. Since guideline values are risk-based and designed to minimise human health risks, these two points for the basis for identifying a potential unacceptable risk to users.

There are contaminants detected at levels that exceed SCS. Table 17 therefore shows a conceptual site model **with linkage** between contamination source, pathways and receptors.

Table 17: Conceptual Site Model

Source	Receptor	Pathway	Pathway Complete?
Cadmium from fertilizer use on grazing land. HAIL category I: Any land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.	Construction workers	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that is a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that is a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – Site is production land. Significant Contaminant sources not identified.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – Short term exposure only. Contaminant sources not identified.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into	Incomplete Pathway – No significant contamination sources identified.

Source	Receptor	Pathway	Pathway Complete?
		surface water discharging into nearby watercourses.	
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – No significant contamination sources identified that would impact groundwater, however groundwater testing is recommended prior to any abstraction and use for human consumption.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – No significant contamination sources identified that would impact biota.
Stockyards and potential sheep dip and run off paddock. HAIL category A.8: Livestock dip or spray race operations	Construction workers	Dermal contact	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible for contaminants associated with HAIL A.8.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health with a change in land use from production land to rural residential.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health with a change in land use from production land to rural residential.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – It is unlikely that contaminants associated with HAIL use would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses.	Incomplete Pathway – Contaminants are not present at a level that will migrate to surface water
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Contaminants are not present at a level that will migrate to ground water
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – Contaminants are not present at a level that will impact the biota.
Above ground bulk fuel storage tank on 40 Kaiapo Rd HAIL category A17: Storage tanks or drums for fuel, chemicals or liquid waste	Construction workers	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that is a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that is a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – Site is production land. Significant Contaminant sources not identified.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – Short term exposure only. Contaminant sources not identified.
		Ingestion	
		Inhalation of dust/vapours	

Source	Receptor	Pathway	Pathway Complete?
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses.	Incomplete Pathway – No significant contamination sources identified.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – No significant contamination sources identified that would impact groundwater, however groundwater testing is recommended prior to any abstraction and use for human consumption.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – No significant contamination sources identified that would impact biota.
Minor Point Sources of contamination.	Construction workers	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that is a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants are present at a level that is a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – Site is production land. Significant Contaminant sources not identified.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – Short term exposure only.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses.	Incomplete Pathway – No significant contamination sources identified by waterways.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – No significant contamination sources identified that would impact groundwater, however groundwater testing is recommended prior to any abstraction and use for human consumption.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Potentially Complete Pathway – Contaminants are elevated above ecological protection guidelines, although isolated and currently away from significant ecological receptors.

5.6 NES Consents

The National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) outlines various 'Permitted Activities' (not requiring consent) and 'Controlled, Restricted Discretionary and Discretionary Activities' (requiring resource consent). The advice of a planner should be sought to ensure all consent requirements are met.

Persistent pesticides (DDT) were detected in site soils, albeit at a very low level, additionally arsenic and lead were detected above SCS guidelines for a residential land use in some samples. As no lindane (an organochlorine pesticide common in sheep dips) was identified and arsenic was at very low levels within the stockyard area, it is considered more likely than not that a sheep dip or spray race operation (HAIL A.8) **did** occur, however did not result in contamination. It is considered more likely than not that an intentional or accidental release of a hazardous substance (**HAIL I**) occurred in the vicinity of sample location R01. This area of site is considered to be a "piece of land" under NES legislation. In Figure 6 below, the light blue lines represent the approximate areas identified as a piece of land.



Figure 6: Areas On-Site Identified as a "Piece of Land"

There is no evidence to suggest that the remainder of the site has been subject to HAIL activities. National Environmental Standard rules relating to the subdivision, land use change or soil disturbance do not apply to the remainder of the site as it is not considered to be a "piece of land".

5.6.1 Subdivision and Land Use Change

Stockyard and Run Off Paddock (Piece of Land)

Section 8(4) of the NES states that subdivision or land use change is a Permitted Activity, provided a PSI exists, and the PSI states that it is highly unlikely that there will be a risk to human health. The act of subdivision itself, by simply altering lines on a plan, does not create any additional risk, provided that no change in use occurs. A change in use can include constructing buildings where there were none previously, even if the overall zoning stays the same.

Section 10 states land use change or subdivision is a Restricted Discretionary activity if contaminants are above guidelines.

The results from the analysis of samples undertaken as part of this CSI indicate that concentrations of contaminants within the stockyards where HAIL A.8 is likely to have occurred are below the adopted criteria. However, due to the localized presence of unacceptable levels of contaminants in the surrounding area, it cannot be stated that it is highly unlikely there is a risk to human health. The proposed change of land use cannot be considered a “Permitted Activity” under NES legislation.

Of the 34 individual soil samples analysed, 1 sample contained elevated concentrations of arsenic and lead above SCS guidelines for the applicable land use. It is likely that the District Council will require a **Restricted Discretionary Consent** for any future subdivision or land use change in this area.

5.6.2 Earthworks

Stockyard and Run Off Paddock (Piece of Land)

The NES sets permitted standards in relation to soil disturbance under Regulation 8(3).

The Piece of Land area is approximately 14,150m². Based on calculations provided in the NES, approximately 707m³ may be disturbed and 142m³ removed as a permitted activity. There are other criteria regarding permitted activities that a planner will be able to assist with. Exceedance of permitted volumes and other criteria means a consent may be required by the local council.

Geohazard Environmental Ltd has not been provided with details relating to the potential earthworks associated with the proposed development. Therefore, the potential for the earthworks associated with the development to require consent cannot be fully discounted at this stage.

In the event future soil disturbance does exceed Permitted Activity criteria, a **Restricted Discretionary Consent** would likely be required. Furthermore, as soils are in excess of applicable guidelines, a Remediation Plan and/or Site Management Plan is likely to be required as part of any earthworks consent.

5.7 Other Consent Requirements

Our assessment is that it is likely contaminants would be present in the stockyard and adjacent drip dry paddock in concentrations likely to pose a hazard to human health or the environment. Furthermore, our assessment is that it is unlikely contaminants would be present over the remainder of the site in concentrations likely to pose a hazard to human health or the environment.

Soils for removal as part of the proposed development (if required) above background levels but within guidelines for the protection of human health and the environment will require consent for disposal to non-landfill sites if they are placed in a location where they may enter water. Soils imported to site above background levels will require consent from the Regional Council.

The advice of a planner should be sought to ensure all consent requirements are met.

6.0 PROPOSED SITE REMEDIATION/MANAGEMENT OPTIONS

As the site is planned to be redeveloped for rural residential use, Remediation and/or Site Management is required in the vicinity of sample R11 in the vicinity of the stockyards in the north of 37 Kaiapo Rd..

Potential remedial works could include several options, which are outlined below. Other remedial options may be available but are generally not suitable for rapid development, e.g. bioremediation. A full Remediation Action Plan and/or Site Management Plan is likely to be required as part of any Resource Consent application.

6.1 Remediation Objectives

The objective of any remediation is to remove linkages between the source and receptors. The linkages can be removed by either:

- Restricting access to affected soils (for example, by installing a cap).
- Excavation and removal of all affected soils, thereby removing the source.
- Soil mixing.
- A combination of the above.

These remediation/management techniques are briefly described below. The Client may elect which option they choose and advise the District Council accordingly.

6.2 Option 1 – Remediation Earthworks

Excavation of the identified impacted soil, and removal to an appropriate disposal location (such as a Class A Landfill facility). Confirmation of acceptance from the selected landfill facility will be required prior to undertaking the works. Any imported soils brought onto the site (used for backfilling, site levels etc) must be verified as clean. This is best done at the source rather than importing soils and then testing.

In order to identify volumes for removal, further soil sampling would need to be undertaken to delineate the horizontal and vertical extent of the contamination.

Once the excavation/removal has been undertaken, a Site Validation Report (SVR) would then be required (detailing the remedial works that were undertaken and results from any validation sampling undertaken etc.)

Advantages:

The site would likely be tagged as “remediated” on the Council file, and no on-going site monitoring and management plan would be required. Any future earthworks will not likely require specific protective measures or environmental controls for ground contamination etc.

Disadvantages:

Time and cost implications (for example, obtaining the relevant consents, reporting requirements, undertaking more sampling to delineate the extent of the contamination, undertaking the earthworks, transporting the soil to an appropriate facility, as well as landfill fees etc.)

6.3 Option 2 - Site Management (Capping)

A cap over affected soils aims to remove the pathway between the source and the receptor. The cap may include a 'hard cap' (e.g. concrete, gravel or asphalt etc.), or 'soft cap' (e.g. a layer of imported clean soils).

With regards to a soft cap, imported soils can be sourced from any suitable location. Testing of imported soils is required to ensure that additional contaminants are not brought onto site soils. A minimum depth of verified clean imported soils includes:

- 300mm of clean soils if vegetables are grown in site soils.
- 100mm if raised vegetable gardens are to be used.

In addition to the soil, a physical indicator layer (such as a geotextile cloth) is required beneath imported soils.

For hard capping, the depth of soil removed can be limited to the minimum required to develop a suitable sub-base and may be less than 300mm. However, any topsoil excavated within the proposed capping area will need to be handled and disposed of correctly (i.e. to a Class A Landfill Facility).

If this option is selected, further soil sampling should be undertaken to delineate the extent of the contamination to identify the size of the area which required capping. A Site Management Plan would be required (detailing the management objectives and goals, the capping methodology, dust/odour controls, worker protection, contingency and notification, duty to disclose, and ongoing long-term site management requirements).

Advantages:

It is typically expected to be less expensive to implement than compared with Option 1, depending on the size of the area (which is still to be delineated at this stage).

Disadvantages:

There would be on-going site management requirements (such as maintenance of the cap, controls regarding gardens/play areas on-site, and any future earthworks etc.)

In the event of any future earthworks, and/or any future removal of site soils below the cap, the owners would be responsible for the disposal of any soil to landfill, and for the reinstatement of the cap. Consent requirements would likely apply under the NES.

It should be noted that information regarding the site's soil quality would likely be included in Council LIM as part of public records, and a Consent Notice would likely be registered onto the title of the land.

6.4 Option 3 – Soil Mixing

Soil mixing involves ploughing site soils to mix affected surface soils with unaffected deeper soils. It is suitable for sites where contaminant concentrations are relatively low, uniform across the site, and likely to be at shallow depths.

The calculation provided by PDP in their report *Guideline for Contaminated Land Remediation by Soil Mixing* is used to estimate the appropriate mixing depth. The mixing depth in this section is provisional and dependant on further information regarding the vertical extent of contamination and additional data to determine a suitable site average.

Mixing depth calculation:

$$Y = \frac{x(a - b)}{0.9(SCS) - b}$$

Where:

Y = estimated vertical mixing depth (mm)

x = depth of soil profile where contamination is expected at level “a”

a = average concentration of contaminant at depth x (mg/kg)

b = average concentration of contaminant in underlying soils

SCS = soil contaminant standard.

A suggested mixing depth has not yet been calculated as area has not been delineated.

If this option is selected, further soil sampling should be undertaken to delineate the extent of the contamination to identify the size of the area which requires mixing, as well as the depth of the contamination. A Site Management Plan would be required (detailing the management objectives and goals, the methodology, dust/odour controls, worker protection, contingency and notification, duty to disclose, and any ongoing long-term site management requirements).

Advantages:

If successful, this option is typically expected to be less expensive to implement than compared with Options 1 and 2.

Disadvantages:

There is the potential for mixing to be unsuccessful, and it could result in spreading the contamination.

It should be noted that information regarding the site's soil quality would likely be included in Council LIM as part of public records, and a Consent Notice would likely be registered onto the title of the land.

6.5 Completion Reporting

A Completion Report, known as a “Site Validation Report” (SVR) is usually required when remedial works are undertaken. The following information is typically retained and presented at completion of the works:

- Volumes and locations of any soil excavated and removed from the site.
- Provision of as-built plans.
- Transport operator details.
- Details of disposal location.
- Receipts from landfill operators showing the date and volume or tonnage of soil disposed.
- Details of any contingency measures invoked.
- Details of any additional sampling undertaken.
- A photographic record of works as they progress.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary and Conclusions

The following summarises results from Geohazard Environmental Ltd.'s preliminary investigation of the site:

- **Overall, the majority of the site is suitable for a proposed low density residential land use.**
- The site currently supports undeveloped grazing land with a dwelling (40 Kaiapo Rd), woolshed (37 Kaiapo Rd), 2 sets of animal handling yards and auxiliary buildings. It is understood that the site is planned to be subdivided and redeveloped for mixed, predominantly rural-residential use.
- Geohazard Environmental Ltd undertook a Preliminary Site Investigation dated December 2021 (ref.: 211003) for a proposed subdivision site at 15 Kaiapo Rd (Lot 1 DP 337255), this subdivision has now been completed and the residue amalgamated with 37 Kaiapo Rd sometime between 2023 and 2026.
 - Samples were collected on a 30m grid basis, composited by the laboratory and tested for cadmium.
 - All samples were within SCS guidelines for a rural residential use.
 - The report found that *"The site **is not** considered to be a "Piece of Land" under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply."* And that for the avoidance of doubt, it is highly unlikely the proposed rural-residential use will present a risk to human health.
- Geoscience Ltd Limited Detailed Site Investigation dated February 2022 (ref.: REP-H0180/DSI/FEB22/REV1) for 40 Kaiapo Rd (Lot 1 DP 410435).
 - A site investigation identified a small, isolated area impacted by diesel refuelling, the report found that the identified hydrocarbon staining was aesthetic in nature rather than representative of gross contamination.
 - Field sampling for cadmium was undertaken, and the results are included in section 4.3.1 of this report. Samples were collected from the paddocks where it was clear uniform application of fertilizers would have occurred and limited to the flat areas where accumulation would occur. The samples were composited by the lab into 7 composite samples comprised of 4 subsamples.
 - All samples were within SCS guidelines for a rural residential (and therefore also residential) use.
 - The report found that *"The site **is not** considered to be a "Piece of Land" under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply."* And that for the avoidance of doubt, it is highly unlikely the proposed rural-residential use will present a risk to human health.
- Aerial images indicate that from at least 1945 the site was assumed undeveloped grazing land. By 1967 a dwelling had been constructed on 40 Kaiapo Rd and a woolshed erected on 37 Kaiapo Rd. In 1975 the wider land parcel was leased to a **farmer**. By 1979 stockyards had been constructed adjacent the woolshed on 37 Kaiapo Rd.

- More recent aerial images indicate that by 2008 land disturbance (likely tilling for recontouring) had been undertaken on 37 Kaiapo Rd and that a bush block had been established in the north of 40 Kaiapo Rd. By 2014 a haybarn had been constructed and land disturbance (likely tilling for recontouring) undertaken on 40 Kaiapo Rd.
- The entire site area of c.335ha was viewed from 3 vantage points and a site walkover of the area surrounding the woolshed was undertaken on 8 February 2023. Geohazard Environmental Ltd staff returned to site on 20 February to collect soil samples from the woolshed and stockyard area.
 - The potential for ground contamination from sheep dip and spray race operation and run-off paddocks was confirmed by the presence of stockyards; however, no evidence of a sheep dip was observed.
 - Stockyards and holding pens with a 200-300 litre above ground diesel tank were located 150m west of the eastern boundary of 40 Kaiapo Rd. There was light superficial hydrocarbon staining (c.30m²) around the diesel tank and a test pit dug by Geoscience Ltd Staff during their site investigation on 19 January 2022 found that the impact was superficial and limited to the top 50mm of the soil profile. No evidence of a stock dipping or spray race operations were seen by Geoscience Ltd staff at 40 Kaiapo Rd.
 - There was no evident sign of significant widespread contamination over the remainder of the site. The absence of odour during the site inspection is consistent with there being no obvious indications of gross contamination at the site.
- It is more likely than not that **HAIL A.8: Livestock dip or spray race operations** occurred in the vicinity of the stockyards in the north of 37 Kaiapo Rd (but did not result in significant contamination, refer below). Furthermore, it is also considered more likely than not that **HAIL I: Any land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment** occurred in the vicinity of sample location R01 in the north of 37 Kaiapo Rd. This area of site is considered to be a “**piece of land**” under NES legislation.

Soil Sampling

- 57 surface level soil samples were collected on a 30m grid basis from across the subdivision site of 15 Kaiapo Rd, these were composited by the Laboratory into 15 composite samples and analysis undertaken for cadmium.
 - All samples were within SCS for a rural residential land use.
- 19 surface level soil samples were collected on a 20m grid basis from across the run-off paddocks adjacent the stockyards and woolshed on 37 Kaiapo Rd. The samples were analysed for a suite of metals. Additionally, samples were composited by the Laboratory into 5 composite samples and analysis undertaken for persistent pesticides.
 - Arsenic and lead concentrations in sample R11 exceeded SCS guidelines for a rural residential use.
 - Arsenic, copper, lead and zinc concentrations in sample R11 exceed environmental guidelines and Class A landfill waste acceptance criteria (WAC).
 - All remaining samples were within SCS for a rural residential land use.

- 15 targeted samples were collected from the stockyard and woolshed area of 37 Kaiapo Rd. These samples were analysed for a suite of metals and persistent organochlorine pesticides.
 - All samples were within SCS guidelines for a commercial land use.
- Geoscience Ltd collected 28 samples from 7 paddocks (4 samples per paddock) at 40 Kaiapo Rd where uniform application of fertilisers would have been undertaken, targeting flat areas where accumulation could occur. Samples were composited by the laboratory and analysed for cadmium.
 - All samples were within SCS for a rural residential land use.
- From the data available, it appears that soils within the vicinity of sample location R11 (situated in the run off paddock) are affected by elevated arsenic and lead concentrations above SCS guideline values for a residential land use, these soils are also affected by arsenic, copper, lead and zinc concentrations above environmental guidelines and Class A Landfill WAC.
- The source(s) of the contamination is not confirmed, however the most likely source of elevated arsenic, copper, lead and zinc at sample R11 is considered to be associated with items that may have historically been stored in this location.
- A Remediation Action Plan or Site Management Plan is likely to be required for this very limited area.
- As contaminants are above applicable criteria, it is considered likely that the District Council will require a **Restricted Discretionary Consent** in the piece of land area. This will include provision of a Remediation Action Plan or Site Management Plan, followed by a Validation Report.
- The remaining areas of the site **are not** considered to be a "Piece of Land" under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply.
 - For the avoidance of doubt, it is highly unlikely the proposed residential use on the remainder of the site will present a risk to human health.
- Due to the nature of this investigation, it is not possible to detail the full extent of contamination at the site and neighbouring sites, and there remains a possibility that the site may have been impacted by previous site activities to a degree greater than apparent from results reported herein.

The extent of any contamination at the site beyond the area of focus for this report and neighbouring sites is unknown at this stage

7.2 Recommendations

The advice of a planner should be sought, or contact made with the District and Regional Councils, prior to undertaking any earthworks at the site, to ensure all rules are complied with.

Based on the results of this investigation, the vast majority of the site is suitable for the proposed rural-residential use.

Geohazard Environmental Ltd recommend to Breda Investments Ltd that a further assessment of the site be conducted to better constrain the nature, extent, and impact contaminants detected in soil samples taken from the site, in accord with the MfE Guidelines for the Management of Contaminated Land.

It is envisaged that the assessment would comprise of the following:

- Soil sampling at surface and depth in the vicinity of sample locations HA01 and R11, refer to Appendix B drawing No. 002.
- Preparation of a Remediation Action plan or Site Management Plan.

7.3 Further Client Actions

If soil is to be taken off site or undergo earthworks, consent requirements must be checked for both the site and the receiving environment. A planner can assist with this.

Soils above background levels but below conservative residential guidelines and/or environmental protection guidelines may still not be suitable for cleanfill. The disposal location should be assessed for compliance with all rules (for example proximity to water).

8.0 REFERENCES

GNS Science (GNS) GeoAtlas, <http://data.gns.cri.nz/geology/> accessed 25.01.23.

Landcare Research (2016) *Background soil concentrations of selected trace elements and organic contaminants in New Zealand*.

Landcare Research, 2022, *S-Map Online*, <https://smap.landcareresearch.co.nz/maps-and-tools/app/> accessed 25.01.23.

Ministry for the Environment (MfE) 2011. *Contaminated Land Management Guidelines No.1: Reporting on Contaminated Site's in New Zealand. Revised 2021*.

Ministry for the Environment (MfE) 2004. *Contaminated Land Management Guidelines Schedule A: Hazardous Activities and Industries List (HAIL) and Schedule B: Hazardous Activities and Industries List (HAIL) with Hazardous Substances*.

Ministry for the Environment (MfE) 2011. *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils. Revised 2021*.

Ministry for the Environment (MfE) 2011. *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values*.

Ministry for the Environment (MfE) 2012 *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*.

National Institute of Water and Atmospheric Research (NIWA) 2011. *The National Climate Database*, <http://cliflo.niwa.co.nz/> -accessed 25.01.23.

National Environment Protection Council (NEPC) 1999. *Guideline on Health Based Investigation Levels (updated 2013)*.

US EPA 2009. *Regional Screening Levels, Industrial Soil Table*, <http://www.epa.gov/region09/superfund/prg/> -updated January 2015.

Waikato Regional Council (2009) *Erosion & Sediment Control Guidelines for Soil Disturbing Activities*.

9.0 STATEMENT OF QUALIFICATION

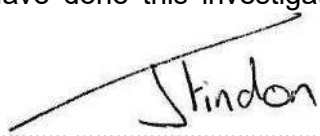
A Suitably Qualified and Experienced Practitioner (SQEP) is required to certify reports in accordance with Ministry for the Environment Guidelines. Holding accreditation under a program such as the Certified Environmental Practitioner scheme is one way of showing competence as a SQEP, but not the sole method. The 2021 Revision of the Contaminated Land Management Guidelines points to the National Environmental Standards Users Guide, which states:

The person certifying the report on behalf of their company would be expected to be a senior or principal scientist/engineer with a relevant tertiary education and with at least 10 years of related experience.

I, Jonathan Findon of Geohazard Environmental Ltd certify that this Report meets the general requirements of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the NESCS) because it has been:

- Done by a suitably qualified and experienced practitioner, and
- Reported on generally in accordance with the current edition of Contaminated Land Management Guidelines No 1 – Reporting on Contaminated Sites in New Zealand, and
- The report is certified by a suitably qualified and experienced practitioner.

Evidence of the qualifications and experience of the suitably qualified and experienced practitioner(s) who have done this investigation and certified this report have been provided previously.

Signed and dated:  (14 May 2026)

APPENDIX A

Historical Certificates of Title



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R. W. Muir
Registrar-General
of Land

Search Copy

Identifier 152831
Land Registration District South Auckland
Date Issued 24 April 2007

Prior References

SA52B/111

Estate Fee Simple
Area 35.6752 hectares more or less
Legal Description Lot 1 Deposited Plan 337255

Proprietors

Kaiapo Bay Limited

Interests

Subject to Section 3 Petroleum Act 1937

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Section 261 Coal Mines Act 1979

Subject to Sections 6 and 8 Mining Act 1971

Subject to Section 5 Coal Mines Act 1979

Subject to a right to convey electricity easement over parts marked A & B on DP 337255 created by Easement Instrument 8475625.1 - 28.4.2010 at 12:00 pm

The easements created by Easement Instrument 8475625.1 are subject to Section 243 (a) Resource Management Act 1991

8508832.1 Resolution pursuant to Section 243(f)(ii) Resource Management Act 1991 cancelling the easement condition on plan DP 337255 described in marked B and C on DP 337255 - 3.6.2010 at 9:14 am



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R. W. Muir
Registrar-General
of Land

Search Copy

Identifier 152832
Land Registration District South Auckland
Date Issued 24 April 2007

Prior References

SA52B/111

Estate Fee Simple
Area 80.1285 hectares more or less
Legal Description Lot 2 Deposited Plan 337255

Proprietors

Kaiapo Point Limited

Interests

Subject to Section 3 Petroleum Act 1937

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Section 261 Coal Mines Act 1979

Subject to Sections 6 and 8 Mining Act 1971

Subject to Section 5 Coal Mines Act 1979

5722729.1 Esplanade Strip Instrument pursuant to Section 232 Resource Management Act 1991 - 9.9.2003 at 9:00 am

Appurtenant hereto is a right to convey electricity easement created by Easement Instrument 8475625.1 - 28.4.2010 at 12:00 pm

The easements created by Easement Instrument 8475625.1 are subject to Section 243 (a) Resource Management Act 1991

8593528.1 Mortgage to Colin Alfred Carran and Patricia Anne Carran - 2.3.2011 at 4:20 pm

8593528.2 Mortgage to Colin Alfred Carran, Patricia Anne Carran and Allan Keith Carran - 2.3.2011 at 4:20 pm

Identifier

152832

Approvals	
Registered Proprietors	
I hereby certify that this plan was approved by the Taupo District Council pursuant to the Resource Management Act 1991, and the Land Information Act 1994, on the 24th day of December 2005, subject to the granting or reserving of the easements set out in the Memorandum hereon.	
<i>Caroline</i> Mayor, Taupo District Council	
MEMORANDUM OF EASEMENTS	
Purpose Shown	Serv. Tene. Dem. Tene.
Right to	A. b Lot 1 hereon Lot 2 hereon
Electricity	
MEMORANDUM OF EASEMENTS IN GROSS	
Purpose Shown	Serv. Tene. Grantee
Right to	a. c Lot 1 hereon
Electricity	Network Limited
NOTE: Lot 2 hereon is subject to an easement strip pursuant to sect 233 of the Resource Management Act 1991. See the document 152218.	
CLASS of Survey II	
C's T. Allocated	
Lot 1 152831	
Lot 2 152832	
Total Area	119 8037 ha
Contracted to:	SAAS/26/11
New Zealand Survey This plan is subject to the provisions of the Land Information Act 1994 and the Resource Management Act 1991. (a) The survey is made in accordance with the Survey Act 2002 and the Survey Regulations 2002. (b) This plan is subject to the provisions of the Land Information Act 1994 and the Resource Management Act 1991.	
Surveyor	John A. Smith
Field Book	152832
Reference Map	SO 45051, DP 52742, DP 54151
Consent	
Approved as the survey by Land Information New Zealand on	
04/12/2006	
Deposited by Land Information New Zealand on	
24/12/2007	
File	19110 cbs
Reference	DP 337255
Approved by the Council	

Surveyed by: CHEAL CONSULTANTS	
Scale: 1:5000	Date: December 2005
LOTS 1 & 2 BEING A SUBDIVISION OF PT. SEC. 9 Bk IV TURINGAMATA EAST S.D.	
Land District: SOUTH AUCKLAND	Territorial Authority: TAUPŌ DISTRICT COUNCIL



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy**



R. W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **152831**
Land Registration District **South Auckland**
Date Issued 24 April 2007

Prior References

SA52B/111

Estate Fee Simple
Area 35.6752 hectares more or less
Legal Description Lot 1 Deposited Plan 337255

Original Registered Owners

Colin Alfred Carran and Patricia Anne Carran

Interests

Subject to Section 3 Petroleum Act 1937

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Section 261 Coal Mines Act 1979

Subject to Sections 6 and 8 Mining Act 1971

Subject to Section 5 Coal Mines Act 1979

SUBJECT TO SECTION 243(C) RESOURCE MANAGEMENT ACT 1991 (AFFECTS DP 337255)

Subject to a right to convey electricity easement over parts marked A & B on DP 337255 created by Easement Instrument 8475625.1 - 28.4.2010 at 12:00 pm

The easements created by Easement Instrument 8475625.1 are subject to Section 243 (a) Resource Management Act 1991

8508832.1 Resolution pursuant to Section 243(f)(ii) Resource Management Act 1991 cancelling the easement condition on plan DP 337255 described in marked B and C on DP 337255 - 3.6.2010 at 9:14 am

8476315.1 Transfer to Kaiapo Bay Limited - 10.6.2010 at 1:11 pm

12149543.1 Transfer to Breda Investments Limited - 30.6.2021 at 3:18 pm

12149543.2 Mortgage to Adrianus Johannes Dykzeul, Barbara Anne Dykzeul and Bill & Barbara Dykzeul Trustee Limited - 30.6.2021 at 3:18 pm



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Historical Search Copy



R. W. Muir
Registrar-General
of Land

Identifier SA52B/111
Land Registration District South Auckland
Date Issued 07 May 1993

Cancelled

Prior References
SA45C/872

Estate	Fee Simple
Area	115.8037 hectares more or less
Legal Description	Part Section 9 Block IV Tuhingamata East Survey District

Original Proprietors

Ailsa Elizabeth Johnson and James Sinclair Veitch as to a 1/2 share as Executors
Ailsa Elizabeth Johnson as to a 1/2 share

Interests

Subject to Section 36 (2) Counties Amendment Act 1961 (vide H075592 and H080112)
Subject to Section 3 Petroleum Act 1937
Subject to Section 8 Atomic Energy Act 1945
Subject to Section 3 Geothermal Energy Act 1953
Subject to Sections 6 and 8 Mining Act 1971
Subject to Section 5 Coal Mines Act 1979
Subject to Section 261 Coal Mines Act 1979
B567054.1 Mortgage to Rabo Wrightson Finance Limited - 14.9.1999 at 11.54 am
5722729.1 Esplanade Strip Instrument pursuant to Section 232 Resource Management Act 1991 - 9.9.2003 at 9:00 am
5978999.1 Discharge of Mortgage B567054.1 - 26.4.2004 at 9:00 am
5978999.2 Transfer to Colin Alfred Carran and Patricia Anne Carran - 26.4.2004 at 9:00 am
7336506.1 CTs issued - 24.4.2007 at 9:00 am

Legal Description	Title
Lot 1 Deposited Plan 337255	152831
Lot 2 Deposited Plan 337255	152832

CANCELLED

References

Prior C/T 45C/872

Transfer No.

N/C. Order No. B.138946.3

Land and Deeds 69

REGISTER

No. 52B/111

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 7th day of May one thousand nine hundred and ninety three under the seal of the District Land Registrar of the Land Registration District of SOUTH AUCKLAND

WITNESSETH that JOHN ALAN JOHNSON of Taupo farmer and AILSA ELIZABETH JOHNSON his wife are seised of an estate in fee simple as tenants in common in equal shares

~~is seised of an estate in fee simple~~ (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 115.8037 HECTARES more or less being Part Section 9 Block IV Tuhingamata East Survey District

Assistant Land Registrar

SOUTH AUCKLAND

Pt. Sec. 9
115.8037 ha

Kaipō Road (20.12 wide)
29.753
78.2
185.13
421.27
Mapara Road (20.12 wide & Over)

Kaiapo Bay Scenic Res.

SO. 43531
Measurements are Metric

THIS CERTIFICATE IS AFFECTED BY THE FOLLOWING INTERESTS AS AT THE DATE OF ISSUE:

Subject to Section 36(2) Counties Amendment Act 1961 - vide H.075592 and H.080112

Subject to:

- Section 3 Petroleum Act 1937
- Section 8 Atomic Energy Act 1945
- Section 3 Geothermal Energy Act 1953
- Sections 6 and 8 Mining Act 1971 and
- Sections 5 and 261 Coal Mines Act 1979

B567054.1 Mortgage to Rabo Wrightson Finance Limited - 14.9.1999 at 11.54

B646632.1 Transmission of the 1/2 share of John Alan Johnson to Ailsa Elizabeth Johnson and James Sinclair Veitch as executors - 19.2.2001 at 11.12

A.L.R.

Handwritten initials

Handwritten initials

Handwritten notes: "of the 1/2 share of John Alan Johnson to Ailsa Elizabeth Johnson and James Sinclair Veitch as executors - 19.2.2001 at 11.12"

No. 52B/111

Transfer No.

N/C. Order No. B.138946.3



REGISTER

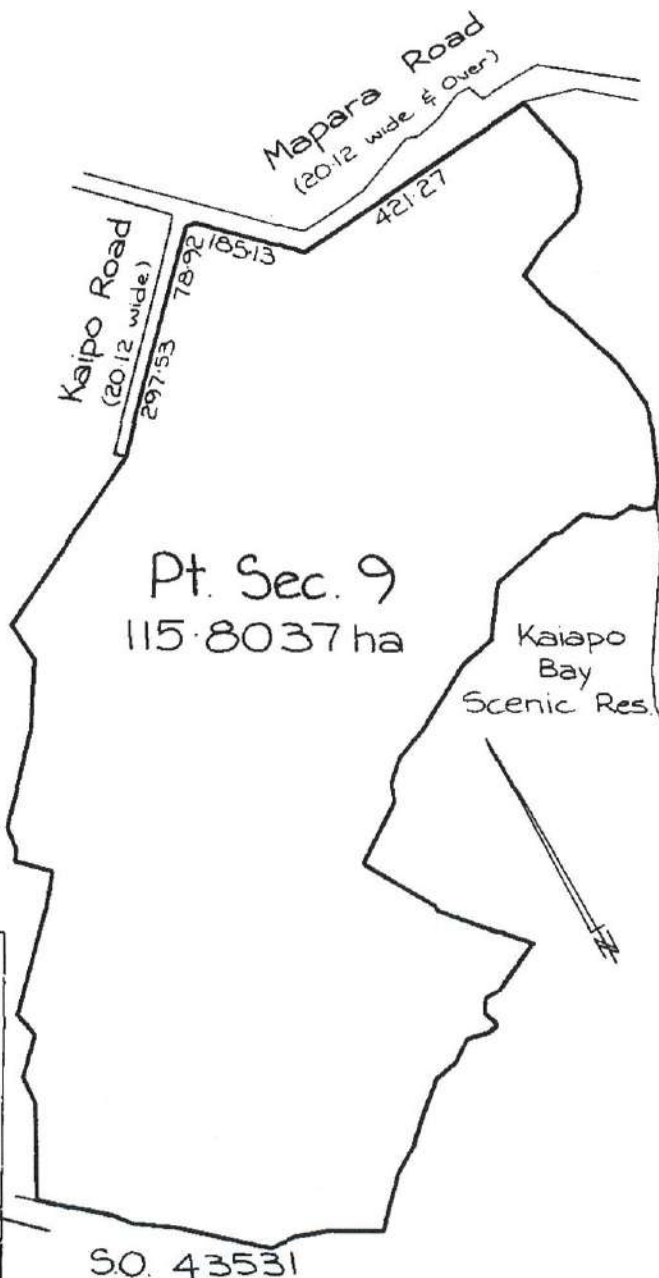
5

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 7th day of May one thousand nine hundred and ninety three under the seal of the District Land Registrar of the Land Registration District of SOUTH AUCKLAND

WITNESSETH that JOHN ALAN JOHNSON of Taupo farmer and AILSA ELIZABETH JOHNSON his wife are seised of an estate in fee simple as tenants in common in equal shares

~~in fee simple~~ (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 115.8037 HECTARES more or less being Part Section 9 Block IV Tuhingamata East Survey District



ASSISTANT LAND REGISTRAR

THIS CERTIFICATE IS AFFECTED BY THE FOLLOWING INTERESTS AS AT THE DATE OF ISSUE:

Subject to Section 36(2) Counties Amendment Act 1961 - vide H.075592 and H.080112

Subject to:

Section 3 Petroleum Act 1937
Section 8 Atomic Energy Act 1945
Section 3 Geothermal Energy Act 1953
Sections 6 and 8 Mining Act 1971 and
Sections 5 and 261 Coal Mines Act 1979

A.L.R.

B567054.1 Mortgage to Rabo Wrightson Finance Limited - 14.9.1999 at 11.54

B646632.1 Transmission of the 1/2 share of John Alan Johnson RGL to Ailsa Elizabeth Johnson and James Sinclair Veitch as executors - 19.2.2001 at 11.12

for RGL

S.O. 43531



Transfer No.
N/C. Order No. H.937516.21

CANCELLED REGISTER
DUPLICATE DESTROYED

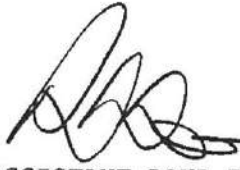
CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 7th day of March one thousand nine hundred and ninety under the seal of the District Land Registrar of the Land Registration District of SOUTH AUCKLAND

WITNESSETH that JOHN ALAN JOHNSON Of Taupo farmer and AILSA ELIZABETH JOHNSON his wife are seised of an estate in fee simple as tenants in common in equal shares

~~seised of an estate in fee simple~~ (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon. be the several admeasurements a little more or less, that is to say: All that parcel of land containing 150.9019 HECTARES more or less being part Section 9 Block IV Tuhingamata East Survey District

S.64757
25.2.93


ASSISTANT LAND REGISTRAR

THIS CERTIFICATE IS AFFECTED BY THE FOLLOWING INTERESTS AS AT THE DATE OF ISSUE:

Subject to:
Section 3 Petroleum Act 1937
Section 8 Atomic Energy Act 1945
Section 3 Geothermal Energy Act 1953
Sections 6 and 8 Mining Act 1971 and
Sections 5 and 261 Coal Mines Act 1979

Subject to Section 36(2) Counties Amendment Act 1961 - vide H.075592 and H080112

H.130838 CANCELLED BY THE TAUPŌ COUNTY COUNCIL - 19.5.1997 AT 16.56 o'clock
B.135501

A.L.R.

B.138946.2 Certificate pursuant to Section 224(c) Resource Management Act 1991 affecting DPS.64757 by The Taupo District Council - 7.5.1993 at 10.36 o'clock

A.L.R.

B.138946.3 ONCT) Cancelled and the following 7.5.1993) Cst issued

Part Lot 1 DPS.64757 - 52B/110
Residue - 52B/111

A.L.R.



CANCELLED
DUPLICATE DESTROYED

5043531

Prior C/T
D.P.L. 20D/673
Transfer No.
N/C. Order No. H.937516.13

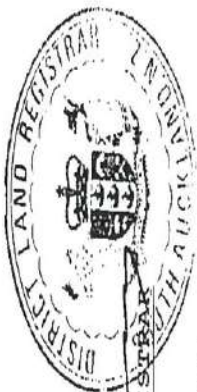


REGISTER ONLY

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 7th day of March one thousand nine hundred and ninety under the seal of the District Land Registrar of the Land Registration District of SOUTH AUCKLAND WITNESSETH that LANDCORP INVESTMENTS LIMITED

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon. be the several admeasurements a little more or less, that is to say: All that parcel of land containing 214.7869 HECTARES more or less being Section 9 Block IV Tuhingamata East Survey District



ASSISTANT LAND REGISTRAR

THIS CERTIFICATE IS AFFECTED BY THE FOLLOWING INTERESTS AS AT THE DATE OF ISSUE:

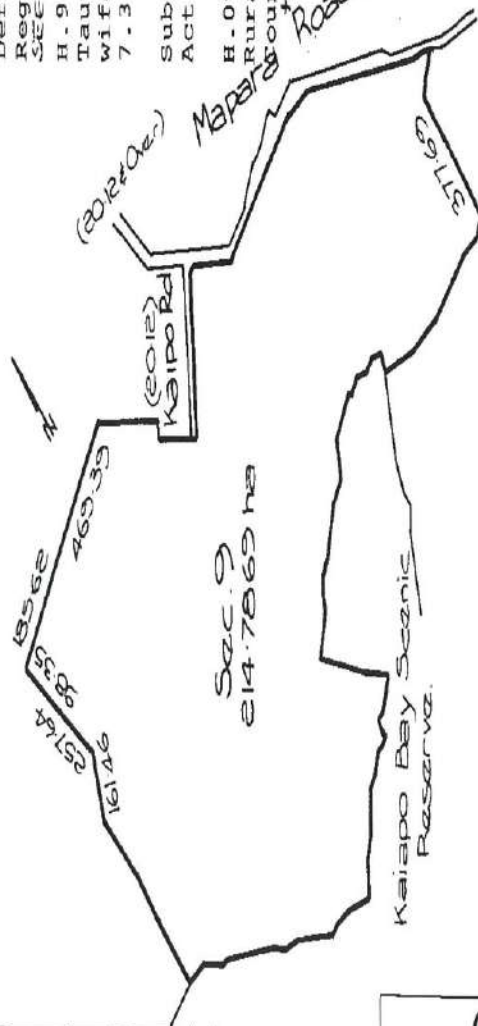
Subject to:
Section 3 Petroleum Act 1937
Section 8 Atomic Energy Act 1945
Section 3 Geothermal Energy Act 1953
Sections 6 and 8 Mining Act 1971 and
Sections 5 and 261 Coal Mines Act 1979
Deferred Payment Licences under the
Register under H.937516.14
H.937516.14 Transfer to John Alan Johnson of
Taupo farmer and Ailsa Elizabeth Johnson his
wife as tenants in common in equal shares -
7.3.1990 at 1.37 o.c

Subject to Section 36(2) Counties Amendment
Act 1961 - vide H.075592

H.096798 Statutory Land Charge under the
Rural Housing Act 1967 to the Taupo County
Council - 27.8.1971 at 1.37 o.c

H.130838 CAVEAT BY THE TAUPU COUNTY
COUNCIL - 19.5.1977 AT 11.56 o.c

H.283168 Mortgage of the Bank of New
Zealand - 24.4.1980 at 11.02 o.c
(with consent of the Bank of New Zealand)
H.130838)
H.937516.17



O V E R . . .

SO 43531
Measurements are Metric

H.537217.4 Mortgage to The Rural Banking and Finance Corporation Limited of New Zealand - 26.7.1984 at 1.31 o'clock with consent of Caveator under Caveat H.130838)

H.937516.18

H.537217.5 Memorandum of Priority making Mortgage H.537217.4 a second mortgage and Mortgage H.283168 a third mortgage - 26.7.1984 at 1.31 o'clock (with consent of Caveator under Caveat H.130838)

H.683838.2 Mortgage to The Wrightson Farmers Finance Limited - 30.9.1986 at 9.03 o'clock (with consent of Caveator in Caveat H.130838)

H.937516.19

H.683838.3 Memorandum of Priority making Mortgage H.683838.2 a second mortgage and Mortgage H.283168 a third mortgage - 30.9.1986 at 9.03 o'clock (with consent of Caveator in Caveat H.130838)

H.937516.15 Withdrawal of Caveat H.130838 as to Lot 1 DPS.52742 - 7.3.1990 at 1.37 o'clock

H.937516.20 Transfer of Lot 1 DPS.52742 to Stockdove Holdings Limited - 7.3.1990 at 1.37 o'clock
amalgamated CT 45C/871 issued

H.937516.21 ONCT) Cancelled and CT 45C/872
7.3.1990) issued for residue

A.L.R.

REGISTER

NEW ZEALAND

L. & S.—B. 8

Former Ref. Vol. 50 fol. 869

L. & S. Ref. No. DPF 1372



Entered in the Register Book, the
9th day of June 1975, at 2.30 o'clock

No. 20D/673

Deferred Payment Licence under the Land Act 1948

This Deed, made the 13th day of March 1975, between HER MAJESTY THE QUEEN (hereinafter referred to as "the Licensor"), of the one part, and JOHN ALAN JOHNSON of Taupo, Farmer two-thirds share and AILSA ELIZABETH JOHNSON, his wife one-third share as tenants in common in the shares set out after their respective names

(hereinafter referred to as "the Licensee"), of the other part: WHEREAS the Licensor has agreed to sell and the Licensee has agreed to purchase the land hereinafter described, including the improvements set out in the schedule hereto for the sum of \$ 21,230-00 pursuant to sections 122 & 65 of the Land Act 1948 by way of deferred payment licence AND whereas on the 13th day of March 1975 the Licensee paid a deposit of \$ 3,190-00 to the Licensor NOW, THIS DEED WITNESSETH that the Licensor, in consideration of the premises and of the covenants, conditions, and agreements herein contained and implied, and on the part of the Licensee to be paid, observed and performed doth hereby grant to the Licensee an exclusive licence to occupy all that parcel of land, containing by admeasurement 214.7859 hectares more or less situated in the Land District of South Auckland, and being Section 9, Block IV, Tuhingamata East Survey District

as the same is more particularly delineated with bold black lines on the plan hereon: TO HOLD the same unto the Licensee for the term of 30 years from the 1st day of July 1975 together with the period between the date of this licence and the aforesaid 1st day of July 1975; or until the said land is sooner granted in fee-simple to the Licensee. AND the Licensee doth hereby covenant with the Licensor as follows: THAT the Licensee will pay to the Department of Lands and Survey at Hamilton the said purchase price, by a deposit of \$3,190-00 (which has already been paid), together with interest thereon at the rate of six per centum per annum and thereafter by sixty half-yearly instalments of \$ 651-85 on the 30th day of June and the 31st day of December in each and every year subject to variation of the rate of interest and the amount of the half-yearly instalments in the manner hereinafter provided. The first such instalment shall be payable on the 31st day of December 1975. Interest on the balance of the purchase-money from the 13th day of March 1975 to the 30th day of June 1975, shall be payable on the said 30th day of June 1975.

AND it is hereby declared and agreed: (1) That these presents are intended to take effect as a licence to occupy Farm Land pending the completion of purchase by deferred payments under the Land Act 1948 and of any enactments passed in amendment or substitution thereof and the provisions of the said Act, applicable to such licences, shall be binding in all respects upon the parties hereto in the same manner as if such provisions had been fully set out herein.

(2) That the Land Settlement Board, pursuant to its powers under section 170n of the Land Act 1948, reserves the right to review the rate of interest payable by the Licensee hereunder for the second and each ensuing period of 5 years of the term hereof, and the provisions of that section shall apply to any such review, and any necessary adjustments to the instalments payable hereunder.

For further conditions see back hereof

CANCELLED

20D/673

Assistant

In witness whereof the ^{Assistant} Commissioner of Crown Lands for the said Land District, on behalf of the Licensor, has hereunto set his hand, and these presents have also been signed by the said Licensee.

Assistant

Signed by the said/Assistant Commissioner, on behalf of the Licensor, in the presence of—

Witness: Alison Lovejoy
Occupation: Clark Land and Survey
Address: Hamilton

Assistant Commissioner of Crown Lands

Signed by the above-named Licensee, in the presence
of--

Witness: *J. J. Jones*
Occupation: *Refuse*
Address: *Auto*

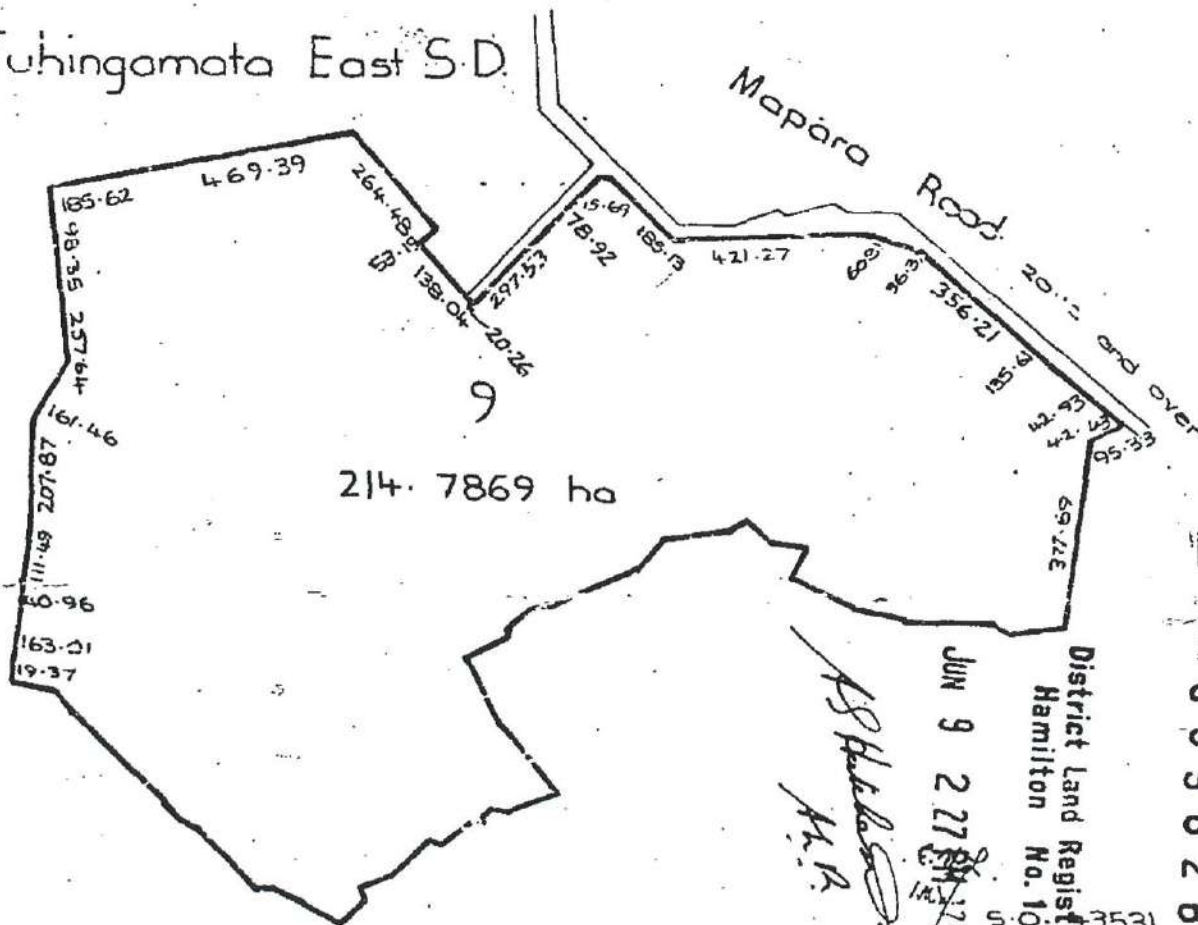
J. A. Johnson
A. E. Johnson

Licensee



- (3) It is hereby agreed between the parties hereto THAT for the purpose of Soil Conservation, the Lessee agrees to keep certain areas, to be defined by the Lessor in conjunction with the Waikato Valley Authority for the purpose appointed, reserved from grazing and free from noxious weeds and to carry out further planting of trees as may be deemed necessary by and under the direction of the said Authority and to allow access to the said areas to enable any further remedial Soil Conservation measures to be taken.
- WHEN such areas prevent access from one part of the land of the Lessee to another for the purpose of the normal working of the unit the Lessor or such Authority as aforesaid as her agent will allow reasonable access for stock and machinery to cross these areas at a given point on terms and conditions to be observed and performed by the Lessee.

Bik IV Tuhingamata East S.D.



District Land Registry
Hamilton No. 10
JUN 9 2 27 PM '75
5 353

039628

CANCELLED
DUPLICATE DESTROYED

MEASUREMENTS ARE METRIC

S.449103 Mortgage to Her Majesty the Queen produced 6.6.1969 at 9.05 o'clock
H.341255 (consent of Caveator under Caveat H.130838)
Variation of terms of Mortgage
S.449103 produced 6.6.1969 at 9.05 o'clock
A.L.R.

S.647165 Mortgage to Her Majesty the Queen produced 12.8.1976 at 9.00 o'clock
H.537217.1
H.065341 Variation of terms of within licence produced 13.1.1976 at 10.58 o'clock
A.L.R.

H.070074 Mortgage to The Rural Banking and Finance Corporation of New Zealand produced 20.2.1984 at 11.57 o'clock
H.537217.2
for A.L.R.

The within land is subject to Section 36 (2) of the Counties Amendment Act 1961 vide H.075592
Blair
for A.L.R.

H.094424 Transfer of Mortgage S.647165 to Rural Banking and Finance Corporation of New Zealand produced 12.8.1976 at 11.57 o'clock
Blair
for A.L.R.

H.096798 Statutory Land Charge under the Rural Housing Act 1939 by the Chairman Councillors and Inhabitants of the County of Taupo entered 27.8.1976 at 2.44 o'clock
for A.L.R.

H.128369.2 Mortgage to Rural Banking and Finance Corporation of New Zealand produced 2.5.1977 at 11.54 o'clock
H.537217.3
for A.L.R.

H.130838 CAVEAT BY THE CHAIRMAN COUNCILLORS AND INHABITANTS OF THE COUNTY OF TAUPO ENTERED 19.5.1977 AT 11.56 o'clock
for A.L.R.

H.283168 Mortgage to Bank of New Zealand produced 24.4.1980 at 2.02 o'clock (Caveator under Caveat H.130838 consenting)
for A.L.R.

H.537217.4 Mortgage to The Rural Banking and Finance Corporation of New Zealand produced 26.7.1984 at 1.31 o'clock (with consent of Caveator under Caveat H.130838)
for A.L.R.

H.537277.5 Memorandum of Priority making Mortgage H.537217.4 a second mortgage and Mortgage H.283168 a third mortgage produced 26.7.1984 at 1.31 o'clock
for A.L.R.

H.683838.1 Transfer of a one sixth share of John Alan Johnson to Ailsa Elizabeth Johnson abovenamed produced 30.9.1986 at 9.03 o'clock (with consent of Caveator under Caveat H.130838 and Chargeholder under Charge H.096798)
B. Lloyd
for A.L.R.

H.683838.2 Mortgage to Wrightson NMA Limited produced 30.9.1986 at 9.03 o'clock (with consent of Caveator under Caveat H.130838)
B. Lloyd
for A.L.R.

H.683838.3 Memorandum of Priority making Mortgage H.683838.2 a second mortgage and Mortgage H.283168 a third mortgage produced 30.9.1986 at 9.03 o'clock (with consent of Caveator under Caveat H.130838)
B. Lloyd
for A.L.R.

~~H.799461 Transfer of mortgage H.683838.2 to Wrightson Farmers Finance Limited Produced 2.6.1984 at 9.15 o'clock
ENTERED IN ERROR
for A.L.R.~~

H.799461 Transfer of Mortgage H.683838.2 to Wrightson Farmers Finance Limited produced 2-6-1988 at 9-15 o'clock
for A.L.R.

H.937516.12 Application pursuant to Sec 25(1)(a) State-Owned Enterprises Act 1976 whereby Landcorp Investments Limited is registered as the licensor under the within licence - 7.3.1990 at 1.37 o'clock
for A.L.R.

Subject to:

Section 3 Petroleum Act 1937
Section 8 Atomic Energy Act 1945
Section 3 Geothermal Energy Act 1953
Sections 6 and 8 Mining Act 1971 and
Sections 5 and 261 Coal Mines Act 1971
for A.L.R.

H.937516.13 Pursuant to Section 25(3) State-Owned Enterprises Act 1986 CT 45C issued for the fee simple
for A.L.R.

Fee Simple acquired - See new CT 45C/87 Transfer H.937516.14
for A.L.R.

CANCELLED
DUPLICATE DESTROYED



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy**



R. W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **438455**
Land Registration District **South Auckland**
Date Issued 20 February 2009

Prior References
 SA45C/871

Estate Fee Simple
Area 218.5233 hectares more or less
Legal Description Lot 1 Deposited Plan 410435
Original Registered Owners
 Kaipo Yuki Company Limited

Interests

Subject to Section 8 Atomic Energy Act 1945
 Subject to Section 3 Geothermal Energy Act 1953
 Subject to Sections 6 and 8 Mining Act 1971
 Subject to Section 3 Petroleum Act 1937
 Subject to Section 5 Coal Mines Act 1979
 Subject to Section 261 Coal Mines Act 1979
 Appurtenant hereto is a right to convey water and electricity specified in Easement Certificate H937516.10 - 7.3.1990 (affects the part formerly Lot 2 on DPS 52707)
 Subject to a right of way over part marked A on DP 410435 specified in Easement Certificate H937516.10 - 7.3.1990
 The easements specified in Easement Certificate H937516.10 are subject to Section 309 (1) (a) Local Government Act 1974
 Appurtenant hereto is a right of way created by Transfer B611954.2 - produced 15.6.2000 at 10.39 am and entered 19.6.2000 at 9.00 am
 8098383.1 Transfer to E. F. Deadman Limited - 13.3.2009 at 3:39 pm
 8098383.2 Mortgage to ASB Bank Limited - 13.3.2009 at 3:39 pm
 8910184.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - - 9.11.2011 at 4:30 pm
 9068122.1 Discharge of Mortgage 8098383.2 - 29.5.2012 at 4:58 pm
 9068122.2 Mortgage to Rabobank New Zealand Limited - 29.5.2012 at 4:58 pm



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy



R. W. Muir
 Registrar-General
 of Land

Identifier **438455**
Land Registration District **South Auckland**
Date Issued 20 February 2009

Prior References

SA45C/871

Estate Fee Simple
Area 218.5233 hectares more or less
Legal Description Lot 1 Deposited Plan 410435
Registered Owners
 E. F. Deadman Limited

Interests

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Sections 6 and 8 Mining Act 1971

Subject to Section 3 Petroleum Act 1937

Subject to Section 5 Coal Mines Act 1979

Subject to Section 261 Coal Mines Act 1979

Appurtenant hereto is a right to convey water and electricity specified in Easement Certificate H937516.10 - 7.3.1990 (affects the part formerly Lot 2 on DPS 52707)

Subject to a right of way over part marked A on DP 410435 specified in Easement Certificate H937516.10 - 7.3.1990

The easements specified in Easement Certificate H937516.10 are subject to Section 309 (1) (a) Local Government Act 1974

Appurtenant hereto is a right of way created by Transfer B611954.2 - produced 15.6.2000 at 10.39 am and entered 19.6.2000 at 9.00 am

8910184.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - - 9.11.2011 at 4:30 pm

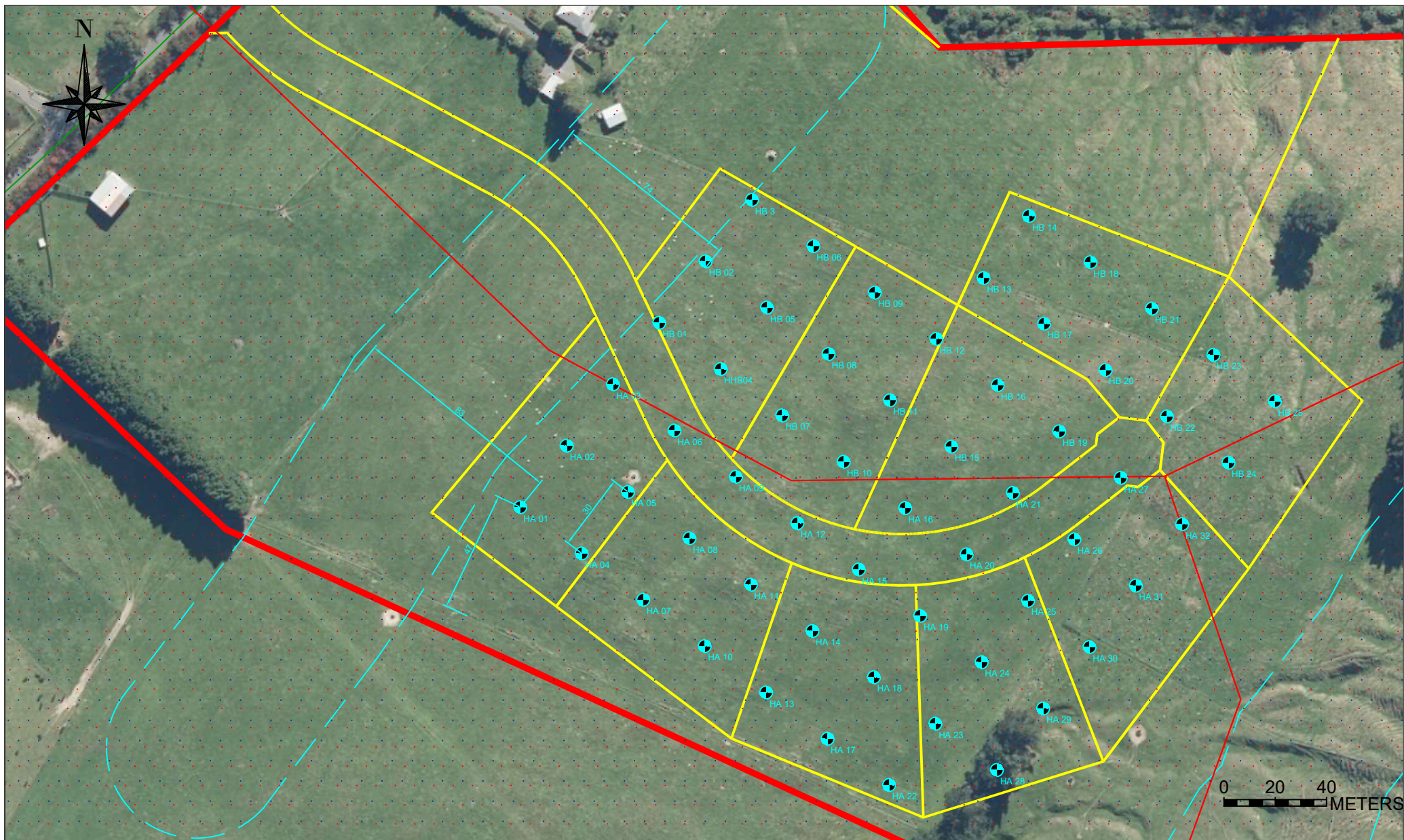
9068122.2 Mortgage to Rabobank New Zealand Limited - 29.5.2012 at 4:58 pm





APPENDIX B

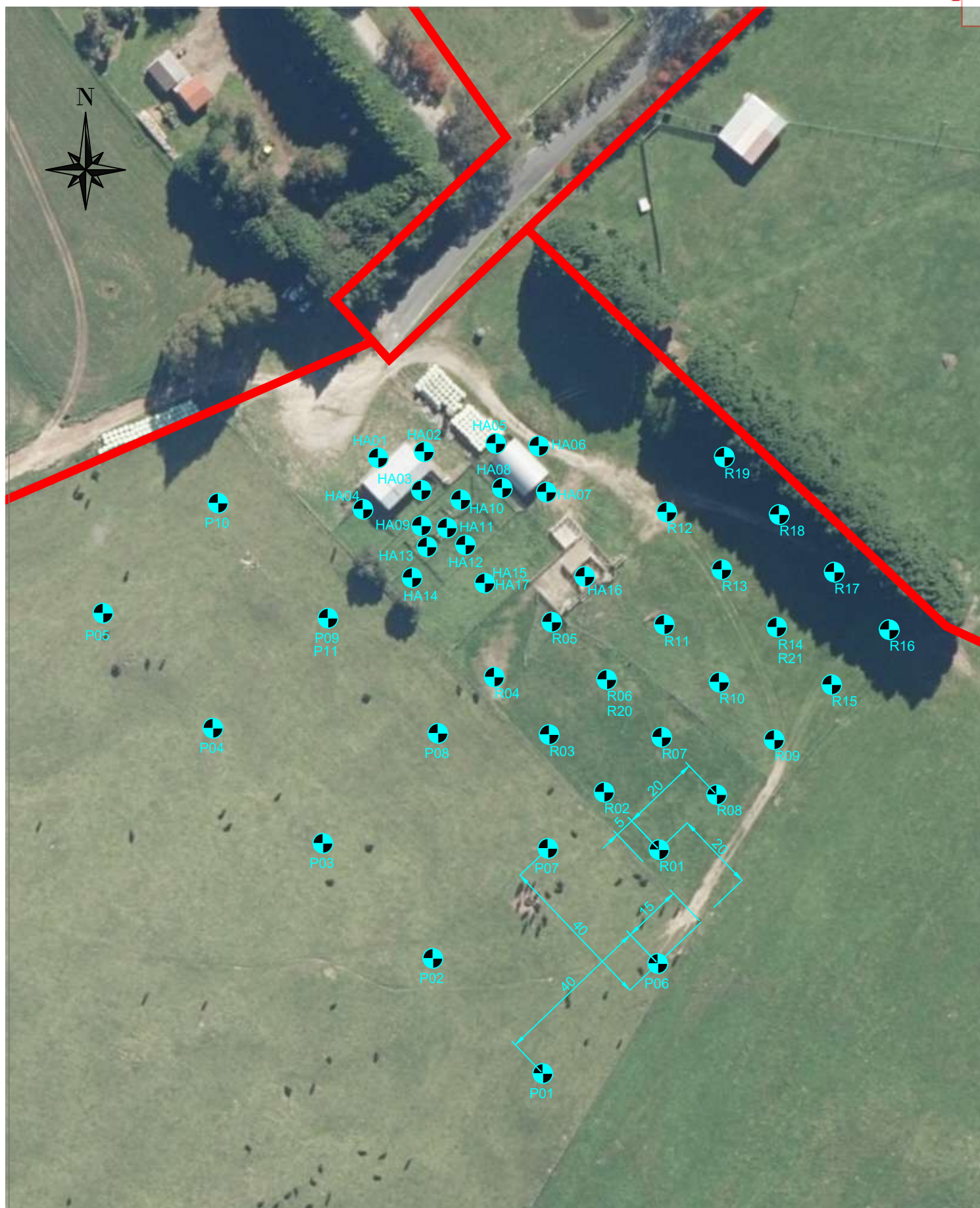
Sample Location Plan



15 Kaiapo Rd, Acacia Bay Sample Location Plan



Client: Breda Investments Ltd		SCALE: 1: 2000 @ A4
JOB # 211003	DATE: 02/13/21	DRAWN BY: SAM
DRG No. 001	REV. -	



**Geohazard
Environmental**

Contaminated Site Investigation Specialists

Dwg Title

37 Kaiapo Rd, Sample Plan

Client: E.F. Deadman Ltd &
Breda Investments Ltd

SCALE:
NTS @ A4

JOB # 2221103

DATE: 07/02/23

DRAWN BY:
SAM

DRG No. **003**

REV. **-**



Legend

-  Sample exceeds SCS guidelines for rural residential use
-  Sample within SCS guidelines for rural residential use

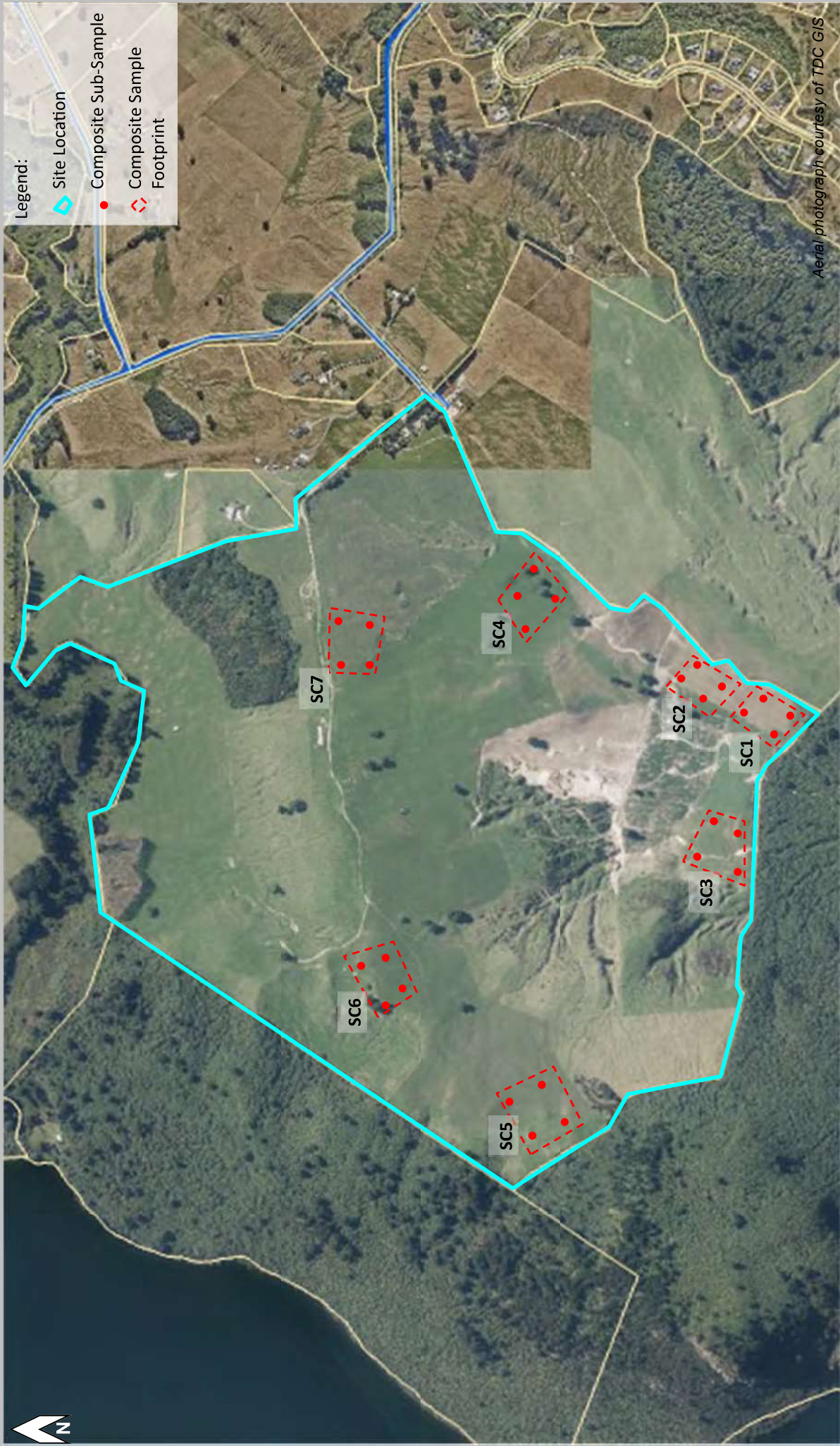
37 Kaiapo Rd South Sample Location Plan



**Geohazard
Environmental**

Contaminated Site Investigation Specialists

Client: E.F. Deadman Ltd & Breda Investments Ltd		SCALE: NTS @ A4
JOB # 221103	DATE: 07/02/23	DRAWN BY: SAM
DRG No. 002	REV. -	



geosciences ^{ltd} ENVIRONMENTAL	Title:	Figure 2 - Soil Sample Locations	Reference: JH0180
	Level 1, 47 Clyde Road, Browns Bay, 0630 Tel: (09) 475 0222	46 Kaiapo Road, Acacia Bay, Taupo	Date: 31 Jan 2022 Drawn: BR Approved: COB

APPENDIX C

Laboratory Results



Certificate of Analysis

Geohazard Environmental Ltd
PO Box 7053, Te Ngae
Rotorua 3042

Attention: Jonathan Findon
Phone: 022 436 4292
Email: jonathan@geohazard.co.nz

Sampling Site: 15 Kaiapo Rd

Lab Reference: 21-51049
Submitted by: Susan / David
Date Received: 08/12/2021
Testing Initiated: 8/12/2021
Date Completed: 13/12/2021
Order Number:
Reference: 211003

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Elements in Soil

Client Sample ID			Composite A (HA01, HA02, HA04, HA05)	Composite B (HA07, HA08, HA10, HA11)	Composite C (HA13, HA14, HA15, HA16)	Composite D (HA17, HA18, HA19, HA20)	Composite E (HA22, HA23, HA24, HA25)
Date Sampled							
Analyte	Unit	Reporting Limit	21-51049-58	21-51049-59	21-51049-60	21-51049-61	21-51049-62
Cadmium	mg/kg dry wt	0.005	0.38	0.44	0.505	0.50	0.541

Elements in Soil

Client Sample ID			Composite F (HA28, HA29, HA30, HA31)	Composite G (HA03, HA06, HA09, HA12)	Composite H (HA21, HA26, HA27, HA32)	Composite I (HB01, HB02, HB04, HB05)	Composite J (HB07, HB08, HB10, HB11)
Date Sampled							
Analyte	Unit	Reporting Limit	21-51049-63	21-51049-64	21-51049-65	21-51049-66	21-51049-67
Cadmium	mg/kg dry wt	0.005	0.30	0.49	0.523	0.46	0.32

Elements in Soil

Client Sample ID			Composite K (HB03, HB06, HB09, HB12)	Composite L (HB15, HB16, HB19)	Composite M (HB13, HB17, HB20)	Composite N (HB14, HB18, HB21)	Composite O (HB22, HB23, HB24, HB25)
Date Sampled							
Analyte	Unit	Reporting Limit	21-51049-68	21-51049-69	21-51049-70	21-51049-71	21-51049-72
Cadmium	mg/kg dry wt	0.005	0.47	0.517	0.23	0.47	0.44

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
This test report shall not be reproduced except in full, without the written permission of Analytica Laboratories.

Soil Composite

Client Sample ID			HA01 0	HA02 0	HA03 0	HA04 0	HA05 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-1	21-51049-2	21-51049-3	21-51049-4	21-51049-5
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA06 0	HA07 0	HA08 0	HA09 0	HA10 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-6	21-51049-7	21-51049-8	21-51049-9	21-51049-10
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA11 0	HA12 0	HA13 0	HA14 0	HA15 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-11	21-51049-12	21-51049-13	21-51049-14	21-51049-15
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA16 0	HA17 0	HA18 0	HA19 0	HA20 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-16	21-51049-17	21-51049-18	21-51049-19	21-51049-20
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA21 0	HA22 0	HA23 0	HA24 0	HA25 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-21	21-51049-22	21-51049-23	21-51049-24	21-51049-25
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA26 0	HA27 0	HA28 0	HA29 0	HA30 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-26	21-51049-27	21-51049-28	21-51049-29	21-51049-30
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA31 0	HA32 0	HB01 0	HB02 0	HB03 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-31	21-51049-32	21-51049-33	21-51049-34	21-51049-35
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB04 0	HB05 0	HB06 0	HB07 0	HB08 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-36	21-51049-37	21-51049-38	21-51049-39	21-51049-40
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB09 0	HB10 0	HB11 0	HB12 0	HB13 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-41	21-51049-42	21-51049-43	21-51049-44	21-51049-45
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB14 0	HB15 0	HB16 0	HB17 0	HB18 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-46	21-51049-47	21-51049-48	21-51049-49	21-51049-50
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB19 0	HB20 0	HB21 0	HB22 0	HB23 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-51	21-51049-52	21-51049-53	21-51049-54	21-51049-55
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB24 0	HB25 0
Date Sampled			07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-56	21-51049-57
Soil - Composite prep - DS			Complete	Complete

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
Soil Composite*	Analytica Laboratories is not accredited for the preparation of composite samples; however, the chemical analysis does hold IANZ accreditation. As composite analysis is conducted when requested by the sampler if they deem fit as per the NES guideline, the results of the chemical analyses still hold proper accreditation based on Analytica's methods.



Sharelle Frank, B.Sc. (Tech)
Technologist



Certificate of Analysis

Geohazard Environmental Ltd
 PO Box 7053, Te Ngae
 Rotorua 3042

Attention: Jonathan Findon
 Phone: 022 4364292
 Email: jonathan@geohazard.co.nz

Sampling Site: Kaiapo Zone Change

Lab Reference: 23-04914
 Submitted by: Susan
 Date Received: 21/02/2023
 Testing Initiated: 21/02/2023
 Date Completed: 27/02/2023
 Order Number:
 Reference: 221103

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
 Specific testing dates are available on request.

Heavy Metals in Soil

Client Sample ID			HA01 0	HA02 0	HA03 0	HA04 0	HA05 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-1	23-04914-2	23-04914-3	23-04914-4	23-04914-5
Arsenic	mg/kg dry wt	0.125	68.3	4.6	7.4	3.3	3.5
Beryllium	mg/kg dry wt	0.013	0.13	0.074	0.087	0.058	0.083
Boron	mg/kg dry wt	1.25	<1.3	1.8	<1.3	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.26	0.18	0.077	0.051	0.13
Chromium	mg/kg dry wt	0.125	20.0	8.5	9.3	4.3	5.5
Copper	mg/kg dry wt	0.075	25.7	10.2	8.58	5.5	8.49
Lead	mg/kg dry wt	0.25	11.0	8.80	13.8	5.81	10.8
Mercury	mg/kg dry wt	0.025	0.033	0.027	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	2.8	1.8	0.93	0.89	1.7
Zinc	mg/kg dry wt	0.05	182	88.5	39.3	36.0	39.1

Heavy Metals in Soil

Client Sample ID			HA06 0	HA07 0	HA08 0	HA09 0	HA10 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-6	23-04914-7	23-04914-8	23-04914-9	23-04914-10
Arsenic	mg/kg dry wt	0.125	2.4	2.5	3.2	2.1	13.8
Beryllium	mg/kg dry wt	0.013	0.11	0.073	0.10	0.087	0.075
Boron	mg/kg dry wt	1.25	<1.3	2.0	1.3	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.20	0.12	0.16	0.058	0.10
Chromium	mg/kg dry wt	0.125	3.9	3.0	4.3	2.8	37.2
Copper	mg/kg dry wt	0.075	5.9	7.2	7.2	4.7	18.0

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
 This test report shall not be reproduced except in full, without the written permission of Analytica Laboratories.

Heavy Metals in Soil

Client Sample ID			HA060	HA070	HA080	HA090	HA100
Date Sampled							
Lead	mg/kg dry wt	0.25	5.25	4.1	5.40	1.9	3.2
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	1.6	1.1	1.3	0.67	0.72
Zinc	mg/kg dry wt	0.05	73.0	50.9	182	40.0	58.0

Heavy Metals in Soil

Client Sample ID			HA110	HA120	HA130	HA140	HA150
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-11	23-04914-12	23-04914-13	23-04914-14	23-04914-15
Arsenic	mg/kg dry wt	0.125	5.1	1.6	3.1	2.1	1.2
Beryllium	mg/kg dry wt	0.013	0.088	0.091	0.053	0.067	0.078
Boron	mg/kg dry wt	1.25	<1.3	<1.3	<1.3	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.12	0.064	0.083	0.19	0.076
Chromium	mg/kg dry wt	0.125	5.7	2.4	4.4	4.3	2.3
Copper	mg/kg dry wt	0.075	16.7	4.5	6.2	9.55	3.8
Lead	mg/kg dry wt	0.25	3.3	2.1	2.7	4.1	2.0
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	0.80	0.74	0.69	0.97	0.76
Zinc	mg/kg dry wt	0.05	27.9	21.0	34.5	56.2	23.5

Heavy Metals in Soil

Client Sample ID			HA170	R010	R020	R030	R040
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-16	23-04914-17	23-04914-18	23-04914-19	23-04914-20
Arsenic	mg/kg dry wt	0.125	1.2	1.4	2.0	1.4	1.4
Beryllium	mg/kg dry wt	0.013	0.078	0.13	0.11	0.12	0.076
Boron	mg/kg dry wt	1.25	<1.3	<1.3	<1.3	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.070	0.15	0.16	0.12	0.0088
Chromium	mg/kg dry wt	0.125	2.0	2.3	2.9	2.6	1.6
Copper	mg/kg dry wt	0.075	3.7	5.4	4.8	5.6	1.1
Lead	mg/kg dry wt	0.25	2.1	2.4	2.5	2.1	1.5
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	0.74	1.1	2.0	1.4	0.75
Zinc	mg/kg dry wt	0.05	21.0	35.4	27.4	20.3	10.5

Heavy Metals in Soil

Client Sample ID			R050	R060	R070	R080	R090
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-21	23-04914-22	23-04914-23	23-04914-24	23-04914-25
Arsenic	mg/kg dry wt	0.125	3.7	2.3	1.9	2.4	2.8
Beryllium	mg/kg dry wt	0.013	0.11	0.089	0.14	0.13	0.10
Boron	mg/kg dry wt	1.25	<1.3	<1.3	<1.3	1.4	<1.3
Cadmium	mg/kg dry wt	0.005	0.17	0.093	0.15	0.19	0.19
Chromium	mg/kg dry wt	0.125	5.2	2.9	3.1	3.0	3.7
Copper	mg/kg dry wt	0.075	5.5	6.2	8.67	7.4	6.6
Lead	mg/kg dry wt	0.25	2.6	1.8	2.4	2.4	2.4
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	0.054	<0.025

Heavy Metals in Soil

Client Sample ID			R05 0	R06 0	R07 0	R08 0	R09 0
Date Sampled							
Nickel	mg/kg dry wt	0.05	1.3	0.99	1.5	1.5	1.4
Zinc	mg/kg dry wt	0.05	35.8	22.4	27.2	40.6	29.7

Heavy Metals in Soil

Client Sample ID			R10 0	R11 0	R12 0	R13 0	R14 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-26	23-04914-27	23-04914-28	23-04914-29	23-04914-30
Arsenic	mg/kg dry wt	0.125	2.4	180	1.8	1.9	2.9
Beryllium	mg/kg dry wt	0.013	0.15	0.12	0.085	0.081	0.15
Boron	mg/kg dry wt	1.25	<1.3	12	2.3	<1.3	1.4
Cadmium	mg/kg dry wt	0.005	0.31	0.692	0.15	0.091	0.27
Chromium	mg/kg dry wt	0.125	6.6	98.0	2.7	2.7	4.3
Copper	mg/kg dry wt	0.075	6.3	174	3.5	3.5	7.2
Lead	mg/kg dry wt	0.25	2.7	1,900	39.0	2.2	2.9
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	2.7	3.8	1.4	1.3	2.1
Zinc	mg/kg dry wt	0.05	28.4	322	21.5	27.2	27.3

Heavy Metals in Soil

Client Sample ID			R15 0	R16 0	R17 0	R18 0	R19 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-31	23-04914-32	23-04914-33	23-04914-34	23-04914-35
Arsenic	mg/kg dry wt	0.125	2.6	2.1	2.0	1.9	1.9
Beryllium	mg/kg dry wt	0.013	0.13	0.15	0.15	0.13	0.12
Boron	mg/kg dry wt	1.25	<1.3	<1.3	1.5	1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.32	0.072	0.23	0.33	0.22
Chromium	mg/kg dry wt	0.125	5.3	2.3	2.7	3.3	3.1
Copper	mg/kg dry wt	0.075	8.73	2.7	5.0	6.6	5.0
Lead	mg/kg dry wt	0.25	2.8	2.4	3.8	3.0	3.1
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	0.035	<0.025
Nickel	mg/kg dry wt	0.05	2.8	1.1	1.5	1.6	1.3
Zinc	mg/kg dry wt	0.05	45.9	19.2	30.9	25.3	24.5

Heavy Metals in Soil

Client Sample ID			R20 0	R21 0
Date Sampled				
Analyte	Unit	Reporting Limit	23-04914-36	23-04914-37
Arsenic	mg/kg dry wt	0.125	2.1	2.8
Beryllium	mg/kg dry wt	0.013	0.085	0.15
Boron	mg/kg dry wt	1.25	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.078	0.23
Chromium	mg/kg dry wt	0.125	2.5	3.5
Copper	mg/kg dry wt	0.075	5.2	5.8
Lead	mg/kg dry wt	0.25	1.8	2.8
Mercury	mg/kg dry wt	0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	0.86	1.3
Zinc	mg/kg dry wt	0.05	20.1	23.6

Soil Composite

Client Sample ID			R01 0	R02 0	R03 0	R04 0	R05 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-17	23-04914-18	23-04914-19	23-04914-20	23-04914-21
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			R06 0	R07 0	R08 0	R09 0	R10 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-22	23-04914-23	23-04914-24	23-04914-25	23-04914-26
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			R11 0	R12 0	R13 0	R14 0	R15 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-27	23-04914-28	23-04914-29	23-04914-30	23-04914-31
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			R16 0	R17 0	R18 0	R19 0
Date Sampled						
Analyte	Unit	Reporting Limit	23-04914-32	23-04914-33	23-04914-34	23-04914-35
Soil - Composite prep - DS			Complete	Complete	Complete	Complete

Organochlorine Pesticides - Soil

Client Sample ID			HA01 0	HA02 0	HA03 0	HA04 0	HA05 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-1	23-04914-2	23-04914-3	23-04914-4	23-04914-5
2,4'-DDD	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	0.005	0.0094	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	0.005	<0.0050	0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Organochlorine Pesticides - Soil

Client Sample ID			HA01 0	HA02 0	HA03 0	HA04 0	HA05 0
Date Sampled							
Endosulfan II	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	1	140	140	130	130	130

Organochlorine Pesticides - Soil

Client Sample ID			HA06 0	HA07 0	HA08 0	HA09 0	HA10 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-6	23-04914-7	23-04914-8	23-04914-9	23-04914-10
2,4'-DDD	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	0.005	<0.0050	<0.0050	0.014	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	0.003	<0.0030	0.0040	0.033	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	0.005	0.0056	0.011	0.11	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	0.005	<0.0050	0.023	1.2	<0.0050	<0.0050
Total DDT	mg/kg dry wt	0.02	<0.020	0.040	1.3	<0.020	<0.020
alpha-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	1	130	130	120	130	130

Organochlorine Pesticides - Soil

Client Sample ID			HA11 0	HA12 0	HA13 0	HA14 0	HA15 0
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-11	23-04914-12	23-04914-13	23-04914-14	23-04914-15
2,4'-DDD	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.0053
4,4'-DDT	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	0.011
Total DDT	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	0.020
alpha-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	1	130	130	130	120	120

Organochlorine Pesticides - Soil

Client Sample ID			HA17 0	Composite A (R03, R04, R05, R06)	Composite B (R01, R02, R07, R08)	Composite C (R09, R10, R11)	Composite D (R12, R13, R18, R19)
Date Sampled							
Analyte	Unit	Reporting Limit	23-04914-16	23-04914-49	23-04914-50	23-04914-51	23-04914-52
2,4'-DDD	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	0.005	<0.0050	0.020	0.036	0.016	0.011
4,4'-DDT	mg/kg dry wt	0.005	0.010	0.012	0.026	0.011	0.012
Total DDT	mg/kg dry wt	0.02	<0.020	0.030	0.060	0.030	0.020
alpha-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050

Organochlorine Pesticides - Soil

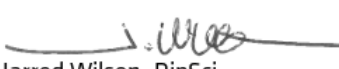
Client Sample ID			HA17 0	Composite A (R03, R04, R05, R06)	Composite B (R01, R02, R07, R08)	Composite C (R09, R10, R11)	Composite D (R12, R13, R18, R19)
Date Sampled							
Endosulfan I	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	1	120	120	120	120	120

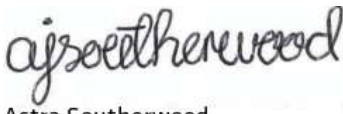
Organochlorine Pesticides - Soil

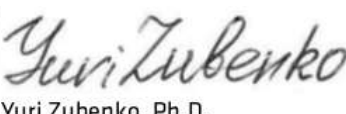
Client Sample ID			Composite E (R14, R15, R16, R17)
Date Sampled			
Analyte	Unit	Reporting Limit	23-04914-53
2,4'-DDD	mg/kg dry wt	0.005	<0.0050
2,4'-DDE	mg/kg dry wt	0.005	<0.0050
2,4'-DDT	mg/kg dry wt	0.005	<0.0050
4,4'-DDD	mg/kg dry wt	0.003	<0.0030
4,4'-DDE	mg/kg dry wt	0.005	0.038
4,4'-DDT	mg/kg dry wt	0.005	0.025
Total DDT	mg/kg dry wt	0.02	0.060
alpha-BHC	mg/kg dry wt	0.005	<0.0050
Aldrin	mg/kg dry wt	0.005	<0.0050
beta-BHC	mg/kg dry wt	0.005	<0.0050
cis-Chlordane	mg/kg dry wt	0.005	<0.0050
cis-Nonachlor	mg/kg dry wt	0.01	<0.010
delta-BHC	mg/kg dry wt	0.005	<0.0050
Dieldrin	mg/kg dry wt	0.05	<0.050
Endosulfan I	mg/kg dry wt	0.005	<0.0050
Endosulfan II	mg/kg dry wt	0.01	<0.010
Endosulfan sulfate	mg/kg dry wt	0.005	<0.0050
Endrin	mg/kg dry wt	0.05	<0.050
Endrin aldehyde	mg/kg dry wt	0.01	<0.010
Endrin ketone	mg/kg dry wt	0.005	<0.0050
gamma-BHC	mg/kg dry wt	0.005	<0.0050
Heptachlor	mg/kg dry wt	0.005	<0.0050
Heptachlor epoxide	mg/kg dry wt	0.005	<0.0050
Hexachlorobenzene	mg/kg dry wt	0.005	<0.0050
Methoxychlor	mg/kg dry wt	0.01	<0.010
trans-nonachlor	mg/kg dry wt	0.01	<0.010
trans-Chlordane	mg/kg dry wt	0.01	<0.010
Chlordane (sum)	mg/kg dry wt	0.02	<0.020
TCMX (Surrogate)	%	1	130

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
Soil Composite*	Analytica Laboratories is not accredited for the preparation of composite samples; however, the chemical analysis does hold IANZ accreditation. As composite analysis is conducted when requested by the sampler if they deem fit as per the NES guideline, the results of the chemical analyses still hold proper accreditation based on Analytica's methods.
OCP in Soil	Samples are extracted with hexane, pre-concetrated then analysed by GC-MSMS. (Chlordane (sum) is calculated from the main actives in technical Chlordane: Chlordane, Nonachlor and Heptachlor). (In accordance with in-house procedure).
Total DDT	Sum of DDT, DDD and DDE (4,4' and 2,4 isomers)


Jarred Wilson, DipSci
Trace Elements Team Leader


Astra Southerwood,
Sample Preparation Team Leader


Yuri Zubenko, Ph.D.
Senior Technologist



Certificate of Analysis

Geosciences Ltd
PO Box 35366, Browns Bay
Auckland 0753

Attention: Carl O'Brien
Phone: 06 281 2454
Email: brodie@geosciences.co.nz

Sampling Site: 40 Kaiapo Road

Lab Reference: 22-02140
Submitted by: COB
Date Received: 21/01/2022
Testing Initiated: 21/01/2022
Date Completed: 27/01/2022
Order Number:
Reference: JH0180

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Elements in Soil

Client Sample ID			Composite SC1 (SC1a,SC1b,SC1c,SC1d)	Composite SC2 (SC2a,SC2b,SC2c,SC2d)	Composite SC3 (SC3a,SC3b,SC3c,SC3d)	Composite SC4 (SC4a,SC4b,SC4c,SC4d)	Composite SC5 (SC5a,SC5b,SC5c,SC5d)
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-29	22-02140-30	22-02140-31	22-02140-32	22-02140-33
Cadmium	mg/kg dry wt	0.005	0.18	0.18	0.20	0.21	0.46

Elements in Soil

Client Sample ID			Composite SC6 (SC6a,SC6b,SC6c,SC6d)	Composite SC7 (SC7a,SC7b,SC7c,SC7d)
Date Sampled			19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-34	22-02140-35
Cadmium	mg/kg dry wt	0.005	0.35	0.31

Soil Aggregate Properties and Nutrients

Client Sample ID			Composite SC1 (SC1a,SC1b,SC1c,SC1d)	Composite SC2 (SC2a,SC2b,SC2c,SC2d)	Composite SC3 (SC3a,SC3b,SC3c,SC3d)	Composite SC4 (SC4a,SC4b,SC4c,SC4d)	Composite SC5 (SC5a,SC5b,SC5c,SC5d)
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-29	22-02140-30	22-02140-31	22-02140-32	22-02140-33
pH*	pH	1	4.8	4.9	4.7	4.8	5.1

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
This test report shall not be reproduced except in full, without the written permission of Analytica Laboratories.

Soil Aggregate Properties and Nutrients

Client Sample ID			Composite SC6 (SC6a,SC6b,SC6c,SC6d)	Composite SC7 (SC7a,SC7b,SC7c,SC7d)
Date Sampled			19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-34	22-02140-35
pH*	pH	1	5.2	5.2

Soil Composite

Client Sample ID			SC1a 0-75mm	SC1b 0-75mm	SC1c 0-75mm	SC1d 0-75mm	SC2a 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-1	22-02140-2	22-02140-3	22-02140-4	22-02140-5
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			SC2b 0-75mm	SC2c 0-75mm	SC2d 0-75mm	SC3a 0-75mm	SC3b 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-6	22-02140-7	22-02140-8	22-02140-9	22-02140-10
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			SC3c 0-75mm	SC3d 0-75mm	SC4a 0-75mm	SC4b 0-75mm	SC4c 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-11	22-02140-12	22-02140-13	22-02140-14	22-02140-15
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			SC4d 0-75mm	SC5a 0-75mm	SC5b 0-75mm	SC5c 0-75mm	SC5d 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-16	22-02140-17	22-02140-18	22-02140-19	22-02140-20
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			SC6a 0-75mm	SC6b 0-75mm	SC6c 0-75mm	SC6d 0-75mm	SC7a 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-21	22-02140-22	22-02140-23	22-02140-24	22-02140-25
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

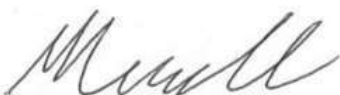
Client Sample ID			SC7b 0-75mm	SC7c 0-75mm	SC7d 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-26	22-02140-27	22-02140-28
Soil - Composite prep - DS			Complete	Complete	Complete

Method Summary

- Elements in Soil** Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
- pH in Soil** 1:2.5 extraction with 0.1M calcium chloride followed by pH probe determination.(Department of Sustainable Natural Resources).
- Soil Composite*** Analytica Laboratories is not accredited for the preparation of composite samples; however, the chemical analysis does hold IANZ accreditation. As composite analysis is conducted when requested by the sampler if they deem fit as per the NES guideline, the results of the chemical analyses still hold proper accreditation based on Analytica's methods.



Sharelle Frank, B.Sc. (Tech)
Technologist



Matthew Counsell, B.Sc.
Inorganics Team Leader

APPENDIX D

Geohazard Environmental Ltd PSI



Preliminary Site Investigation Report

15 Kaiapo Road, Acacia Bay, Taupō

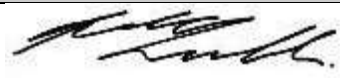
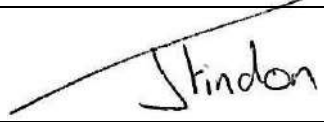
**13 December 2021
Job# 211003**

Preliminary Site Investigation Report 15 Kaiapo Road, Acacia Bay, Taupō

This report has been prepared for Breda Investments Limited (The Client) by Geohazard Environmental Ltd. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other parties.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

The contents of this report comply with good practice and professional standards. It has been approved for release and signed by a Suitably Qualified and Experienced Practitioner.

Quality Assurance Statement		
Task	Responsibility	Signature
Prepared	Susan McLachlan	
Reviewed	Jonathan Findon	
Approved for issue	Jonathan Findon	

Revision Schedule		
Revision	Reason	Date
Original Report	-	13 December 2021

Prepared by:

Geohazard Environmental Ltd

PO Box 7053

Rotorua 3042

Telephone: 0800 GEOHAZARD (436 429)

Job No.: 211003

E-mail: info@geohazard.co.nz

**Preliminary Site Investigation Report
15 Kaiapo Road, Acacia Bay, Taupō
TABLE OF CONTENTS**

EXECUTIVE SUMMARY	1
Recommendations	2
1.0 INTRODUCTION	3
1.1 Background and Objectives	3
1.2 Scope of Work	3
1.3 Limitations	4
2.0 SITE OVERVIEW	5
2.1 Site Identification	5
2.2 History of Site Ownership and Use	6
2.3 Previous Investigations	11
2.4 Current and Future Use	11
2.5 Geology and Hydrology	11
2.6 Climate	11
2.7 Additional Site Information	12
2.8 Site Owner Information	12
2.9 Summary of Desktop Information	13
3.0 SITE CONDITION AND SURROUNDING ENVIRONMENT	14
3.1 Site Inspection	14
3.2 Conditions at Site Boundaries	14
3.3 Visible Inspection, Signs of Contamination and Odours	14
4.0 DISPOSITION OF SITE CONTAMINATION	19
4.1 Basis for Soil Contaminants Standards (SCS)	19
4.2 Field Sampling and Analysis	20
4.3 Results	21
4.4 Quality Control	22
5.0 SITE CHARACTERISATION	23
5.1 Type of Environmental Contamination	23
5.2 Exposure Routes and Risks to Exposed Populations	23
5.3 NES Consents	24
5.4 Other Consent Requirements	24
6.0 CONCLUSIONS AND RECOMMENDATIONS	25
6.1 Summary and Conclusions	25
6.2 Recommendations	25
6.3 Further Client Actions	26
7.0 REFERENCES	27
APPENDIX A	HISTORICAL CERTIFICATES OF TITLE
APPENDIX B	SAMPLE LOCATION PLAN
APPENDIX C	LABORATORY RESULTS

EXECUTIVE SUMMARY

Breda Investments Limited (The Client) has commissioned Geohazard Environmental Ltd to prepare a Preliminary Site Investigation (PSI) Report to investigate 15 Kaiapo Road, Acacia Bay, Taupō for the presence of contaminants. The primary purpose of this is to investigate whether contaminants are present at high levels that would warrant further action prior to use for the proposed residential subdivision.

This report summarises Geohazard Environmental Ltd.'s investigation, and has been prepared following the Ministry for the Environment's Guidelines for investigations involving potentially contaminated land (referred to herein as the MfE Guidelines). The report consisted of a desktop study and interviews, to gather information about the site and its history, and a site inspection; this information was used to develop an initial conceptual site model, which identifies potential sources of contamination, pathways for release, and potential effects.

The findings reported herein indicate that there are no triggers to indicate that the site is contaminated. Accordingly, Geohazard Environmental Ltd assesses that by the standards of best practice there is no basis for recommending a detailed site investigation and recommends no further investigation for contaminants be undertaken at the site. This assessment is subject to limitations, as described herein, and it is important that The Client ensure that these are understood and that additional advice is sought, if appropriate, to manage any undiscovered risks.

The presence of any contaminants at site, even at levels that exceed the relevant soil guideline values, does not necessarily mean that an unacceptable human health risk or environmental risk exists. Specific conclusions and recommendations based on findings herein are summarised as follows:

- The site currently supports pasture. It is understood that the site is planned to be subdivided and redeveloped for rural residential use.
- No evidence of previous ground contamination investigations was identified during the course of undertaking this PSI.
- From at least 1945 the site has been undeveloped assumed grazing land. By 1967 a dwelling had been constructed in the west of the site, and by 1979 sheds had been erected, one associated with the dwelling and one in the southwest of the site.
 - The dwelling and associated building forms part of Proposed Lot 1, and is not changing use.
 - A shed on proposed Lot 12 is on Production Land. The provisions of the NES do not apply to production land.
- A site inspection of the entire site area of c.5.9 hectares was conducted on 1st November 2021.
 - There was no evident sign of contamination at the site, although the potential for elevated cadmium in soil from fertiliser application could not be discounted.
- A second site visit was undertaken on 7th December 2021 during which 57 samples were collected. These were composited at the Laboratory and analysed for cadmium.
 - All composite samples were within SCS for a rural residential land use, albeit 5 composite samples exceed predicted background level for cadmium.

- The site **is not** considered to be a “Piece of Land” under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply.
 - For the avoidance of doubt, it is highly unlikely the proposed rural-residential use will present a risk to human health.
- Due to the nature of this investigation, it is not possible to detail the full extent of contamination at the site and neighbouring sites, and there remains a possibility that the site may have been impacted by previous site activities to a degree greater than apparent from results reported herein.
- The extent of any contamination at the site beyond the area of focus for this report and neighbouring sites is unknown at this stage.

Recommendations

The advice of a planner should be sought, or contact made with the District and Regional Councils, prior to undertaking any earthworks at the site, to ensure all rules are complied with.

Based on the results of this PSI, Geohazard Environmental Ltd recommend to Breda Investments Limited that further assessment of the site for potential contaminants is not required. However, should site earthworks indicate fill material on site contains anthropogenic material, a suitably qualified environmental specialist should be engaged to determine if there is any undue risk.

1.0 INTRODUCTION

1.1 Background and Objectives

Historically, the site at 15 Kaiapo Road, Acacia Bay, Taupō has been used for farming. It is planned to be used for a residential subdivision. Breda Investments Limited requested that Geohazard Environmental Ltd investigate the site to determine whether environmental contamination might be present. The primary deliverable of the work is this Report, which includes conclusions as to the site's disposition with respect to known or potential environmental contamination, and, as appropriate, recommended steps needed to ensure that contaminant risk is mitigated for end-users of the site.

1.2 Scope of Work

Consistent with the MfE Guidelines for reports of potentially contaminated land, the following scope of work was undertaken:

- (i) Review of all relevant information, including searching for any previous reports pertaining to 15 Kaiapo Rd, Acacia Bay, Taupō. Sources were as follows:
 - Taupō District Council property file records.
 - Waikato Regional Council property file records.
 - Historical Certificates of Title.
 - Historical aerial images.
 - Cheal Consultants proposed subdivision plan
- (ii) Inspection of the site to assess its present state and any indications of potentially contaminating activities that have taken place historically or are currently occurring at the site.
- (iii) Preparation of this report, which includes all relevant information (collected from above), and complies with relevant reporting guidelines (MfE, 2003). Herein, this report will assess the following:
 - Whether previous and/or current on-site activities had or have the potential to cause on-site contamination.
 - The likely nature of any contamination.
 - The risks to future site users from any contamination.
 - The requirement for further on-site investigations to define the extent of any contamination.

1.3 Limitations

Geohazard Environmental Ltd has performed services for this project in accordance with current professional standards for environmental site assessments. No guarantees are either expressed or implied. This report does not attempt to fulfil the requirements of legal due diligence.

There is no investigation that is thorough enough to preclude the presence of materials at the site that presently, or in the future, may be considered hazardous. As regulatory criteria are subject to change, contaminant concentrations present and considered to be acceptable may, in the future, become subject to different regulatory standards that cause them to become unacceptable for existing or proposed land use activities.

Any recommendations, opinions or findings stated in this report are based on circumstances, facts and regulatory criteria as they existed at the time that Geohazard Environmental Ltd performed the work and on data obtained from the investigations and site observations as detailed in this report. Opinions and judgements expressed in this report, which are based on an understanding and interpretation of current regulatory standards, should not be construed as legal opinions. This report and the information it contains have been prepared solely for the use of Breda Investments Limited, and by local authorities for any subsequent relevant consent application where it is submitted by the client to council. Any reliance on this report by other parties shall be at such party's own risk.

2.0 SITE OVERVIEW

2.1 Site Identification

The Site is located at 15 Kaiapo Road, Acacia Bay, Taupō. The site is listed on Taupō District Council files as 0738353812. Figure 1 illustrates the general locale of the site. The site is legally described as Lot 1 DP 337255. The land parcel site is 356,752m² in size.

In this report, reference to the site constitutes the proposed development area only within the land parcel (the subdivision site), of c.59400m².



Figure 1: Map View of the Site Location in Relation to Taupō.

In Figure 2, the area located inside the red box is the land parcel under investigation, The yellow lines indicate the proposed subdivision, the green lines show the proposed building platforms and the light blue lines indicate fault avoidance areas.



Figure 215 Kaiapo Road, Acacia Bay, Taupō. Lot 1 DP 337255

2.2 History of Site Ownership and Use

The site history is reviewed to give an indication of potential contaminants at the site. This includes review of past ownership, council file review, historical photo review, and where possible discussions with occupiers. Hazardous Activities and Industries List (HAIL) codes are given where appropriate.

2.2.1 Historical Certificates of Title

Historical Certificates of Title (CT) are used to give an indication of the occupation of landowners. Whilst not definitive that an activity did occur, in many cases it can be reasonably assumed that the owner's occupation correlated with site use. This report uses the terminology "(?)" to indicate if text is unclear or illegible.

The documents available for the site indicate that CT 152832 for Lot 2 DP 337255 and CT152831 for Lot 1 DP337255 were issued 24th April 2017 and lists Kaiapo Bay Limited as Proprietors.

- Easement Instruction 847525.1 to convey electricity was created 28.04.2010.

2.2.2 Taupō District Council Files

In February 2008 a Code of Compliance Certificate was issued for building consent 050712 for a bathroom extension and alteration for a building constructed in 1970.

In August 2015 a 5-year extension on the lapse date of the subdivision Resource Consent RM100167A to November 2020 was granted.

In November 2010 Subdivision consent was granted for 11 new lots from 2 existing lots (ref.: RM100167).

In May 2018 an application for subdivision consent for a non-complying subdivision was lodged.

In October 2019 an application for Resource Consent and an assessment of Environmental Effects for the Kaiapo Bay Cluster Area Subdivision prepared by Boffa Miskell was lodged.

In May 2020 subdivision Consent RM190302 was approved.

2.2.3 Waikato Regional Council Files

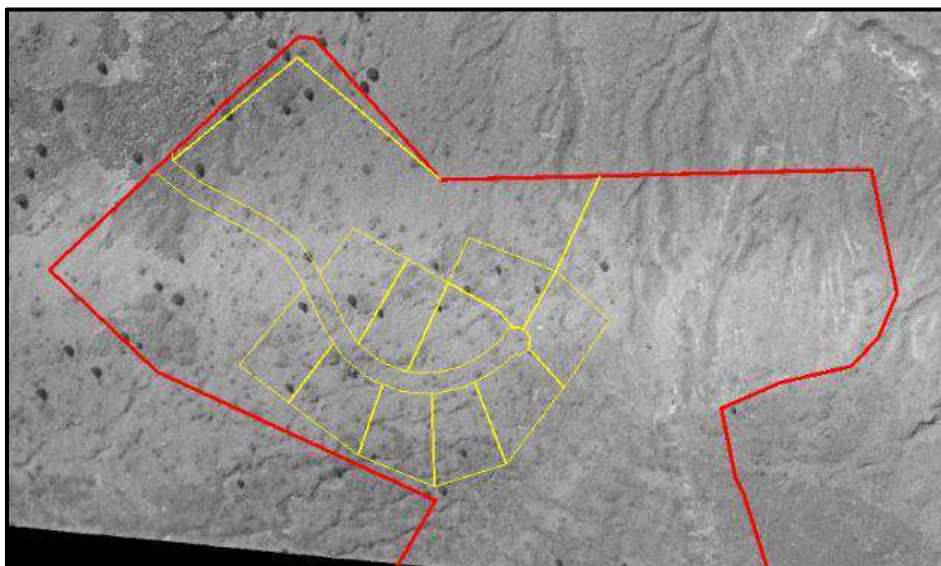
The Waikato Regional Council noted in an email dated 9.11.2021 that

*"I can confirm that this property **does not** currently appear on the Land Use Information Register"*

2.2.4 Historical Aerial Images

Aerial images are reviewed to present a snapshot in time, and give an indication of what activities may have been undertaken at the site.

The aerial image dated 22nd February 1945 (below) indicates that the subdivision area is situated at the base of an escarpment and is scrub covered and undeveloped. There is no road access and a fault zone is visible to the east of the proposed sub division.



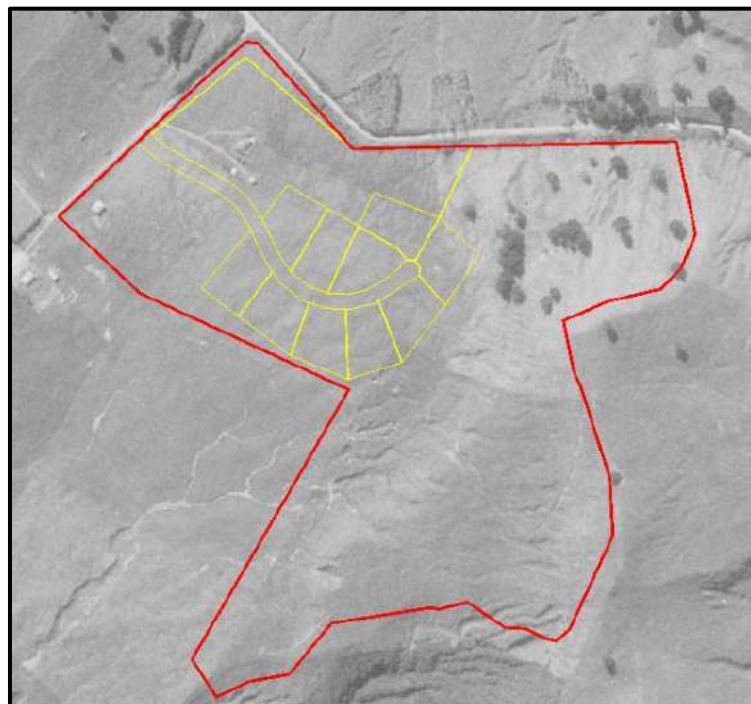
Historical Aerial Image er: 1945 (Image Ref.:SN178 1084/81, Courtesy of Retrolens)

The aerial image dated 25th October 1967 indicates that there is now road access, and the land has been cleared of scrub and converted to pasture. A dwelling (**HAIL E.1 and HAIL I**) has been constructed in the west of the subdivision area (proposed Lot 1). The fault zone to the east is more pronounced.



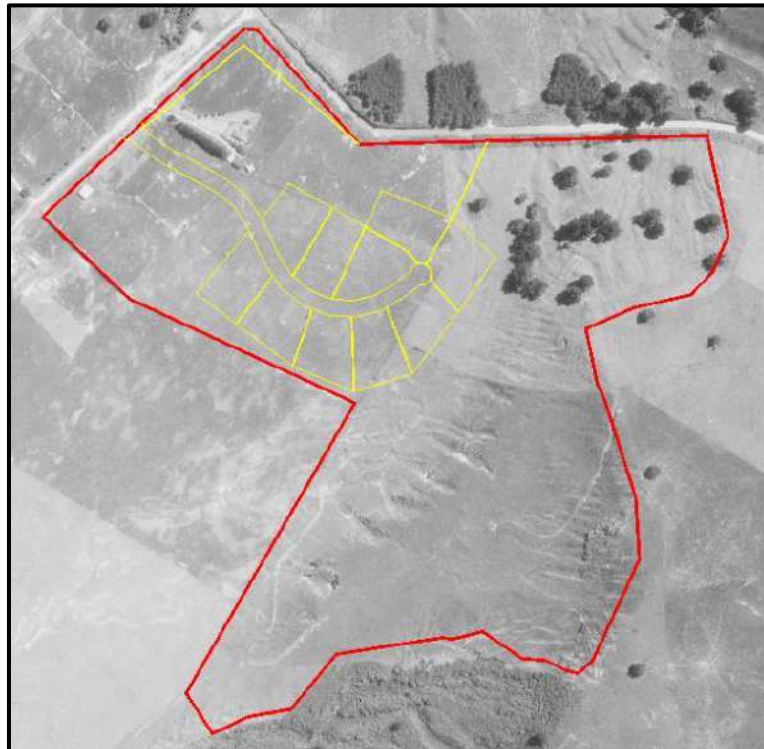
Historical Aerial Image 1: 1967 (Image Ref.:SN3005 E/1, Courtesy of Retrolens)

The aerial image dated 14th April 1979 show that two buildings have been constructed; one in the western corner of the subdivision area (proposed Lot 12) and one associated with the existing dwelling (HAIL E.1) on proposed Lot 1, there little change to the remainder of the site from 1967.



Historical Aerial Image 2: 1979 (Image Ref.:SN5410 D/3, Courtesy of Retrolens)

The aerial image dated 21st November 1986 indicates that the dwelling on proposed Lot 1 may have been extended. Gullying east of the subdivision site towards the fault zone is increasing.



Historical Aerial Image 3: 1986 (Image Ref.:SN8687 B/14, Courtesy of Retrolens)

The aerial image dated November 2005 shows little change from 1986.



Historical Aerial Image 4: 2005 (Image Courtesy of Google Earth Pro)

The aerial image dated March 2013 shows little change from 2005.



Historical Aerial Image 5: 2013 (Image Courtesy of Google Earth Pro)

The aerial image dated October 2021 shows little change from 2013.



Historical Aerial Image 6: 2021 (Image Courtesy of Google Earth Pro)

2.3 Previous Investigations

No evidence of previous ground contamination investigations was identified during the course of undertaking this PSI.

2.4 Current and Future Use

The site currently supports undeveloped grazing land. It is understood that the site is planned to be subdivided and redeveloped for residential use.

2.5 Geology and Hydrology

The topography generally slopes in small drainage valleys down to the west over the subdivision site and to the north towards Marapa Road in the north of the subdivision site. To the northeast and east of the of the subdivision is the Marapa Escarpment slopes down towards the site at angles of up to c.30°.

The geology of the subdivision site is mapped as Oruanui Formation Ignimbrite (Taupo group) of Taupo Volcanic Centre from the Late Pleistocene (0.027Ma) and described as “*Non-welded ignimbrite and phreatomagmatic fall deposits, and reworked ignimbrite.*” The north of the site east of the fault zone is mapped as OIS6-OIS4 (Middle – Late Pleistocene) lake deposits and described as “*Lacustrine pumice-bearing sandy or clayey silt*”. The south of the site east of the fault zone is mapped as undifferentiated Taupo Group Middle Pleistocene rhyolite of Taupo Volcanic Centre and described as “*rhyolite lava variably with lesser pumice and breccia as a carapace*”.

Lake Taupō is located c.1.8km southwest of the subdivision site. The lake catchment drains to the lake via drainage channels including one of which begins at the southern boundary of the subdivision site, and a second which begins towards the base of the escarpment slope c.50-100m inside the western boundary c.500m south of the subdivision site.

The two groundwater abstraction bores are recorded as being c.1km east of the subdivision site. The bore (Well Number 68-252) is shown on the Regional Council GIS website as being 88m deep and drilled in January 1994. There are no details recorded against the second bore (Well Number 68-1002). A bore was observed (now abandoned) during a site visit on 1st November 2021.

2.6 Climate

Rainfall has a defined seasonal variation with c.31% of rain falling during the winter months of June -August and c.22% falling in the summer months from December to February. The number of rain days (greater than 0.1mm of rain) annually is 160 and the number of wet days (greater than 1mm of rain) annually is 112. According to the National Climate Database, annual statistics normalised (average) for a given 30 year period (1981 – 2010) recorded at a station in Taupō were as follows:

Table 1: Average Climate Recorded over 1981 - 2010 at Taupō Aws

Description	Station	From - To	Annual
Total Rainfall (mm)	1858	1981 – 2010	960.1
Mean Air Temperature (Celsius)			11.7
Mean Daily Maximum Air Temperature (Celsius)			16.7
Mean Daily Minimum Air Temperature (Celsius)			6.8

2.7 Additional Site Information

Additional details concerning the site's present disposition are summarised in Table 2 below.

Table 2: Summary of Additional Site Information

Ownership	– The original Legal Description of the site is "Lot 1 DP337255 and Lot 2 DP337255" both dated 24 th April 2007.
Zoning/Classifications	– All land parcels on the site are zoned "Rural Environment" in the Taupō District Plan.
Easements	– An easement to convey electricity is on the Certificates of Title
Building Consents / Permits	– The Taupō District Council property files were reviewed on 15 November 2021 by Geohazard Environmental staff. The property files contained a building permit for a bathroom extension to a dwelling constructed in 1970.
Resource Consents	– The Taupō District Council property files were reviewed on 15 November 2021 by Geohazard Environmental staff. The property files contained a resource consent for the Kaiapo Bay subdivision.
Underground / Aboveground Storage Tanks	– None Identified.
Sewerage and Services	– Describe any relevant information concerning sewerage (active and abandoned sewerage) – Describe any relevant information concerning services (active or abandoned)
Additional Features	– Active normal faults with moderate (1-5mm/yr) slip rates cross the site east and west of the proposed subdivision.

2.8 Site Owner Information

The landowner provided information regarding the fertiliser regime. On average, 200 to 250kg/ha per year is applied to site soils. The last application was Balance "Special Mix", with 23-29% phosphorus. In New Zealand, phosphate fertilisers are regarded as the dominant source of anthropogenic cadmium on farmed land, and the main reason for accumulation of this metal.

2.9 Summary of Desktop Information

Table 3, below outlines typical contaminants found on land uses similar to the site. It does not imply some or all the contaminants will be found on site.

Table 3: Contaminants on Similar Sites

Activity or Industry	Possible Contaminants	Possible Locations	Possible Vertical Extent	Notes
Pastoral Farming	Pesticides, metals	Elevated concentrations in and around sheds, near water supplies (mixing chemicals), animal holding yards and dips. Lower or residual levels across paddocks from fertiliser and pesticide broadcast application.	Surface soils (0.0 to 0.1m) likely to be affected by surface application of pesticides. Deeper soils may be affected where ploughing has occurred. Deeper soils may be affected by point-source spills etc.	No animal handling yards or likely dip sites present. Cadmium likely to be most common contaminant if fertiliser use was extensive. Information provided is that this is not a main dairy farm and fertiliser use is at the low end. Published soil pH is relatively high, which influences cadmium uptake.
	Hydrocarbons	Fuel storage areas, sheds and workshops on farm	Deeper soils (to groundwater) may be affected by downward migration of hydrocarbons.	

3.0 SITE CONDITION AND SURROUNDING ENVIRONMENT

3.1 Site Inspection

A site inspection of the entire subdivision site of c.5.9 hectares was conducted on 01 November 2021. The inspection was conducted by Geohazard Environmental Ltd staff to examine the site and observe any evidence of contamination. Specific points noted are conditions at the site boundaries and visible signs of contamination or odours that might suggest contamination. A cursory inspection of factors that relate to site geology and hydrology is also performed to ensure consistency with what is known of the surrounding area. An overall picture of the site geology and hydrology is useful in assessing the transport potential of contaminants to or from the site.

A second site visit was undertaken on 07 December 2021 to collect soil samples for analysis at a Laboratory.

3.2 Conditions at Site Boundaries

Conditions at the site boundaries are as described below:

- | | |
|--------------|--|
| North | – Vegetation the top edge of the bank along the Marapa Road edge, tree felling operation at the north east corner. |
| East | – grazing land on the Marapa Escarpment |
| South | – grazing land |
| West | – Grazing land and Kaiapo Road |

There are post and wire fences along the north, south and west boundaries where the land slopes away from the subdivision site. As the land along these boundaries slopes away from the subdivision site this is likely to form a barrier from any offsite contaminants migrating to the site. Any contaminants onsite may migrate off site downslope to the north south and west.

Marapa Escarpment to the east and northeast slopes down towards the subdivision site, this will not prevent migration of any contaminants onto the site but may prevent migration off site in this direction.

3.3 Visible Inspection, Signs of Contamination and Odours

The ground surface at the area of the site investigated is in pasture, in good condition. There were no noticeable bare patches. No remnants of any structures were observed during the site walkover.

The site appears to be a typical pastoral farm, historically used for sheep and beef.

From visible indications, there is no evident sign of contamination at the site. However, in the southwest and southeast corners of the site trees have been felled and the slash burnt. A concrete tank and fencing wire was observed in the southeast corner. The house and sheds located in the west of the subdivision area (proposed Lots 1 and 12) appear to be in good order.

The absence of odour is consistent with there being no obvious indications of gross contamination from site inspection.

Photographs below show the general nature of the site.



Photograph 1: View looking northeast over the site.



Photograph 2: View looking northwest over the site.



Photograph 3: View to the west over the site.



Photograph 4: The Marapa Escarpment along the eastern boundary.



Photograph 5: Tree felling operation on the Marapa Escarpment in the northeast corner of the subdivision site.



Photograph 6: Felled trees and slash burn at the southwestern boundary.



Photograph 7: Slash burn remnants, concrete water tank and fencing wire.

4.0 DISPOSITION OF SITE CONTAMINATION

The disposition of any contamination at site must be confirmed with results from field sampling and analysis, and, for contaminated land, these results must be evaluated against soil guideline values (SGV), also known as soil contaminant standards (SCS). This section summarises appropriate SCS for the site, followed by Geohazard Environmental Ltd review of readily available information concerning the disposition of site contamination.

4.1 Basis for Soil Contaminants Standards (SCS)

The site investigated here is classed as Rural Environment by the Taupō District Council, and also considering the site's proposed residential use, the Rural/lifestyle block use scenario, described in Table 4 below, is most relevant to this investigation. As a result, based on the MfE Guidelines, any results should be assessed against SCS given for this scenario. There are both more conservative and more liberal standards that could be applied; however, the one presented is appropriate both to the use classification of the site based on the information available.

Table 4: Use Scenario Most Relevant to this Report.

Parks / Recreational	Covers exposure at public and private green areas and reserves that are used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Residential grown produce consumption (up to 10 %)	Covers standard residential lots for single dwelling sites with gardens, including home-grown produce consumption (up to 10 %).
Rural/ lifestyle block	Rural residential use, including home-grown produce consumption. Applicable to the residential portion of farms, but not productive parts of agricultural land.
Industrial	Commercial / industrial sites with varying degrees of exposed soil.

SCS in this report, tabulated in Section 4.3, are taken from the National Environmental Standards (NES) and New Zealand Ministry for the Environment (MfE) wherever possible. In some cases, the MfE has not developed a specific SCS for some contaminants under some use scenarios. When MfE values are unavailable, guideline values from reputable sources such as the Australian National Environmental Protection Council (NEPC) are used, according to acceptable SCS sources and the hierarchy of use for these sources that is specified by the MfE (2007).

The NES for contaminated land was introduced in order to address a legacy of soil contamination in New Zealand that has resulted from the use, and improper storage and disposal, of chemicals in industry and agriculture.

The NES controls apply to "Land use change, subdivision, and disturbance of any land where, according to the best information available to the local authority, there has been a facility on the land or a hazardous activity carried out on the land that may have involved the intentional or accidental discharges of hazardous substances that could now be a risk to human health". Hence the NES is applicable to the present site due to the proposed use change. The NES contains SCS, and where present these supersede those previously published in MfE industry-specific guidelines.

4.1.1 Background Levels

The NES defines background as "natural background" levels. Background soil concentration predictions were developed by Landcare Research from geostatistical analysis of trace element data from regional councils, national soils database and GNS Science identifying associations

with geological parameters adapted from the GNS Science QMAP geological map dataset. The applicable guidelines are shown in the tables in Section 4.3 below. Background levels are particularly relevant when considering whether soils are suitable for disposal as cleanfill.

Background soil concentrations are specifically mentioned in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012) which is implemented by District and City Councils.

The Waikato Regional Council presents “background” trace elements data for selected elements in soil of the Waikato region. The most common method of estimating natural background values is sampling soil at native reserve sites where no direct human use has occurred (i.e. well removed from urban areas and fertilised land). This approach is applicable in New Zealand where we have experienced negligible atmospheric inputs of trace elements to soil.

Soil samples from 38 sites were reportedly chosen to represent background concentrations for the Waikato region. Their soil types represented the most common in the region but did not include peat soils (as these have quite different properties). Each sample was reportedly analysed for acid recoverable trace element content (except for total fluorine) and the 95th percentile was calculated for each element to give an upper limit for the natural range of concentrations (see Table 5 below).

4.2 Field Sampling and Analysis

For this PSI, the Client’s brief specifically entailed conducting field sampling and analysis, and this provides an evidentiary basis for determination of the disposition of contaminants at the site.

There have been no confirmed HAIL (Hazardous Activities and Industries List) associated site uses that Geohazard Environmental Ltd has discovered, and there are many contaminants for which analysis could have been performed. However, contamination consistent with pastoral farming is of concern in the area given the history of previous use of site, and analysis was requested for cadmium since this represent contaminants that might be anticipated to be present based on the limited historical information on the site and Geohazard Environmental Ltd.’s knowledge of contaminated sites in the area.

Cadmium is identified as the primary contaminant of concern on pastoral land, as there are no sheds or animal handling yards noted in the site history.

Soil samples were collected on a 30m grid basis, in line with Ministry for the Environment guidelines.

Samples were collected using a hand auger. The auger was cleaned between each sample location using Decon90 (a non-phosphate laboratory grade detergent) and deionised water. Samples were placed into laboratory supplied jars and placed into a chillibin. Samples were couriered to Analytica Laboratories in Hamilton under Chain of Custody documentation.

Samples were composited by the laboratory, with composites created of no more than four sub-samples.

The composites were selected to be representative of the two soil types identified at the site, and each composite generally reflective of a proposed lot. The objectives of the sampling was to determine an overall indication of cadmium concentrations. Composite sampling is appropriate for this objective.

4.3 Results

The results from analysis of samples, summarised in this section, indicate that [all concentrations of contaminants are below SCS.

4.3.1 Metals

The results from analysis of samples for metals are summarised in Table 5 below. Results which exceed predicted background levels are shown in bold. All results are within SCS for a rural residential use.

Table 5: Results from Analysis for Metals (all results in mg/kg).

Sample	Cd
Composite A (HA01, HA02, HA04, HA05)	0.38
Composite B (HA07, HA08, HA10, HA11)	0.44
Composite C (HA13, HA14, HA15, HA16)	0.505
Composite D (HA17, HA18, HA19, HA20)	0.50
Composite E (HA22, HA23, HA24, HA25)	0.541
Composite F (HA28, HA29, HA30, HA31)	0.30
Composite G (HA03, HA06, HA09, HA12)	0.49
Composite H (HA21, HA26, HA27, HA32)	0.523
Composite I (HB01, HB02, HB04, HB05)	0.46
Composite J (HB07, HB08, HB10, HB11)	0.32
Composite K (HB03, HB06, HB09, HB12)	0.47
Composite K (HB03, HB06, HB09, HB12)	0.48
Composite L (HB15, HB16, HB19)	0.517
Composite M (HB13, HB17, HB20)	0.23
Composite N (HB14, HB18, HB21)	0.47
Composite O (HB22, HB23, HB24, HB25)	0.44
SCS (Rural residential)	0.8 ^a
“U95pred” Predicted Background Soil Concentrations ^b	0.49
WRC Background ^c	0.22
Cleanfill Disposal Outside of High Risk Locations (If less than 2500m³) ^d	0.8
Class A Landfill WAC ^e	20

As - Arsenic, Be - Beryllium, B - Boron, Cd - Cadmium, Cr - Chromium, Cu - Copper, Hg - Mercury, Pb - Lead, Ni - Nickel, Zn - Zinc
Values in bold exceed predicted background level.

a) MfE 2012 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health,

b) Regional Council Interim Environmental Guidelines

c) Landcare Research Limited (June 2016) Predicted Background Soil Concentrations

- d) Natural Background Soil Concentrations in the Waikato Region (Regional Council website, accessed 31/01/2019)
- e) Information Received from a Senior Resource Officer at Regional Council dated 30 July 2018.
- f) MfE 2004 Module 2 Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification

Copies of all laboratory results are given in Appendix C.

4.4 Quality Control

The objectives of the sampling were to determine the concentration of contaminants across the site. The sample plan incorporated a grid-pattern to allow for statistical analysis.

Quality control included washing equipment between each sample location using laboratory grade detergent and deionised water and using fresh disposable gloves.

As the objective of sampling was to determine average cadmium concentrations in soil, rather than identify hotspots of contamination, no field duplicate samples were considered necessary.

4.4.1 Laboratory Quality Control

The laboratory undertook duplicate sampling on sample Composite K. A typical data quality objective would be for a sample to be acceptable if the relative percent difference (RPD) for field duplicate samples is less than 30–50%, depending on the analyte. The RPD is calculated as:

$$RPD = \frac{(\text{Result No. 1} - \text{Result No. 2}) \times 100}{(\text{Mean result})}$$

For laboratory split samples, an RPD of 30-50% would typically be acceptable.

Table 6: Laboratory Duplicate Results

	Composite K	Composite K (Laboratory Duplicate)	RPD
(Cd)	0.47	0.48	-2.11

For this site, the laboratory quality control is considered adequate.

5.0 SITE CHARACTERISATION

5.1 Type of Environmental Contamination

The term contaminant refers to a substance that is not normally present in the environment. For this report however, the following operational definition is used: a contaminant is a substance that is present at levels that might cause harmful effects to humans or the environment. Therefore, this report does not consider whether or not the levels present are from natural sources or not, but only whether or not contamination is likely to, or does, exist above safe levels, i.e. SCS.

The results from analysis of samples taken at site, summarised in Section 4.3, indicate that all contaminant levels are below SCS, and therefore the site is not contaminated with respect to the operational definition given above.

5.2 Exposure Routes and Risks to Exposed Populations

For human health, exposure is the primary concern, and below we summarise ways by which exposure is most likely to occur:

- Surface soils (0-1 m)
 - Soil ingestion;
 - Dermal contact (absorption through skin); and
 - Inhalation of soil, dust, or volatized contaminants.
- Sub-surface soils (> 1 m)
 - Water-borne migration of contaminants to surface during times of high rainfall (enabling exposure via all three routes above); and
 - Inhalation via diffusion of vapour-phase contaminants to the surface.

Of these exposure routes, none are likely because no contamination source is known or suspected. There is no basis to recommend further investigation at this site. Table 7 therefore shows a conceptual site model **without linkage** between contamination source, pathways and receptors.

Table 7: Conceptual Site Model

Source	Receptor	Pathway	Pathway Complete?
Grazing pasture land	Construction workers	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that is a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that is a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – Site is production land. Significant Contaminant sources not identified.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – Short term exposure only. Contaminant sources not identified.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into	Incomplete Pathway – No significant contamination sources identified.

Source	Receptor	Pathway	Pathway Complete?
		nearby watercourses.	
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – No significant contamination sources identified that would impact groundwater, however groundwater testing is recommended prior to any abstraction and use for human consumption.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – No significant contamination sources identified that would impact biota.

5.3 NES Consents

The National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) outlines various 'Permitted Activities' (not requiring consent) and 'Controlled, Restricted Discretionary and Discretionary Activities' (requiring resource consent). The advice of a planner should be sought to ensure all consent requirements are met.

"There is no evidence to suggest that the site has been subject to HAIL activities. It is more likely than not that HAIL activities did not occur at the site."

National Environmental Standard rules relating to the subdivision, land use change or soil disturbance at the site do not apply as the site is not considered to be a "piece of land".

5.4 Other Consent Requirements

Our assessment is that it is unlikely contaminants would be present at the site in concentrations likely to pose a hazard to human health or the environment.

The advice of a planner should be sought to ensure all consent requirements are met.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary and Conclusions

The following summarises results from Geohazard Environmental Ltd.'s preliminary investigation of the site:

- The site currently supports pasture. It is understood that the site is planned to be subdivided and redeveloped for rural residential use.
- No evidence of previous ground contamination investigations was identified during the course of undertaking this PSI.
- From at least 1945 the site has been undeveloped assumed grazing land. By 1967 a dwelling had been constructed in the west of the site, and by 1979 sheds had been erected, one associated with the dwelling and one in the southwest of the site.
 - The dwelling and associated building forms part of Proposed Lot 1, and is not changing use.
 - A shed on proposed Lot 12 is on Production Land. The provisions of the NES do not apply to production land.
- A site inspection of the entire site area of c.5.9 hectares was conducted on 1st November 2021.
 - There was no evident sign of contamination at the site, although the potential for elevated cadmium in soil from fertiliser application could not be discounted..
- A second site visit was undertaken on 7th December 2021 during which 57 samples were collected. These were composited at the Laboratory and analysed for cadmium.
 - All composite samples were within SCS for a rural residential land use, albeit 5 composite samples exceed predicted background level for cadmium.
- The site **is not** considered to be a "Piece of Land" under the NESCS legislation. Rules relating to subdivision, soil disturbance and land use change in the NESCS therefore do not apply.
 - For the avoidance of doubt, it is highly unlikely the proposed rural-residential use will present a risk to human health.
- Due to the nature of this investigation, it is not possible to detail the full extent of contamination at the site and neighbouring sites, and there remains a possibility that the site may have been impacted by previous site activities to a degree greater than apparent from results reported herein.
- The extent of any contamination at the site beyond the area of focus for this report and neighbouring sites is unknown at this stage.

6.2 Recommendations

The advice of a planner should be sought, or contact made with the District and Regional Councils, prior to undertaking any earthworks at the site, to ensure all rules are complied with.

Based on the results of this PSI, Geohazard Environmental Ltd recommend to Breda Investments Limited that further assessment of the site for potential contaminants is not required. However, should site earthworks indicate fill material on site contains anthropogenic material, a suitably qualified environmental specialist should be engaged to determine if there is any undue risk.

6.3 Further Client Actions

If soil is to be taken off site or undergo earthworks, consent requirements must be checked for both the site and the receiving environment. A planner can assist with this.

Soils above background levels but below conservative residential guidelines and/or environmental protection guidelines may still not be suitable for cleanfill. The disposal location should be assessed for compliance with all rules (for example proximity to water).

7.0 REFERENCES

GNS Science (GNS) GeoAtlas, <http://data.gns.cri.nz/geology/> accessed 01.11.2021.

Environment Waikato (2005) Cadmium Accumulation in Waikato Soils

Landcare Research (2016) *Background soil concentrations of selected trace elements and organic contaminants in New Zealand.*

Ministry for the Environment (MfE) 2021. *Contaminated Land Management Guidelines No.1: Reporting on Contaminated Site's in New Zealand.*

Ministry for the Environment (MfE) 2004. *Contaminated Land Management Guidelines Schedule A: Hazardous Activities and Industries List (HAIL) and Schedule B: Hazardous Activities and Industries List (HAIL) with Hazardous Substances.*

Ministry for the Environment (MfE) 2021. *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils.*

Ministry for the Environment (MfE) 2012 *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.*

National Institute of Water and Atmospheric Research (NIWA) 2011. *The National Climate Database*, <http://cliflo.niwa.co.nz/> -accessed 01.11.2021.

Waikato Regional Council (2009) *Erosion & Sediment Control Guidelines for Soil Disturbing Activities.*

APPENDIX A

Historical Certificates of Title



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R. W. Muir
Registrar-General
of Land

Search Copy

Identifier 152831
Land Registration District South Auckland
Date Issued 24 April 2007

Prior References

SA52B/111

Estate Fee Simple
Area 35.6752 hectares more or less
Legal Description Lot 1 Deposited Plan 337255

Proprietors

Kaiapo Bay Limited

Interests

Subject to Section 3 Petroleum Act 1937

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Section 261 Coal Mines Act 1979

Subject to Sections 6 and 8 Mining Act 1971

Subject to Section 5 Coal Mines Act 1979

Subject to a right to convey electricity easement over parts marked A & B on DP 337255 created by Easement Instrument 8475625.1 - 28.4.2010 at 12:00 pm

The easements created by Easement Instrument 8475625.1 are subject to Section 243 (a) Resource Management Act 1991

8508832.1 Resolution pursuant to Section 243(f)(ii) Resource Management Act 1991 cancelling the easement condition on plan DP 337255 described in marked B and C on DP 337255 - 3.6.2010 at 9:14 am



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



R. W. Muir
Registrar-General
of Land

Search Copy

Identifier 152832
Land Registration District South Auckland
Date Issued 24 April 2007

Prior References

SA52B/111

Estate Fee Simple
Area 80.1285 hectares more or less
Legal Description Lot 2 Deposited Plan 337255

Proprietors

Kaiapo Point Limited

Interests

Subject to Section 3 Petroleum Act 1937

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Section 261 Coal Mines Act 1979

Subject to Sections 6 and 8 Mining Act 1971

Subject to Section 5 Coal Mines Act 1979

5722729.1 Esplanade Strip Instrument pursuant to Section 232 Resource Management Act 1991 - 9.9.2003 at 9:00 am

Appurtenant hereto is a right to convey electricity easement created by Easement Instrument 8475625.1 - 28.4.2010 at 12:00 pm

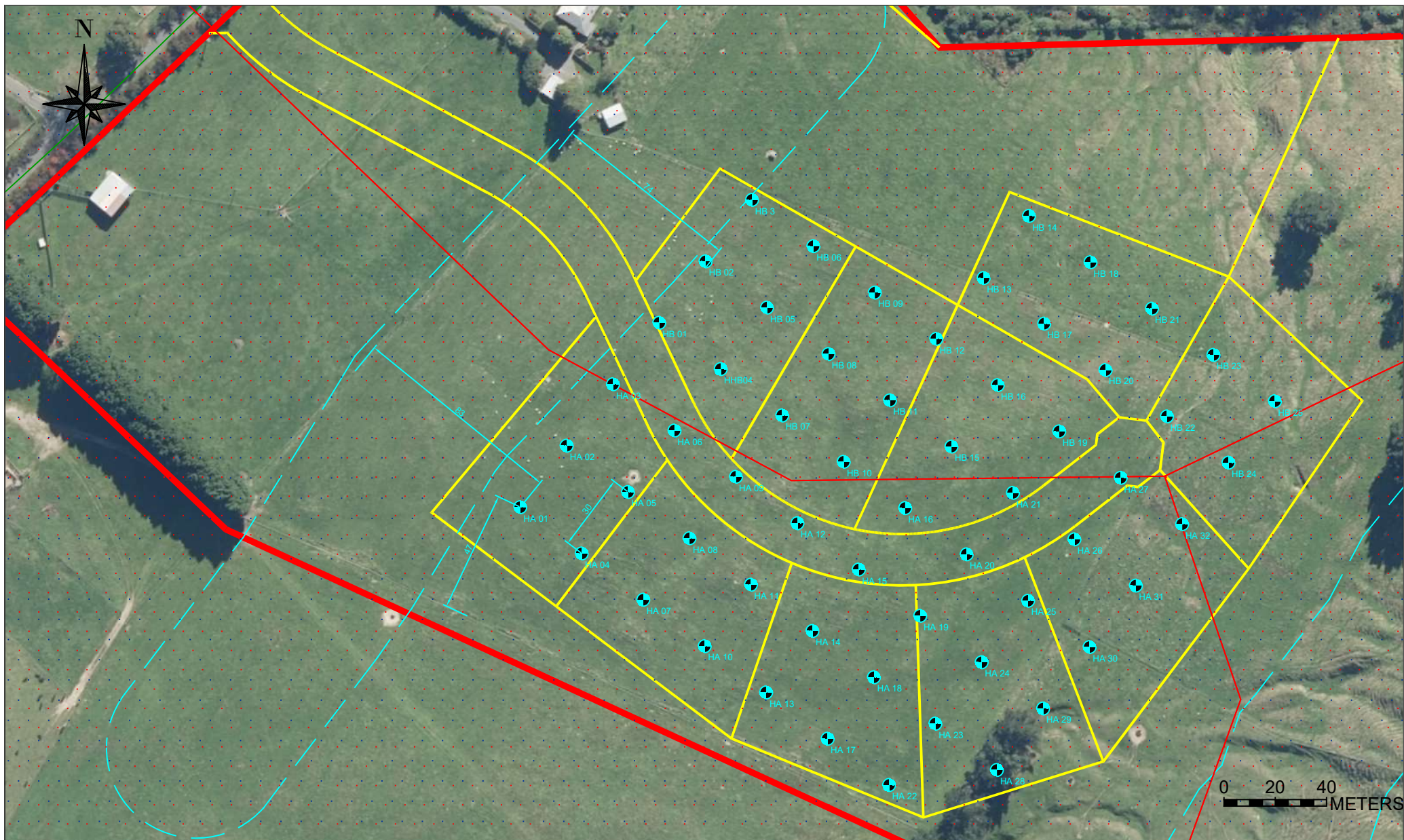
The easements created by Easement Instrument 8475625.1 are subject to Section 243 (a) Resource Management Act 1991

8593528.1 Mortgage to Colin Alfred Carran and Patricia Anne Carran - 2.3.2011 at 4:20 pm

8593528.2 Mortgage to Colin Alfred Carran, Patricia Anne Carran and Allan Keith Carran - 2.3.2011 at 4:20 pm

APPENDIX B

Sample Location Plan



15 Kaiapo Rd, Acacia Bay Sample Location Plan



Client: Breda Investments Ltd		SCALE: 1: 2000 @ A4
JOB # 211003	DATE: 02/13/21	DRAWN BY: SAM
DRG No. 001	REV. -	

APPENDIX C

Laboratory Results



Certificate of Analysis

Geohazard Environmental Ltd
PO Box 7053, Te Ngae
Rotorua 3042

Attention: Jonathan Findon
Phone: 022 436 4292
Email: jonathan@geohazard.co.nz

Sampling Site: 15 Kaiapo Rd

Lab Reference: 21-51049
Submitted by: Susan / David
Date Received: 08/12/2021
Testing Initiated: 8/12/2021
Date Completed: 13/12/2021
Order Number:
Reference: 211003

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Elements in Soil

Client Sample ID			Composite A (HA01, HA02, HA04, HA05)	Composite B (HA07, HA08, HA10, HA11)	Composite C (HA13, HA14, HA15, HA16)	Composite D (HA17, HA18, HA19, HA20)	Composite E (HA22, HA23, HA24, HA25)
Date Sampled							
Analyte	Unit	Reporting Limit	21-51049-58	21-51049-59	21-51049-60	21-51049-61	21-51049-62
Cadmium	mg/kg dry wt	0.005	0.38	0.44	0.505	0.50	0.541

Elements in Soil

Client Sample ID			Composite F (HA28, HA29, HA30, HA31)	Composite G (HA03, HA06, HA09, HA12)	Composite H (HA21, HA26, HA27, HA32)	Composite I (HB01, HB02, HB04, HB05)	Composite J (HB07, HB08, HB10, HB11)
Date Sampled							
Analyte	Unit	Reporting Limit	21-51049-63	21-51049-64	21-51049-65	21-51049-66	21-51049-67
Cadmium	mg/kg dry wt	0.005	0.30	0.49	0.523	0.46	0.32

Elements in Soil

Client Sample ID			Composite K (HB03, HB06, HB09, HB12)	Composite L (HB15, HB16, HB19)	Composite M (HB13, HB17, HB20)	Composite N (HB14, HB18, HB21)	Composite O (HB22, HB23, HB24, HB25)
Date Sampled							
Analyte	Unit	Reporting Limit	21-51049-68	21-51049-69	21-51049-70	21-51049-71	21-51049-72
Cadmium	mg/kg dry wt	0.005	0.47	0.517	0.23	0.47	0.44

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
This test report shall not be reproduced except in full, without the written permission of Analytica Laboratories.

Soil Composite

Client Sample ID			HA01 0	HA02 0	HA03 0	HA04 0	HA05 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-1	21-51049-2	21-51049-3	21-51049-4	21-51049-5
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA06 0	HA07 0	HA08 0	HA09 0	HA10 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-6	21-51049-7	21-51049-8	21-51049-9	21-51049-10
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA11 0	HA12 0	HA13 0	HA14 0	HA15 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-11	21-51049-12	21-51049-13	21-51049-14	21-51049-15
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA16 0	HA17 0	HA18 0	HA19 0	HA20 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-16	21-51049-17	21-51049-18	21-51049-19	21-51049-20
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA21 0	HA22 0	HA23 0	HA24 0	HA25 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-21	21-51049-22	21-51049-23	21-51049-24	21-51049-25
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA26 0	HA27 0	HA28 0	HA29 0	HA30 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-26	21-51049-27	21-51049-28	21-51049-29	21-51049-30
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HA31 0	HA32 0	HB01 0	HB02 0	HB03 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-31	21-51049-32	21-51049-33	21-51049-34	21-51049-35
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB04 0	HB05 0	HB06 0	HB07 0	HB08 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-36	21-51049-37	21-51049-38	21-51049-39	21-51049-40
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB09 0	HB10 0	HB11 0	HB12 0	HB13 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-41	21-51049-42	21-51049-43	21-51049-44	21-51049-45
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB14 0	HB15 0	HB16 0	HB17 0	HB18 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-46	21-51049-47	21-51049-48	21-51049-49	21-51049-50
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB19 0	HB20 0	HB21 0	HB22 0	HB23 0
Date Sampled			07/12/2021	07/12/2021	07/12/2021	07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-51	21-51049-52	21-51049-53	21-51049-54	21-51049-55
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			HB24 0	HB25 0
Date Sampled			07/12/2021	07/12/2021
Analyte	Unit	Reporting Limit	21-51049-56	21-51049-57
Soil - Composite prep - DS			Complete	Complete

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
Soil Composite*	Analytica Laboratories is not accredited for the preparation of composite samples; however, the chemical analysis does hold IANZ accreditation. As composite analysis is conducted when requested by the sampler if they deem fit as per the NES guideline, the results of the chemical analyses still hold proper accreditation based on Analytica's methods.



Sharelle Frank, B.Sc. (Tech)
Technologist

APPENDIX E

Geosciences Ltd DSI

LIMITED DETAILED SITE INVESTIGATION (DSI)

40 KAIAPO ROAD, ACACIA BAY, TAUPO



REFERENCE NUMBER: REP-H0180/DSI/FEB22/REV1

PREPARED FOR: E.F. DEADMAN LTD C/- MCKENZIE & CO LTD

DATE ISSUED: 11 FEBRUARY 2022



info@geosciences.co.nz www.geosciences.co.nz

Auckland

47 Clyde Road, Browns Bay,
Auckland
PO Box 35-366, Browns Bay,
Auckland
(09) 475 0222

Hawkes Bay

73 Bridge Street, Ahuriri,
Napier
(06) 281 2454

DISCLAIMER

This report is provided on the condition that Geosciences Ltd disclaims all liability to any person or entity other than the client, Taupo District Council and Waikato Regional Council in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by any such person in reliance, whether in whole or in part, on the contents of this report. Furthermore, Geosciences Ltd disclaims all liability in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by the client, or any such person in reliance, whether in whole or any part of the contents of this report of all matters not stated in the brief outlined in our proposal and according to our general terms and conditions and special terms and conditions for contaminated sites.

STATEMENT

This site investigation has been prepared in accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. It has been managed by a suitably qualified and experienced practitioner (SQEP); and reported on in accordance with the current edition of the Ministry for the Environment's *Contaminated Land Management Guidelines No.1 – Reporting on Contaminated Sites in New Zealand*.

Report prepared on behalf of
GSL by:

Brodie Rowse
Environmental Scientist
Geosciences Ltd

Report reviewed and authorised on
behalf of GSL by:

Carl O'Brien
Director
Geosciences Ltd

Thank you for the opportunity to carry out this investigation. Should you have any queries regarding this report please do not hesitate to contact us on 09 475 0222 or 06 281 2454.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1 INTRODUCTION	1
2 PROPERTY DETAILS	1
2.1 ENVIRONMENTAL CONTEXT.....	1
2.1.1 <i>Geology and Geohydrology</i>	1
2.1.2 <i>Topography and Drainage</i>	1
2.1.3 <i>Waikato Regional Hazards Portal</i>	2
3 PROPOSED DEVELOPMENT.....	2
4 STANDARDS AND REGULATIONS	2
4.1 NATIONAL ENVIRONMENTAL STANDARD (NES).....	2
4.2 TAUPO DISTRICT PLAN	2
4.3 WAIKATO REGIONAL PLAN.....	3
5 OBJECTIVES AND PROJECT DESIGN	3
6 DESKTOP STUDY	4
6.1 RECORDS OF TITLE.....	4
6.2 HISTORIC AERIAL PHOTOGRAPHS	4
6.2.1 <i>Summary of Historic Aerial Photographs</i>	5
6.3 PROPERTY FILE.....	6
7 SITE INSPECTION & INFRASTRUCTURE	6
7.1 SITE OWNER INTERVIEW.....	7
8 PRELIMINARY CONCEPTUAL SITE MODEL.....	8
8.1 POTENTIAL SOURCES OF CONTAMINATION	8
8.2 EXPECTED SPATIAL DISTRIBUTION AND RISK.....	8
8.2.1 <i>Application of Superphosphate Fertilisers</i>	8
8.2.2 <i>Bulk Fuel Storage</i>	9
8.3 INTRUSIVE INVESTIGATION REQUIREMENTS.....	9
9 SOIL SAMPLING AND ANALYSIS	9
9.1 LABORATORY ANALYSIS AND ACCREDITATION.....	9
9.2 QUALITY ASSURANCE & QUALITY CONTROL.....	10
9.3 ACCEPTANCE CRITERIA AND RELEVANT GUIDELINES	10
9.4 SOIL PH CONSIDERATIONS	10
9.5 ANALYTICAL RESULTS.....	10
9.6 HEAVY METALS.....	11
10 SOIL CONTAMINATION RISK ASSESSMENT	11
11 CONCLUSIONS	12
11.1 NATIONAL ENVIRONMENTAL STANDARDS	12
11.2 WAIKATO REGIONAL PLAN	12

12 REFERENCES	13
13 LIMITATIONS	14

TABLES

TABLE 1	PROPERTY DETAILS
TABLE 2	HEAVY METALS ANALYTICAL RESULTS

FIGURES

FIGURE 1	SITE LOCALITY
FIGURE 2	SOIL SAMPLE LOCATIONS

APPENDICES

APPENDIX A	PROPOSED SCHEME PLAN
APPENDIX B	RECORDS OF TITLE
APPENDIX C	HISTORIC AERIAL PHOTOGRAPHS
APPENDIX D	PROPERTY FILE EXTRACTS
APPENDIX E	SITE PHOTOGRAPHS
APPENDIX F	LABORATORY TRANSCRIPTS

EXECUTIVE SUMMARY

Geosciences Ltd (GSL) was engaged to undertake a limited detailed site investigation (DSI) of the property located at 40 Kaiapo Road, Acacia Bay, Taupo, as part of a proposal to subdivide the property into forty rural residential lots.

The DSI included a desktop study of publicly available information, visual inspection, and interview with the current landowner to determine whether any items listed on the Ministry for the Environment (MfE) Hazardous Activities and Industries List (HAIL) have occurred, are occurring or are more likely than not to have occurred at the property. The desktop study identified that the property has been utilised for drystock grazing and 'cut and carry' feedstock production for much of its discernible history.

GSL's preliminary conceptual site model for potential soil contamination identified the primary source of potential soil contamination onsite was through cadmium accumulation within topsoil because of regular superphosphate application since at least the mid 1990's. Other potential sources of soil contamination, including limited fuel storage and historic lead-based paint use, were assessed as posing a negligible soil contamination risk.

Based on the conceptual site model, GSL staff collected seven composite soil samples targeted to areas of discernible cropping and extended superphosphate application with a low soil erosion risk that would facilitate the accumulation of cadmium impurities. These locations were based on the aerial imagery evidence and interview with the current landowner. Composite soil sample analytical results returned cadmium concentrations within the expected naturally occurring soil background range for the site, indicating the application of superphosphate onsite has not resulted in the accumulation of cadmium within the soil profile which would pose a risk to end land users or the receiving environment.

Based on the findings of this investigation, there is no complete soil contaminant source-pathway-receptor relationship present onsite, and as a result the MfE *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health* (NES) regulations, and contaminated land provisions of the Waikato Regional Plan will not apply to the proposed subdivision and development.

1 INTRODUCTION

Geosciences Ltd (GSL) has prepared the following report for E.F. Deadman Ltd C/- McKenzie & Co Ltd in accordance with the GSL proposal, Ref: *Pro-2595/Nov21*, dated 25 November 2021.

This report has been prepared in accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG): No. 1 - "*Guidelines for Reporting on Contaminated Sites in New Zealand*", and No. 5 – "*Site Investigation and Analysis of Soils*" (References 1 and 2).

2 PROPERTY DETAILS

TABLE 1: PROPERTY DETAILS

Address	Legal Description	Size	Zoning
40 Kaiapo Road, Acacia Bay, Taupo	Lot 1 DP 410435	218.71 Ha	Rural Environment Zone

The property at the above addresses, and hereafter referred to as 'the site' in this report is located in a predominantly rural area of Acacia Bay approximately 7.5 km to the west of Taupo. The site is currently utilised for pastoral farming activities and lies on the escarpment of Lake Taupo.

2.1 ENVIRONMENTAL CONTEXT

2.1.1 GEOLOGY AND GEOHYDROLOGY

The local geology of the site is predominantly described by GNS Science as non-welded ignimbrite and phreatomagmatic fall deposits, and reworked ignimbrite of the Oranui Formation Ignimbrites, Taupo Volcanic Centre. A small portion of the site westernmost extent falls within an area described by GNS as rhyolite lava variably with lesser pumice and breccia as a carapace of the Taupo Volcanic Centre.

The site is situated within the Taupo Ignimbrite and Taupo Sand aquifers as defined by the Ministry for the Environment *Location and extent of NZ's aquifers (2015)* GIS data layer.

2.1.2 TOPOGRAPHY AND DRAINAGE

The sites topography forms a ridge through the approximate centre of the site elevated approximately 500 m above sea level (asl), leading to a high point in the westernmost extent of the site of approximately 540 m asl. The site slopes away from the ridgeline on both sides to the north and south, dropping to approximately 380 m asl at the northern boundary and approximately 400 m asl at the southern boundary.

Drainage from the site is through overland flow and soakage across the sites surfaces. The Waikato Regional Council GIS website indicates that a small dendritic network of overland flowpaths are present across the site with the central ridgeline forming a watershed draining to the north and south

and ultimately draining to Lake Taupo. The site falls within the Lake Taupo and surrounds Catchment Management Zone

2.1.3 WAIKATO REGIONAL HAZARDS PORTAL

The site is not included on any natural hazards overlay included on the Waikato Regional Council Hazards Portal.

3 PROPOSED DEVELOPMENT

It is proposed to subdivide the property through the formation of approximately 40 rural residential lots alongside the development of roading, infrastructure, and suitable building platforms.

The proposed development will include the change in landuse from rural landuse to rural residential, the subdivision of the title, and will involve the disturbance of soil in order to establish the associated infrastructure.

A copy of the proposed subdivision plans are attached as Appendix A.

4 STANDARDS AND REGULATIONS

As a result of the proposed development outlined above, it will be necessary to address the requirements of the following applicable standards and regulations for the site.

4.1 NATIONAL ENVIRONMENTAL STANDARD (NES)

The *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health* (NES) (Reference 3), which came into effect on 1 January 2012, ensures that land affected by contaminants in soil is appropriately identified and assessed when soil disturbance and/or land development activities take place and, if necessary, remediated or the contaminants contained to make the land safe for human use.

Under the NES, land is considered to be actually or potentially contaminated if an activity or industry on the MfE Hazardous Activities and Industries List (HAIL) has been, is, or is more likely than not to have been, undertaken on the land. In order to establish the sites landuse history, and the resulting applicability of the NES, a preliminary site investigation is required.

The NES defines five standard landuse scenarios for which soil contaminant standards have been derived. The most sensitive landuse scenario which is applicable to the proposed change in landuse, subdivision and development at this site is defined by the NES as: *Rural residential / lifestyle block with 25% homegrown produce*.

4.2 TAUPO DISTRICT PLAN

Chapter 3m of the Taupo District Plan (the Plan) contains an objective and policies which seek to protect activities, the environment and community during and after redevelopment of contaminated sites (Reference 4). Similarly, Chapter 4a.7 relating to the Residential Environment provides assessment criteria relating to whether the design and layout of the subdivision avoids, remedies or mitigates any adverse effects resulting from identified natural hazards or land contamination,

including an assessment of any information provided by a suitably qualified person whose investigations are supplied with the subdivision/development application.

For all purposes of this investigation, the relevant provisions of the Plan relating to soil contamination have legal jurisdiction and those provisions have been considered where they may have an impact on the proposed development. GSL has considered provisions of the Plan in this report where they may have an impact on the proposed development and any soil disturbance.

4.3 WAIKATO REGIONAL PLAN

Section 30(1)(f) of the RMA provides the Waikato Regional Council with a statutory duty to investigate land for the purposes of identifying and monitoring contaminated land and for the control of discharges of contaminants into or onto land or water and discharges of water into water.

Chapter 5, Section 3, of the Waikato Regional Plan (Reference 5), and Chapter 9 of the Waikato District Plan deals specifically with contaminated land and maintains that Council is required to manage both the use of land containing elevated levels of contaminants and the discharge of contaminants from land containing elevated levels of contaminants. The provisions of that chapter have been considered where they may have an impact on the proposed development.

5 OBJECTIVES AND PROJECT DESIGN

The primary objective of this investigation is to provide an assessment of whether any actual or potential soil contamination exists within the piece of land for the purposes of regulatory assessment under the Resource Management Act 1991.

In competing the primary objective GSL has:

- undertaken a desktop study of publicly available historical information to ascertain current and historic landuse activities;
- conducted a visual inspection of the site extent, including a systematic inspection of the land surface for evidence of contamination;
- developed a preliminary conceptual site model for potential soil contamination;
- carried out an intrusive investigation of the site based on the preliminary conceptual model to determine the soil quality and any associated risk to human health and /or the environment arising from actual or potential soil contamination on site;
- determine what, if any, contaminated land rules of the NES, TDP, and/or WRP apply to the proposed subdivision and development and any further work that may be required; and
- prepared this Detailed Site Investigation report in accordance with Contaminated Land Management Guideline No.1 – “*Reporting on Contaminated sites in New Zealand*” (Ministry for the Environment, 2021) detailing the findings of this investigation and the recommendations, if any, for further work.

6 DESKTOP STUDY

A desktop study of publicly available files and photographs was undertaken to determine the history of the site with respect to any current or historic potentially contaminating landuses.

6.1 RECORDS OF TITLE

GSL has reviewed copies of the current and historical Records of Title for the aforementioned property, including any instruments on the title which detail relevant property information such as: current ownership, registered interests, easements, covenants, lease restrictions and transmissions, to determine if pre-existing consent notices or other restrictions / notifications which may be relevant to historic uses or potential soil contamination are held against the property.

The titles were issued in 2009 with the current boundaries formed by a subdivision of Lot 2 DPS 52707 & Lot 1 DPS 524742. No notes of interest, with respect to actual or potential contamination on the site, are recorded on the titles. Copies of the records of title are included as Appendix B.

6.2 HISTORIC AERIAL PHOTOGRAPHS

GSL conducted a review of the publicly available historic aerial images of the site. Images from 1945, 1963, 1967, 1975, 1979, 1983, 1986, and 2002 are available on the Retrolens website, while images from 2012, and 2021 are available from LINZ and Google Earth respectively.

The findings of the historic aerial image review are summarised below while copies of the images are provided in Appendix C.

1945 The 1945 plate is the first available image of the site and while only displaying partial coverage of the piece of land, the site is vacant with no features of note. There are no structures present on the site or notable anywhere on the plate and Kaiapo Road is yet to be constructed. The northern portion of the site's boundary is demarcated by a river channel running east to west toward Lake Taupo while a dendritic network of overland flow paths is noted across the southern portion of the site.

1963 By the time of the 1963 plate, the site remains vacant, and the only notable change is that the network of drainage channels appears to be more deeply incised. To the east of the site Kaiapo Road has now been established alongside Mapara Road at the northeast termination of Kaiapo Road. Some fence lines and minor farm tracks and water troughs are noted on the site's area indicating that the piece of land is likely under pastoral landuses by this time.

1967-1979 By the time of the 1967 plate, a residential dwelling has been established in the eastern corner of the site adjacent to Kaiapo Road. The wider site area remains under pasture with no discernible features of note.

The site remains under the same configuration through the 1975 and 1979 plates, being predominantly pasture with a single dwelling located in the eastern corner.

1983-2002 The 1983 plate shows the site in the same general configuration with no discernible additions to the site's infrastructure. However, the network of overland drainage appears less visible in the plate and the eastern and westernmost paddocks appear to have been resown. A new distinct farm track is noted across the centre of the site, extending from a driveway forming the eastern boundary and running from east to west to the site's approximate centre. No structures, aside from the residential dwelling, are noted on the site.

The site remains in the same configuration in the images from 1989 and 2002 except for the central farm track being extended to the north by the time of the 2002 plate. Additionally, a portion of the site to the north of the farm track has been re-established as scrub / bush in the 2002 plate.

2012 The 2012 plate shows the site in a generally similar configuration, remaining predominantly vacant pasture. However, two new features are noted on site; one along the central track in the approximate centre which when zoomed in reveals stacked round bales, while the second appears to be a simple hay barn approximately 400 m to the north. A turning loop is also noted near to the eastern extent of the central farm track, adjacent to the loop in the track, a sorting race and holding pen has been established. No other sheds or infrastructure is noted adjacent to the race indicating this is likely a sorting and loading race rather only.

The southern half of the site appears to be significantly eroded along the drainage channels while a block of forestry planting has been established to the north of the track.

2018 By the time of the 2018 plate a large portion of the southern half of the site appears to have undergone earthworks which have obscured the previously discussed drainage network. A block of the pasture in the southern portion of the site is clearly undergoing earthworks at the time of the plate with an access road established along the eastern boundary of the site. The earthworks are clearly being undertaken to recontour portions of the site, resulting in filling of the network of channels. A section of the site to the east of the open area of earthworks has clearly been completed in this fashion with new flatter, contoured pasture evident.

The remaining site area remains in the same general configuration as previously noted with the race and hay bale store remaining along the central farm track.

2021 The 2021 Google Earth plate shows all above earthworks completed, with new blocks of pasture evident across the full extent of the southern half of the site. Along the central access track noted above the original central bale store has been removed, with hay bales now stored adjacent to the loading race and at the western end of the track. No other developments are noted on the site in the plate.

6.2.1 SUMMARY OF HISTORIC AERIAL PHOTOGRAPHS

Review of the historic aerial images indicates that the site has remained largely vacant pasture for much of its discernible history. A dwelling was established in the 1960s with further a stock sorting and loading race constructed between 2002 and 2012. The race is of modern construction and being

built post-2002 is highly unlikely to have been used for spraying activities as modern practises for treatment of animals is through oral drenching as opposed to spraying or immersion dipping.

For the majority of the sites discernible history there is no indication of any actually or potentially contaminating landuse activities. That said, between 2012 and 2018 significant earthworks are undertaken across the southern portion of the site in order to fill in overland flow channels and establish grazing pasture.

While no distinct evidence for any actually or potentially contaminating landuse activity is noted in the aerial images, the following activities associated with the sites history can be encompassed under Item I on the MfE HAIL where they have resulted in a risk to human or environmental health:

- uncertified / unverified fill material used to fill drainage network and establish pasture; and
- application of superphosphate fertilisers to pasture over prolonged periods of time can result in elevated cadmium concentrations in soil as a result of impurities in the source rock used to manufacture the fertiliser.

While potential use of lead-based paint on dwelling and shed / garage was considered during the aerial image review, GSL notes lead contents in paint pigments had been reduced from the high levels present in pre-1940s paints by the 1960s and nearly completely phased out by 1970. While the presence of lead in exterior paints cannot be entirely ruled out, GSL notes that the age of dwelling and associated suggests that any gross discharges are highly unlikely to present any risk to human health or the environment. Similarly, the dwelling and sheds are to remain in the same configuration as they currently are, subdivided as a new title. As there is no change in landuse or development required in this portion of the site, and the subdivision represents a change in paper boundaries only, no further consideration to the dwelling and shed is required.

6.3 PROPERTY FILE

GSL were provided a copy of the property file held by Taupo District Council for review by McKenzie & Co Ltd. The property file documents were limited to several resource consent applications pertaining to the subdivision of the site in 1988, 2007, and 2011, with only the 1988 application realised to create a 'rural retirement block'.

The only items of note across the applications are held in the 1988 application detailing land use activities of the parent lot at the time. The application noted the site was utilised for raising deer, goat, sheep and beef farmstock, with a woolshed and rural farm airstrip located within the parent lot some 70m and 180m east of the site under investigation. The application does not detail the locations of any sheep dip/spray race infrastructure, farm dumps, or rural fuel storage infrastructure presence at the time of the application. GSL notes that if these features were present, they would be proximate to the woolshed and airstrip infrastructure, which are situated outside of the site under investigation.

Property file extracts are attached as Appendix D.

7 SITE INSPECTION & INFRASTRUCTURE

GSL staff undertook a visual inspection of the site on 19 January 2022, during which time all external areas of the site were made accessible. Weather at the time of inspection was fine, with light winds.

The site appeared consistent with the most recent aerial image, comprising pasture and lucerne being cultivated for 'cut and carry' feedstock. Small quantities of beef farmstock were being run supplementing site operations and to tidy up areas of lucerne and pasture that machinery could not access around gates, fences and trees.

Areas of earthworks observable in the aerial images had been placed back under pasture and lucerne cover and no evidence of any importation of fill could be noted. Test pit excavation within these areas noted a very thin layer of topsoil <100mm before natural pumice formations were encountered suggesting that earthworks utilised existing soil formations on site only. Portions of the dendritic network of overland flow paths were observable in areas of the site outside of the earthworks footprint and some areas of localised scour were noted at surface where these flow paths traverse towards Lake Taupo.

A medium stockyard and holding pens were located approximately 150m west of the eastern site boundary which included an approximate 200-300 litre above ground fuel tank. Visual inspection of this area noted the presence of light surficial hydrocarbon staining, limited to an approximate 3m² area, while a shallow testpit noted visual impacts were surficial and limited to the top 50mm of the soil profile only. No evidence of stock dipping or spray race infrastructure was apparent during the visual inspection.

The only other notable features onsite were an open-sided haybarn and a large number of stockpiled hay bales.

Site photographs are attached as Appendix E.

7.1 SITE OWNER INTERVIEW

During the visual inspection GSL met with the client and current site owner, Mr Stuart Deadman, to provide greater insight to the discernible site history. Mr Deadman first occupied the site in 1998 through a lease from overseas owners, before purchasing the property in 2008. His understanding was that prior to overseas ownership the site was part of a larger Land and Survey Government block which was maintained under a leasehold framework. The original Land and Survey block was subdivided to form the current boundaries of the property, separating off some of the previous infrastructure.

Since his tenure, first as a leasehold, and then as owner, it has been utilised predominantly for cut and carry feedstock production supplemented by beef cattle. To support site operations approximately 800kg/Ha of Serpentine 25k fertiliser has been applied to the site annually to portions of the site suitable for such application, typically limited to the gentle sloped and contoured portions of the site. All fertiliser application has been undertaken via contract for supply and spreading and as such no stockpiles have been present during Mr Deadman's tenure.

When questioned about site developments since possession, Mr Deadman noted that the site stockyards were constructed in 2010 under his ownership, while the earthworks noted in the aerial image review were also undertaken at his instruction and comprised contouring works predominantly undertaken with via tilling to provide more suitable topography for site cropping activities. No fill was imported to site to facilitate this activity.

Mr Deadman was not aware of any farm dump locations, or other current or historic potential soil contaminating activities, occurring onsite.

No groundwater bores are located onsite, with all domestic and stock water provided from the local municipal supply. An historical feature (historical bore) was noted to be present on the southern boundary, however could not be located during discussions and site inspections suggesting that it is either located on the adjacent property, or is now overgrown.

Discussions regarding the existing residential dwelling noted that this was currently occupied by the farm manager and the proposed subdivision and development will retain the dwelling and sheds in its current configuration.

8 PRELIMINARY CONCEPTUAL SITE MODEL

Based on the historical review and previous investigations GSL has developed the following conceptual site model for potential contamination on the site.

8.1 POTENTIAL SOURCES OF CONTAMINATION

The following potential sources of contamination were identified during the desktop study:

- prolonged application of superphosphate fertilisers to pasture;
 - **Contaminants of concern:** *Cadmium only*
- Storage of fuels:
 - **Contaminants of Concern:** *total petroleum hydrocarbons (TPH);*

8.2 EXPECTED SPATIAL DISTRIBUTION AND RISK

The above potential sources of contamination are expected to result in the following spatial distribution of contaminants.

8.2.1 APPLICATION OF SUPERPHOSPHATE FERTILISERS

The application of superphosphate fertilisers as top dressing to pasture is generally undertaken through spreading from a tractor / trailer mounted spreader resulting in a generally uniform distribution of the product across the paddock. Prolonged use of superphosphate with repeated applications over long time periods is expected to result in a uniform distribution of cadmium within the surficial topsoil horizon. It is not expected that the application of superphosphate fertilisers to land would result in the generation of hotspots. Infiltration into the deeper soil strata is unlikely as there is no seasonal turnover of soil in pasture farming, nor has any evidence of bulk storage been encountered.

The risk associated with potential cadmium contamination is considered to low to moderate as it is dependent level of cadmium impurity associated with the parent source of the superphosphate utilised onsite.

8.2.2 BULK FUEL STORAGE

The visual inspection of the site identified a very small, isolated area impacted by diesel from vehicle refuelling. Any soil contamination associated with the visual staining of the surficial soils is considered limited to the immediate soil surface, attenuating rapidly with distance and depth.

Based on the site observations, the identified hydrocarbon staining is aesthetic in nature rather than representative of gross soil contamination. As a result, any soil contamination is considered negligible and can be addressed when the tank is removed and farming operations decommissioned.

8.3 INTRUSIVE INVESTIGATION REQUIREMENTS

Following the completion of the desktop study, visual inspection, and preparation of a preliminary conceptual site model for soil contamination, GSL considers that the primary risk of soil contamination is from cadmium impurities and is likely concentrated in a uniform distribution across the areas of the site heavily utilised for cut and carry farming operations. A systematic soil sampling regime utilising composite soil samples from the surficial (0 – 75mm) horizon is considered the most applicable method for assessing potential impacts.

The soil sample locations targeted the flatter portions of the site which had been subject the greatest superphosphate application during the site history and also represent the portions with the lowest soil erosion risks, representing the greatest accumulation of potential soil contaminants.

9 SOIL SAMPLING AND ANALYSIS

To assess the preliminary CSM, GSL implemented the above strategy comprising the collection of seven composite soil samples, each comprising four 0-75mm soil subsamples from within areas of consistent landuse (Figure 2). Composite samples were confined to paddock extents where it was clear uniform application of fertilisers would have been undertaken and targeted to flat portions of the site where accumulation could occur.

Soil sub-samples were collected using a stainless-steel 0-75mm foot corer and placed into individually labelled sample bags for compositing at the laboratory in accordance with MfE CLMG No.5. Soil sample bags were labelled with individual identifiers, sample depth, job identifier, date, and initials of the sampler.

Sampling equipment was cleaned between sample locations using a soft soap solution in accordance with GSL internal quality control procedures. The sampling protocol followed was in accordance with the CLMG No. 5 *Site Investigation and Analysis of Soils*.

No soil samples were collected from the location of the fuel storage tank and dwelling location as the potential soil contamination risk associated with these locations has been assessed as negligible by the conceptual site model.

9.1 LABORATORY ANALYSIS AND ACCREDITATION

Soil samples were transported back to GSL offices for storage overnight, prior to laboratory dispatch the following day. All soil samples were dispatched via overnight courier to Analytica Laboratories in Hamilton on the first business day following sampling. Samples were packed in a chillybin and

submitted directly to the laboratory under Chain of Custody (CoC) protocols to preserve sample integrity. The CoC outlined the samples to be composited and the analysis of all soil samples for cadmium and pH only.

Analytica Laboratories are accredited by International Accreditation New Zealand (IANZ) for the heavy metal and organic compound analysis undertaken.

9.2 QUALITY ASSURANCE & QUALITY CONTROL

GSL field staff are appropriately qualified, suitably trained and experienced in undertaking contaminated land assessments. Personnel are cognisant of the requirements for sample handling and storage, and equipment decontamination procedures alongside completion of field assessments, notes and record keeping and documentation.

During this assessment, appropriate sample handling and storage protocols were followed to ensure sample integrity was maintained during sampling and transport while laboratory analysis has been undertaken at an IANZ accredited laboratory.

Consequently, it is considered that appropriate QA/QC has been met for this investigation.

9.3 ACCEPTANCE CRITERIA AND RELEVANT GUIDELINES

To provide a conservative risk assessment in the context of the proposed subdivision and development, GSL has applied the rural residential land use standards of the NES and Eco-SGV to assess potential heavy metal and organic compound soil contaminant risks. Where the NES or Eco-SGV omits guidance for a soil contaminant, a suitably conservative criteria has been derived from MfE CLMG No. 2 – *Hierarchy and Application in New Zealand of Environmental Guideline Values (revised 2011)*.

Results are also compared to the background concentration ranges of inorganic elements in soils detailed by the Landcare Research LRIS Portal.

9.4 SOIL pH CONSIDERATIONS

Soil guideline values for cadmium are dependent on the soil pH due to the influence of pH on the cadmium phytoavailable and bioavailability, with default NES and Eco-SGV soil contaminant standards based on a soil pH of 5. pH analysis of all composite soil samples provided a pH range of 4.7 to 5.2, with an average pH value of 4.96. Based on the pH analysis, the default NES and Eco-SGV values are considered applicable to the site and analytical results obtained.

9.5 ANALYTICAL RESULTS

A comparison of the analytical results for cadmium with the relevant guideline criteria is provided in Table 4 below. Copies of the laboratory COC and analytical transcripts are included in Appendix F while a discussion of the results is provided below.

TABLE 2: CADMIUM ANALYTICAL RESULTS¹

	Cadmium
SC1	0.18
SC2	0.18
SC3	0.20
SC4	0.21
SC5	0.46
SC6	0.35
SC7	0.31
Human Health ²	0.8
Environmental ³	17.49
Background ⁴	0.49

Notes:

1. All concentrations measured in mg/kg.
2. National Environmental Standards (NES) for assessing and managing contaminants in soil to protect human health – rural residential land use with 25% homegrown produce consumption.
3. Landcare Research (2016) User Guide: Background soil concentrations and soil guideline values for the protection of ecological receptors (Eco-SGVs);
4. Landcare Research (2014) Landcare Research LRIS Portal – Predicted Soil Background Range (Sandstone Pakihi).
5. Values in **BOLD** exceed the NES criteria, values in **BOLD** exceed the Eco-SGV criteria, Values in **BOLD** exceed the Background Ranges.

9.6 HEAVY METALS

All cadmium concentrations returned are with consistent with the expected naturally occurring soil background range for the site. Consequently, all analytical results comply with the applicable NES and Eco-SGV soil guideline values.

10 SOIL CONTAMINATION RISK ASSESSMENT

For actual or potential soil contamination to pose a risk to current or end land users, and/or the receiving environment, a source-pathway-receptor relationship pathway must exist. Following the completion of visual inspection of the site, intrusive investigation, and assessment of analytical results received, the risk associated with soil contamination is considered negligible, with no complete soil contaminant source-pathway-receptor relationships present.

The minor hydrocarbon staining observed during the visual inspection is considered to be aesthetic only and should be tidied up as part of any future site preparation and development activities. Given the extremely limited extent, this can readily meet the permitted soil disturbance thresholds.

11 CONCLUSIONS

GSL conducted a detailed site investigation in accordance with the MfE Contaminated Land Management Guidelines to assess the site history and potential soil contamination risks as a result. This DSI has concluded:

- The site has been maintained as a drystock grazing and 'cut and carry' farm for its discernible history;
- Historic stock handling and woolshed infrastructure associated with site operations prior to the current tenure were located on the adjacent site, which was subdivided from the piece of land under investigation in the 1980s;
- The current landowner has occupied the site since 1998, with the predominant use being for 'cut and carry' feedstock, which has included regular application of superphosphate to pasture and lucerne crops; and
- A small quantity of diesel is stored onsite has stained the immediate soil surface under the bowser, however the impacts of this are considered aesthetic rather than a soil contaminant exposure risk. Given the extremely limited area and depth, this can be addressed when decommissioning farming operations within the permitted activity thresholds of the NES.

Based on a conceptual model developed, GSL collected seven composite soil samples from portions of the site subject to greatest superphosphate application, which were analysed for cadmium only. Analytical results all returned cadmium concentrations which were compliant with the expected naturally occurring soil background.

There is no identified soil contaminant exposure risk identified onsite by this investigation.

11.1 NATIONAL ENVIRONMENTAL STANDARDS

This investigation has identified that potential soil contaminants of concern are within the expected naturally occurring soil background range for the site. Consequently, under NES Regulation 5(9), the regulations of the NES are not considered to apply to the proposed subdivision and development.

11.2 WAIKATO REGIONAL PLAN

As soil quality is consistent with the background range for the site, it does not meet the WRP definition of *contaminated land*. Consequently, the contaminated land provisions of WRP Chapter 5.3 will not apply to the proposed subdivision and development.

12 REFERENCES

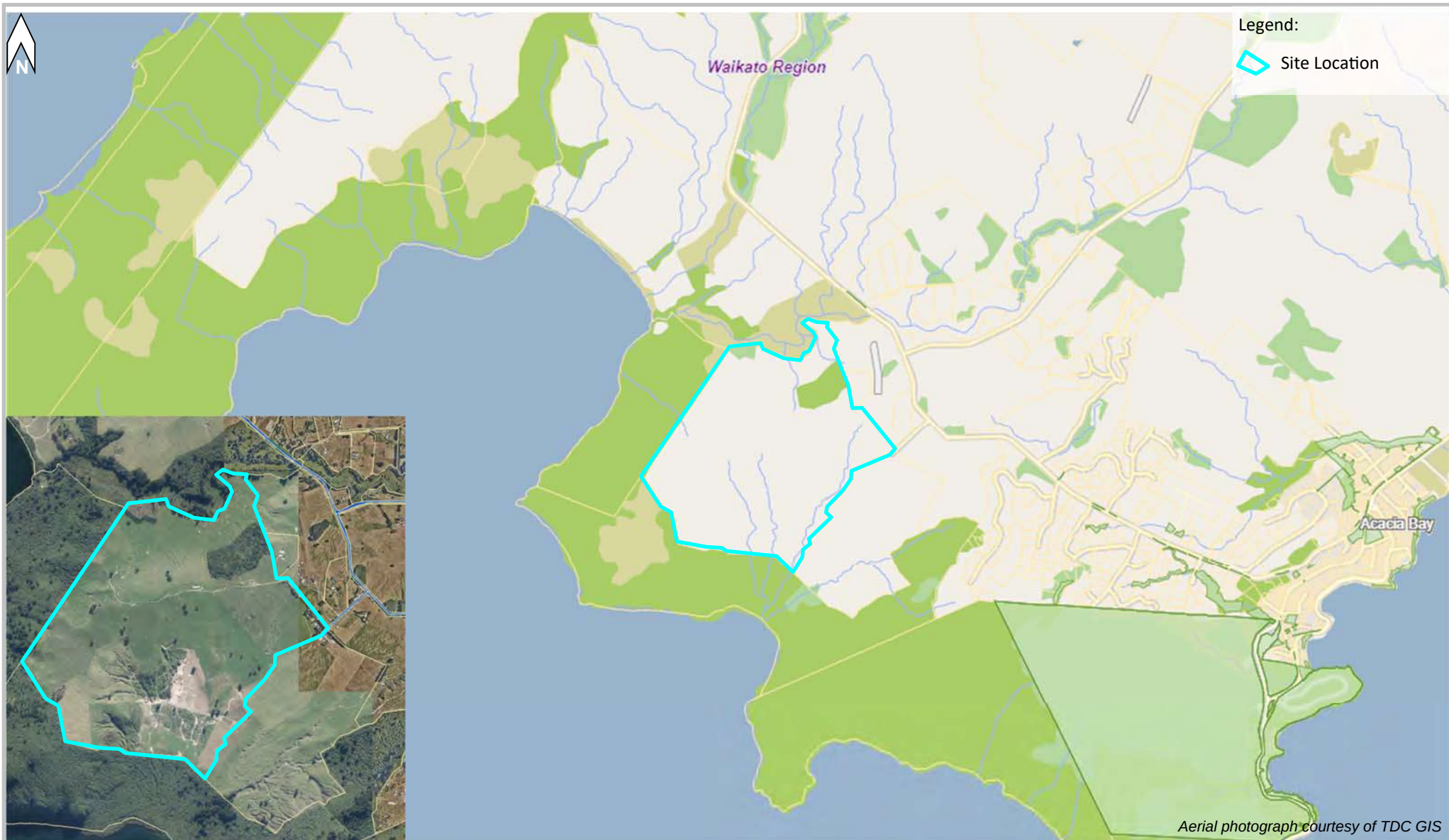
1. Ministry for the Environment (2021) — *Contaminated Land Management Guidelines No.1: Reporting on contaminated Sites in New Zealand*. Ministry for the Environment, Wellington, New Zealand.
2. Ministry for the Environment (2021) — *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils*. Ministry for the Environment, Wellington, New Zealand.
3. Ministry for the Environment (2012) - *Users Guide National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil to Protect Human Health*. Ministry for the Environment, Wellington, New Zealand.
4. Taupo District Council (2007, revised 2017) — *Taupo District Plan*. Taupo District Council, Taupo, New Zealand.
5. Waikato Regional Council (2007, reprinted 2012) — *Waikato Regional Plan*. Waikato Regional Council, Hamilton, New Zealand.
6. Waikato Regional Council (2015) — *Natural Background Concentrations in the Waikato Region*. <https://www.waikatoregion.govt.nz/services/regional-services/waste-hazardous-substances-and-contaminated-sites/contaminated-sites/natural-background-concentrations/>
7. Landcare Research (2016) — *User Guide: Background soil concentrations and soil guideline values for the protection of ecological receptors (Eco-SGVs) – Consultation Draft*. Landcare Research, Lincoln, New Zealand.

13 LIMITATIONS

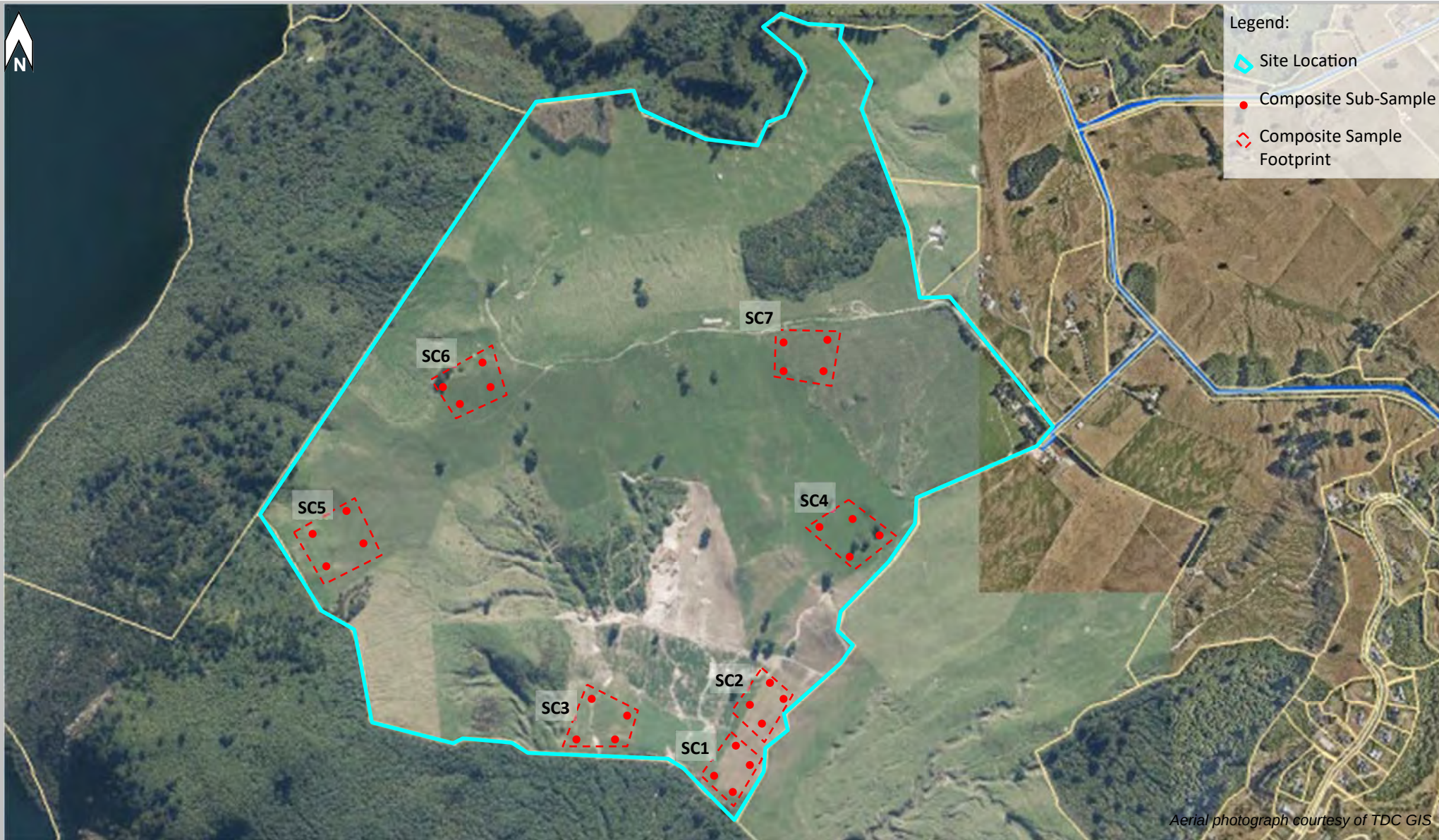
The conclusions and all information in this Report are given strictly in accordance with and subject to the following limitations and recommendations:

1. The assessment undertaken to form this conclusion is limited to the scope of work agreed between GSL and the client, or the client's agent as outlined in this Report. This report has been prepared for the sole benefit of the client and neither the whole nor any part of this report may be used or relied upon by any other party.
2. The investigations carried out for the purposes of the report have been undertaken, and the report has been prepared, in accordance with normal prudent practice and by reference to applicable environmental regulatory authority and industry standards, guidelines and assessment criteria in existence at the date of this report.
3. This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by GSL for use of any part of this report in any other context.
4. This Report was prepared on the dates and times as referenced in the report and is based on the conditions encountered on the site and information reviewed during the time of preparation. GSL accepts no responsibility for any changes in site conditions or in the information reviewed that have occurred after this period of time.
5. Where this report indicates that information has been provided to GSL by third parties, GSL has made no independent verification of this information except as expressly stated in the report. GSL assumes no liability for any inaccuracies in or omissions to that information.
6. Given the limited Scope of Works, GSL has only assessed the potential for contamination resulting from past and current known uses of the site.
7. Environmental studies identify actual sub-surface conditions only at those points where samples are taken and when they are taken. Actual conditions between sampling locations or differ from those inferred. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated and GSL does not guarantee that contamination does not exist at the site.
8. Except as otherwise specifically stated in this report, GSL makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") on the site. If fill has been imported on to the site at any time, or if any buildings constructed prior to 1970 have been demolished on the site or materials from such buildings disposed of on the site, the site may contain asbestos or ACM.
9. No investigations have been undertaken into any off-site conditions, or whether any adjoining sites may have been impacted by contamination or other conditions originating from this site. The conclusion set out above is based solely on the information and findings contained in this report.
10. Except as specifically stated above, GSL makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.
11. The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation is changing rapidly. Our interpretation of the investigation findings should not be taken to be that of any other party. When approval from a statutory authority is required for a project, that approval should be directly sought by the client.
12. Use, development or re-development of the site for any purpose may require planning and other approvals and, in some cases, environmental regulatory authority and accredited site auditor approvals. GSL offers no opinion as to whether the current use has any or all approvals required, is operating in accordance with any approvals, the likelihood of obtaining any approvals, or the conditions and obligations which such approvals may impose, which may include the requirement for additional environmental works.
13. GSL makes no determination or recommendation regarding a decision to provide or not to provide financing with respect to the site. The on-going use of the site and/or use of the site for any different purpose may require the owner/user to manage and/or remediate site conditions, such as contamination and other conditions, including but not limited to conditions referred to in this report.
14. Except as required by law, no third party may use or rely on, this report unless otherwise agreed by GSL in writing. Where such agreement is provided, GSL will provide a letter of reliance to the agreed third party in the form required by GSL.
15. To the extent permitted by law, GSL expressly disclaims and excludes liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this Report. GSL does not admit that any action, liability or claim may exist or be available to any third party.
16. Except as specifically stated in this section, GSL does not authorise the use of this report by any third party.

FIGURES

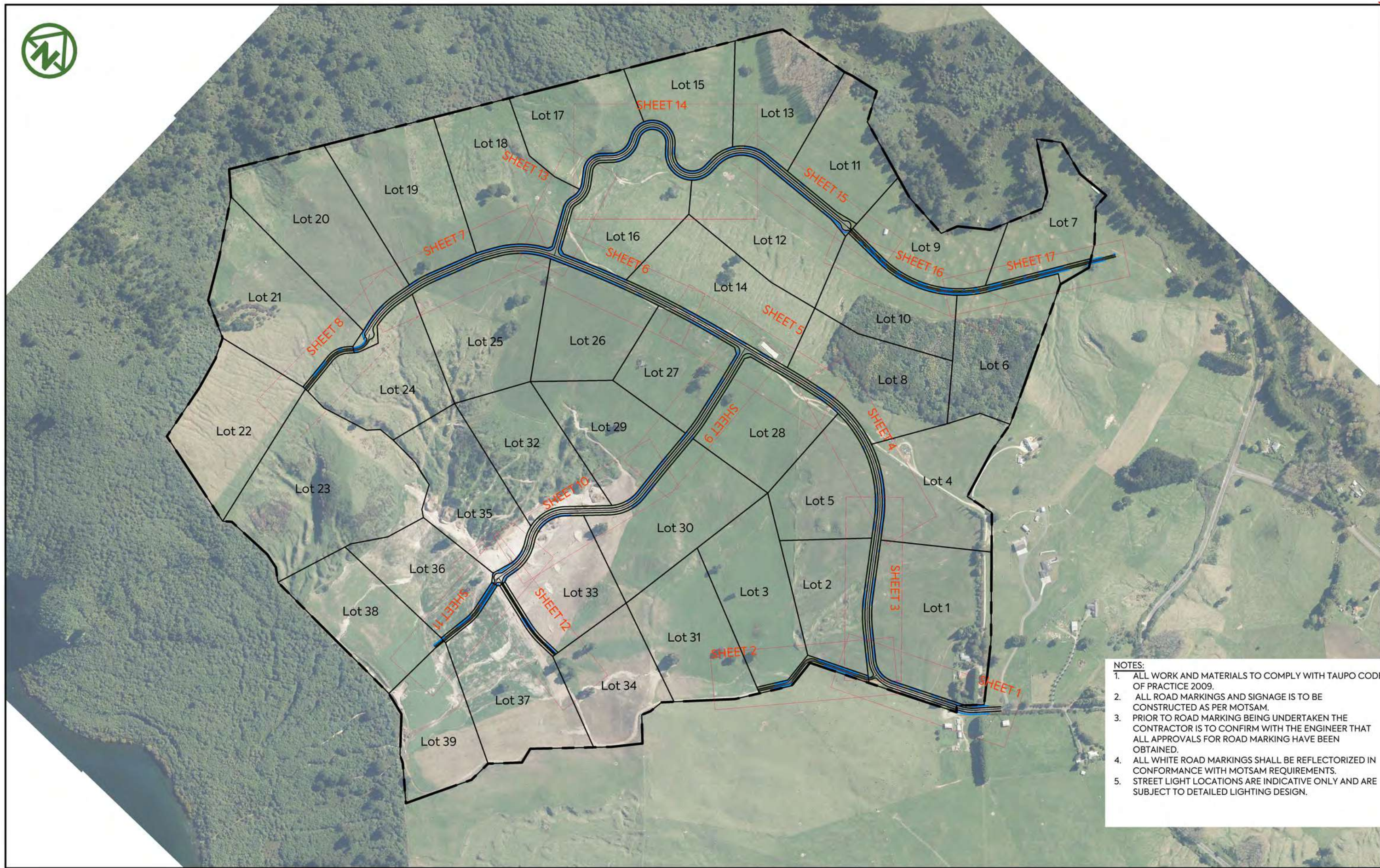


geosciences Ltd ENVIRONMENTAL	Title:	Figure 1 - Site Location		Reference: JH0180
Level 1, 47 Clyde Road, Browns Bay, 0630 Tel: (09) 475 0222	Project name:	46 Kaiapo Road, Acacia Bay, Taupo		Date: 31 Jan 2022
				Drawn: BR
				Approved: COB



geosciences Ltd ENVIRONMENTAL Level 1, 47 Clyde Road, Browns Bay, 0630 Tel: (09) 475 0222	Title:	Figure 2 - Soil Sample Locations	Reference: JH0180
	Project name:	46 Kaiapo Road, Acacia Bay, Taupo	Date: 31 Jan 2022 Drawn: BR Approved: COB

APPENDIX A PROPOSED SCHEME PLAN



- NOTES:
1. ALL WORK AND MATERIALS TO COMPLY WITH TAUPU CODE OF PRACTICE 2009.
 2. ALL ROAD MARKINGS AND SIGNAGE IS TO BE CONSTRUCTED AS PER MOTSAM.
 3. PRIOR TO ROAD MARKING BEING UNDERTAKEN THE CONTRACTOR IS TO CONFIRM WITH THE ENGINEER THAT ALL APPROVALS FOR ROAD MARKING HAVE BEEN OBTAINED.
 4. ALL WHITE ROAD MARKINGS SHALL BE REFLECTORIZED IN CONFORMANCE WITH MOTSAM REQUIREMENTS.
 5. STREET LIGHT LOCATIONS ARE INDICATIVE ONLY AND ARE SUBJECT TO DETAILED LIGHTING DESIGN.

CLIENT:

PROJECT:

TITLE:

PURPOSE OF ISSUE:

FOR CONSENT

SCALE:
1:7500

DO NOT SCALE

DRAWING NO:
2049-300

REV:
A



MCKENZIE & CO.

E.F DEADMAN LIMITED

40 KAIAPO ROAD
TAUPO

ROADING PLAN
OVERALL

REV	DESCRIPTION	DRN BY	CHK BY	APP BY	DATE
A	FIRST ISSUE	SS	LK	JF	17/11/21

THIS DRAWING IS SOLELY FOR USE BY THE CLIENT ON THIS PROJECT ONLY. NO LIABILITY IS ACCEPTED IN ITS USE BY ANY OTHER ENTITY OR FOR ANY OTHER PURPOSE

C:\1205\DATA\MCKFS01\2049 46 KAIAPO ROAD - TAUPU - R42 DRAWING\2049-300.DWG 124Consult Page 264 of 1585

APPENDIX B CERTIFICATES OF TITLE



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy**



R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **438455**

Land Registration District **South Auckland**

Date Issued 20 February 2009

Prior References
SA45C/871

Estate Fee Simple

Area 218.5233 hectares more or less

Legal Description Lot 1 Deposited Plan 410435

Original Registered Owners
Kaipo Yuki Company Limited

Interests

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Sections 6 and 8 Mining Act 1971

Subject to Section 3 Petroleum Act 1937

Subject to Section 5 Coal Mines Act 1979

Subject to Section 261 Coal Mines Act 1979

Appurtenant hereto is a right to convey water and electricity specified in Easement Certificate H937516.10 - 7.3.1990 (affects the part formerly Lot 2 on DPS 52707)

Subject to a right of way over part marked A on DP 410435 specified in Easement Certificate H937516.10 - 7.3.1990

The easements specified in Easement Certificate H937516.10 are subject to Section 309 (1) (a) Local Government Act 1974

Appurtenant hereto is a right of way created by Transfer B611954.2 - produced 15.6.2000 at 10.39 am and entered 19.6.2000 at 9.00 am

8098383.1 Transfer to E. F. Deadman Limited - 13.3.2009 at 3:39 pm

8098383.2 Mortgage to ASB Bank Limited - 13.3.2009 at 3:39 pm

8910184.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - - 9.11.2011 at 4:30 pm

9068122.1 Discharge of Mortgage 8098383.2 - 29.5.2012 at 4:58 pm

9068122.2 Mortgage to Rabobank New Zealand Limited - 29.5.2012 at 4:58 pm



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy



R.W. Muir
 Registrar-General
 of Land

Identifier **438455**
Land Registration District **South Auckland**
Date Issued 20 February 2009

Prior References

SA45C/871

Estate Fee Simple
Area 218.5233 hectares more or less
Legal Description Lot 1 Deposited Plan 410435
Registered Owners
 E. F. Deadman Limited

Interests

Subject to Section 8 Atomic Energy Act 1945

Subject to Section 3 Geothermal Energy Act 1953

Subject to Sections 6 and 8 Mining Act 1971

Subject to Section 3 Petroleum Act 1937

Subject to Section 5 Coal Mines Act 1979

Subject to Section 261 Coal Mines Act 1979

Appurtenant hereto is a right to convey water and electricity specified in Easement Certificate H937516.10 - 7.3.1990 (affects the part formerly Lot 2 on DPS 52707)

Subject to a right of way over part marked A on DP 410435 specified in Easement Certificate H937516.10 - 7.3.1990

The easements specified in Easement Certificate H937516.10 are subject to Section 309 (1) (a) Local Government Act 1974

Appurtenant hereto is a right of way created by Transfer B611954.2 - produced 15.6.2000 at 10.39 am and entered 19.6.2000 at 9.00 am

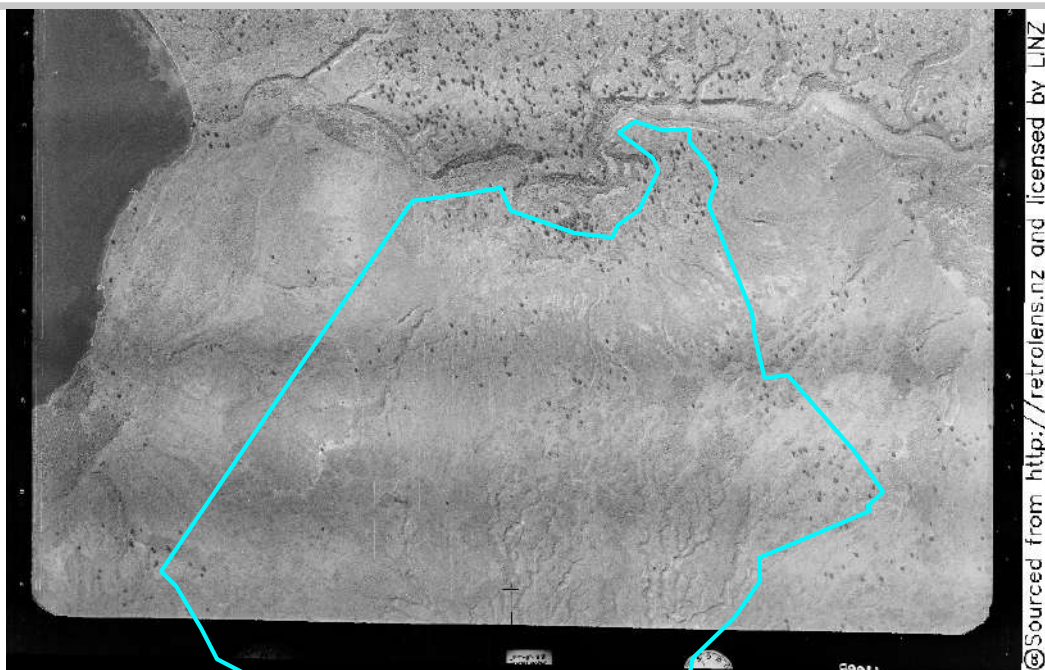
8910184.1 Notice pursuant to Section 195(2) Climate Change Response Act 2002 - - 9.11.2011 at 4:30 pm

9068122.2 Mortgage to Rabobank New Zealand Limited - 29.5.2012 at 4:58 pm





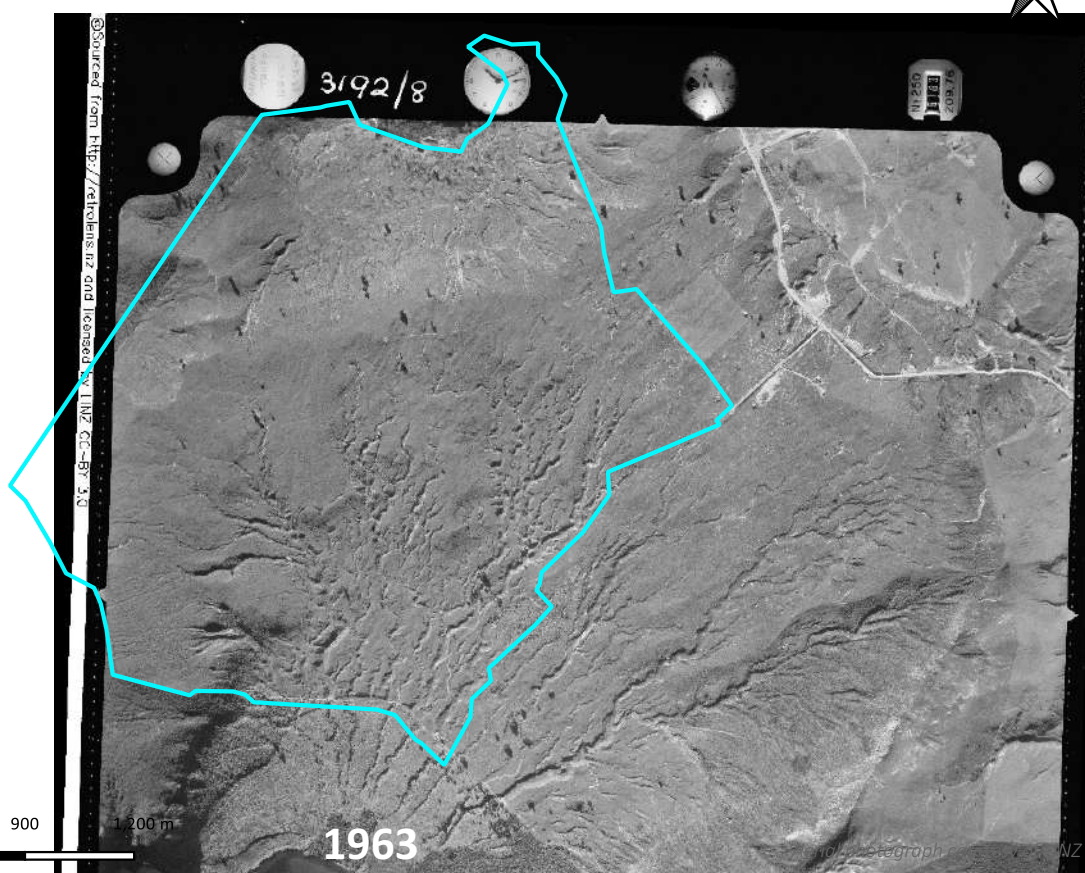
APPENDIX C HISTORIC AERIAL IMAGES



0 300 600 900 1,200 m

1945

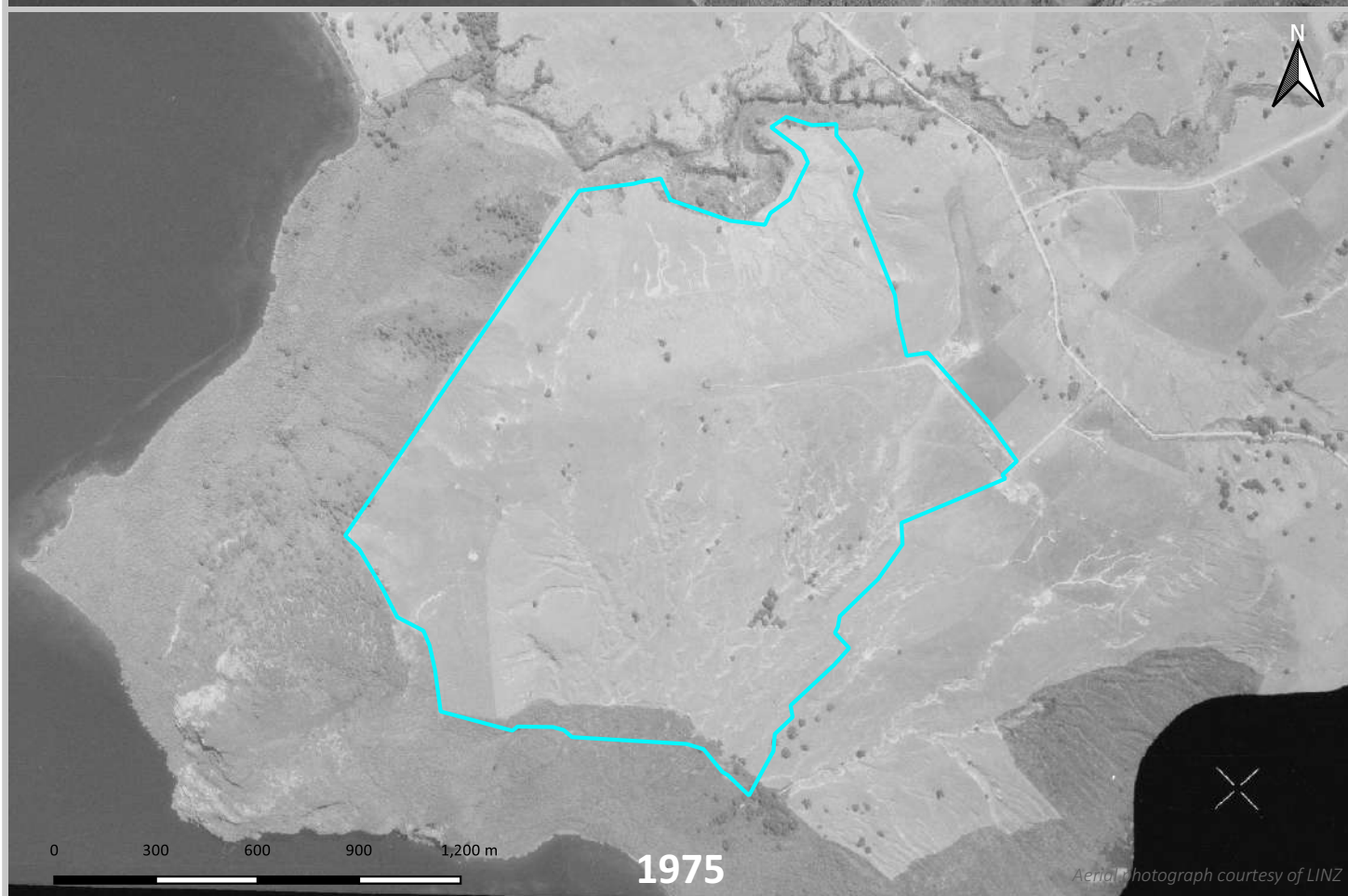
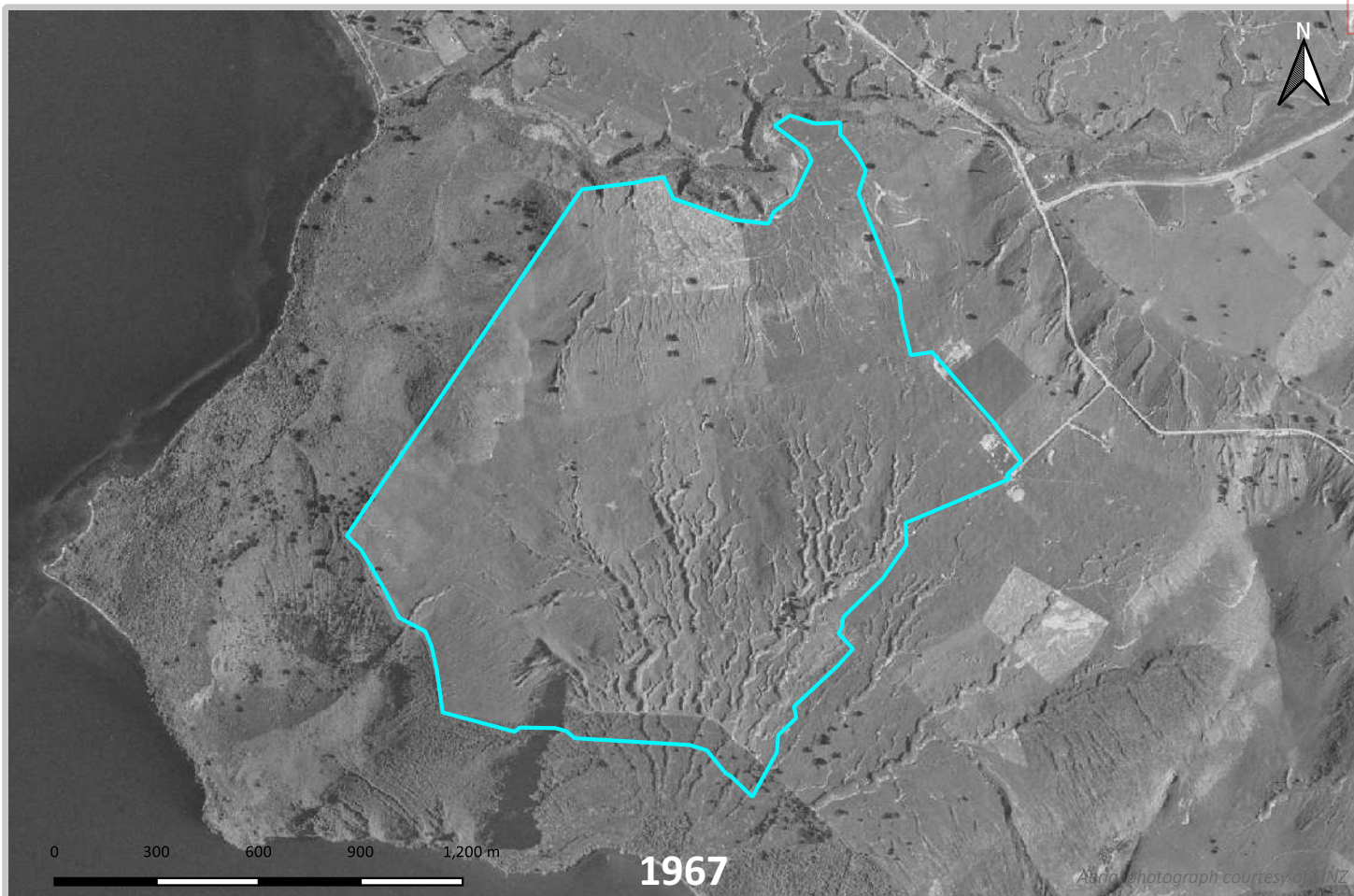
Aerial photograph courtesy of LINZ



0 300 600 900 1,200 m

1963

Aerial photograph courtesy of LINZ

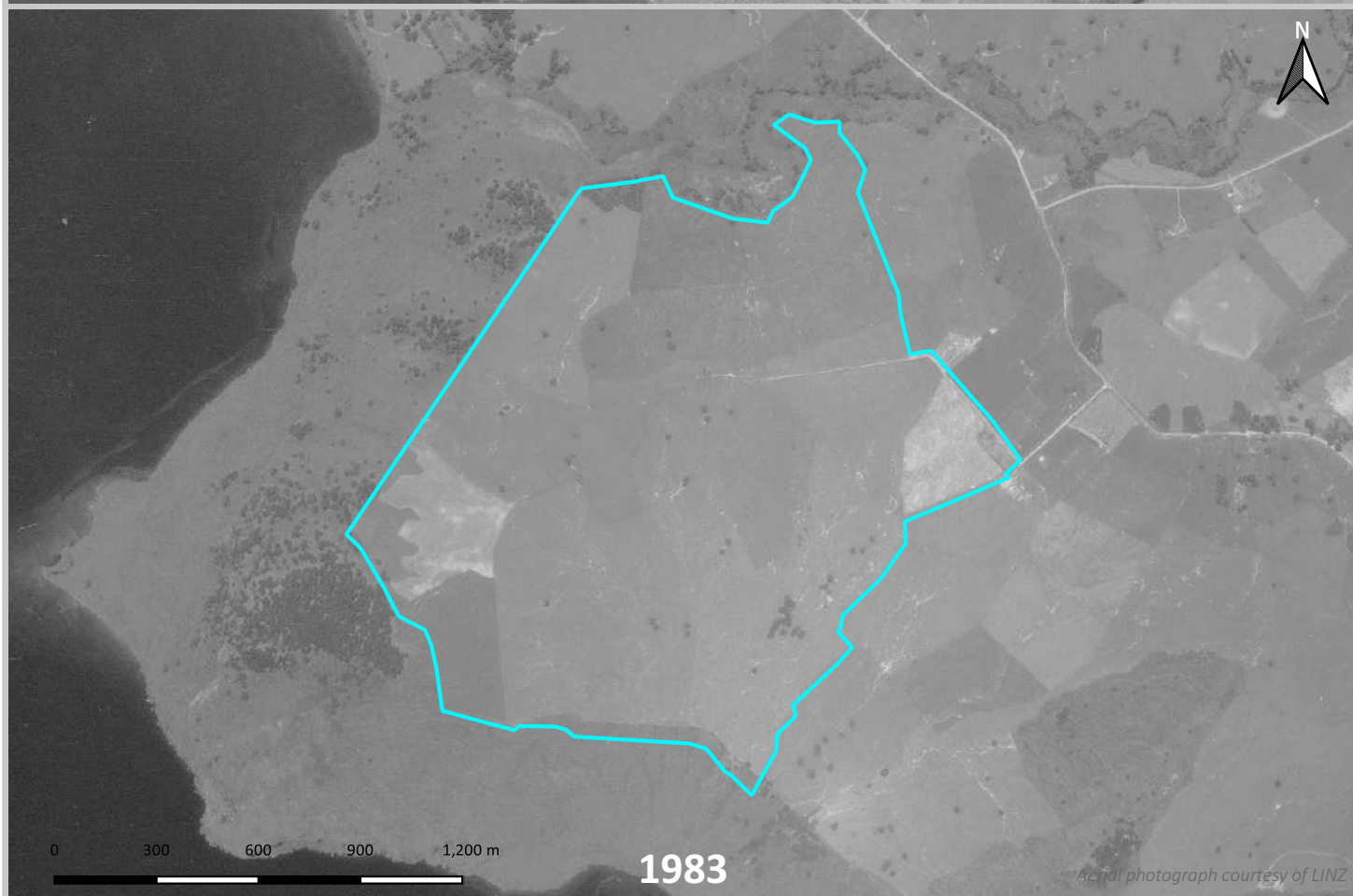
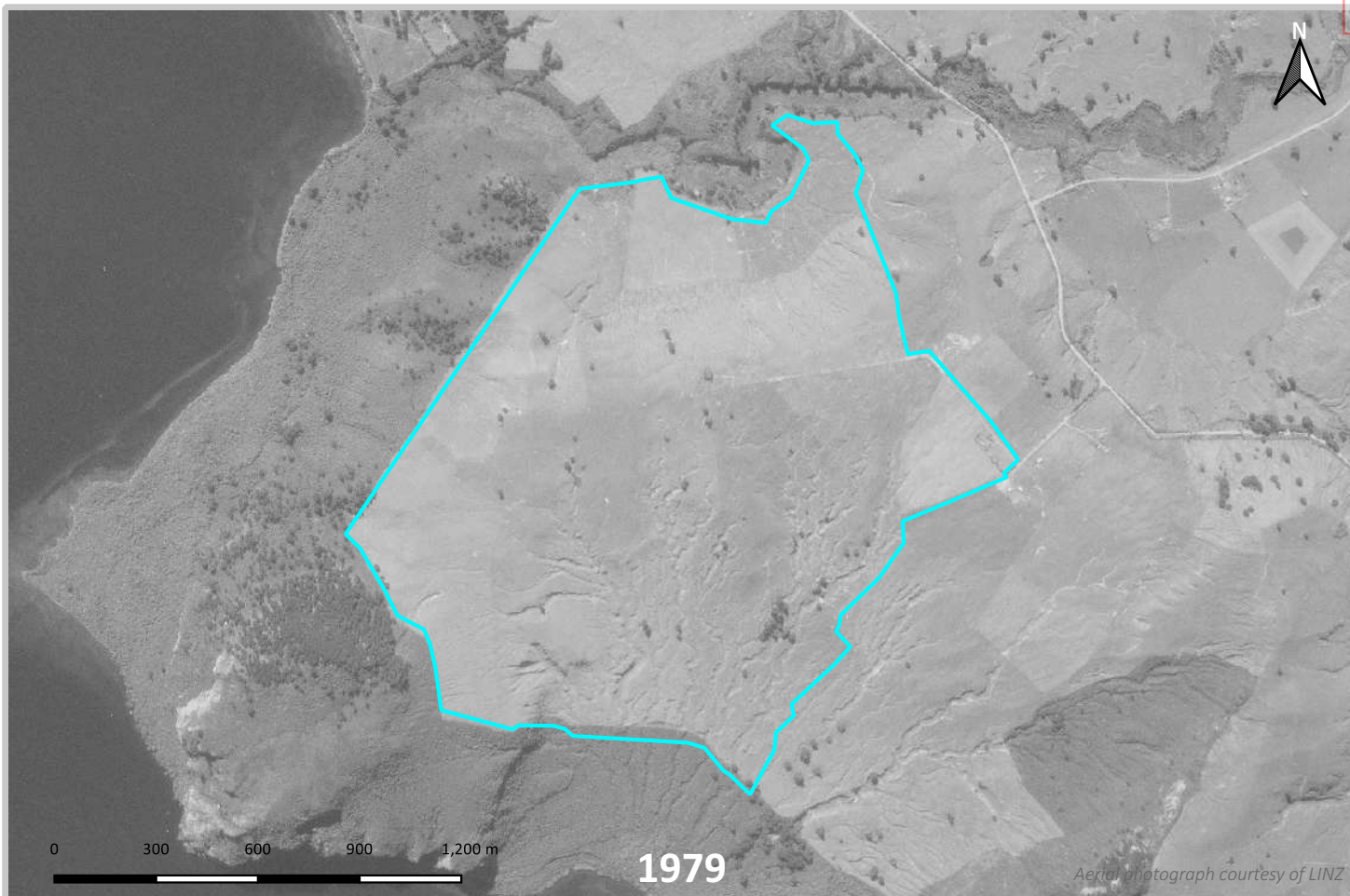


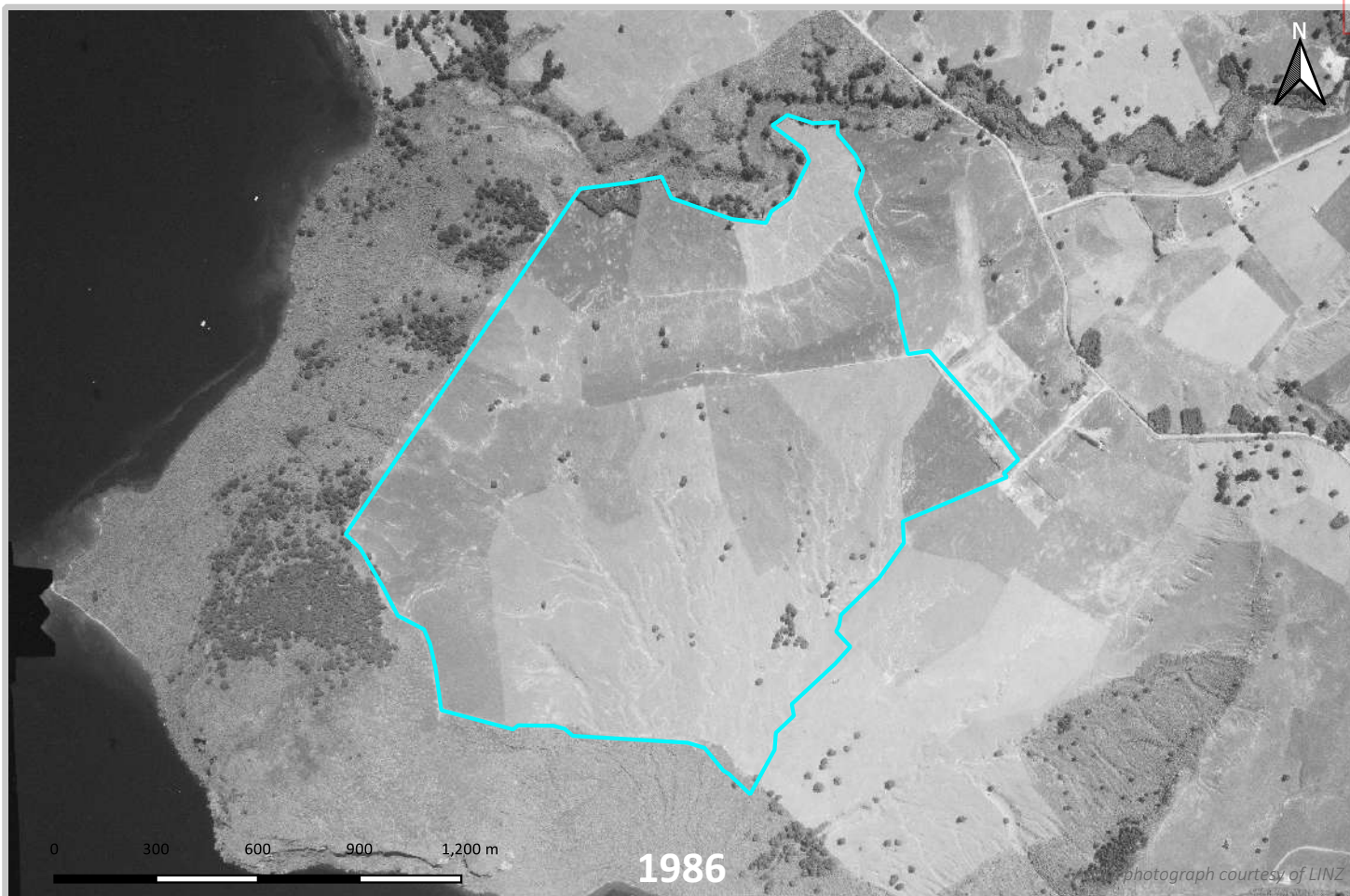
geosciences Ltd
ENVIRONMENTAL
Level 1, 47 Clyde Road,
Browns Bay, 0630
Tel: (09) 475 0222

Historic Aerial Photographs

46 Kaiapo Road, Acaciav Bay, Taupo

Reference: JH0180
Date: 11/01/2022
Drawn: DW
Approved: COB









APPENDIX D PROPERTY FILE EXTRACTS

PRINCIPALS:
K. F. THORNTON, N.Z.I.S.
PRIVATE PHONE 2222
A. C. P. DAGG, N.Z.I.S.
PRIVATE PHONE 2727
P. WESTON, N.Z.I.S.
PRIVATE PHONE 2828

DAGG & THORN
REGISTERED SURVEYORS
TAMATEA SHOPPING CENTRE

P.O. BOX 398
TELEPHONE 438812
NAPIER

5th. May, 1987

REF. J.N. 87/69



Reams 22/4/88.

The County Clerk,
Taupo County Council
TAUPO.

Dear Sir,

re:- Proposed Subdivision- Mr. & Mrs.W.A.Patterson
Kaipu Road.

We enclose - Plans of the proposed Subdivision, the necessary planning consent form, the perusal fee of \$220.00(G.S.T.inclusive), copy of the relevant certificate of title; report on well capacity etc.;

Mr. & Mrs.Patterson have farmed the subject property for approximately 20 years and are now reaching the age of retirement. They wish to sell Lot 2 on the enclosed plans and retain Lot 1 on which they will build a suitable home. The small area retained will provide them with both work and a small income in their retirement and enable them to live in the locality where they will be most happy.

Access to the two lots will be from Kaipo Road via the R.O.W.shown.

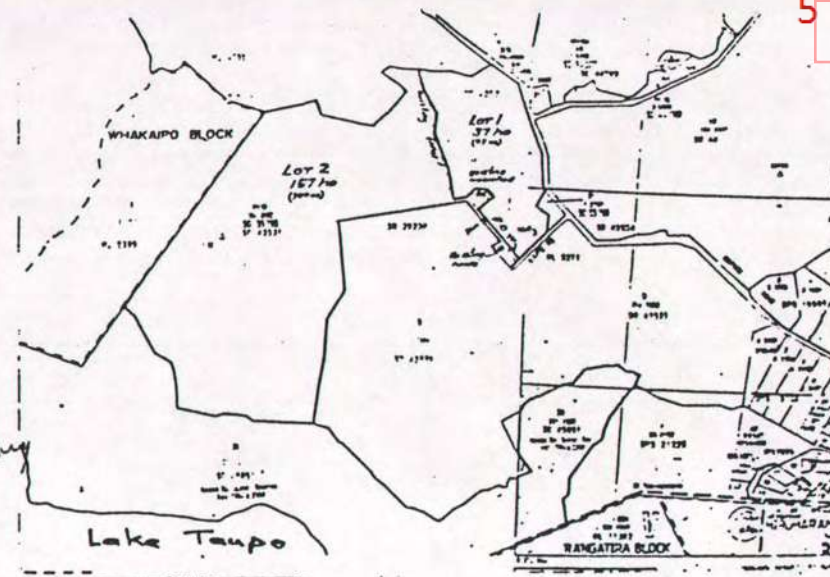
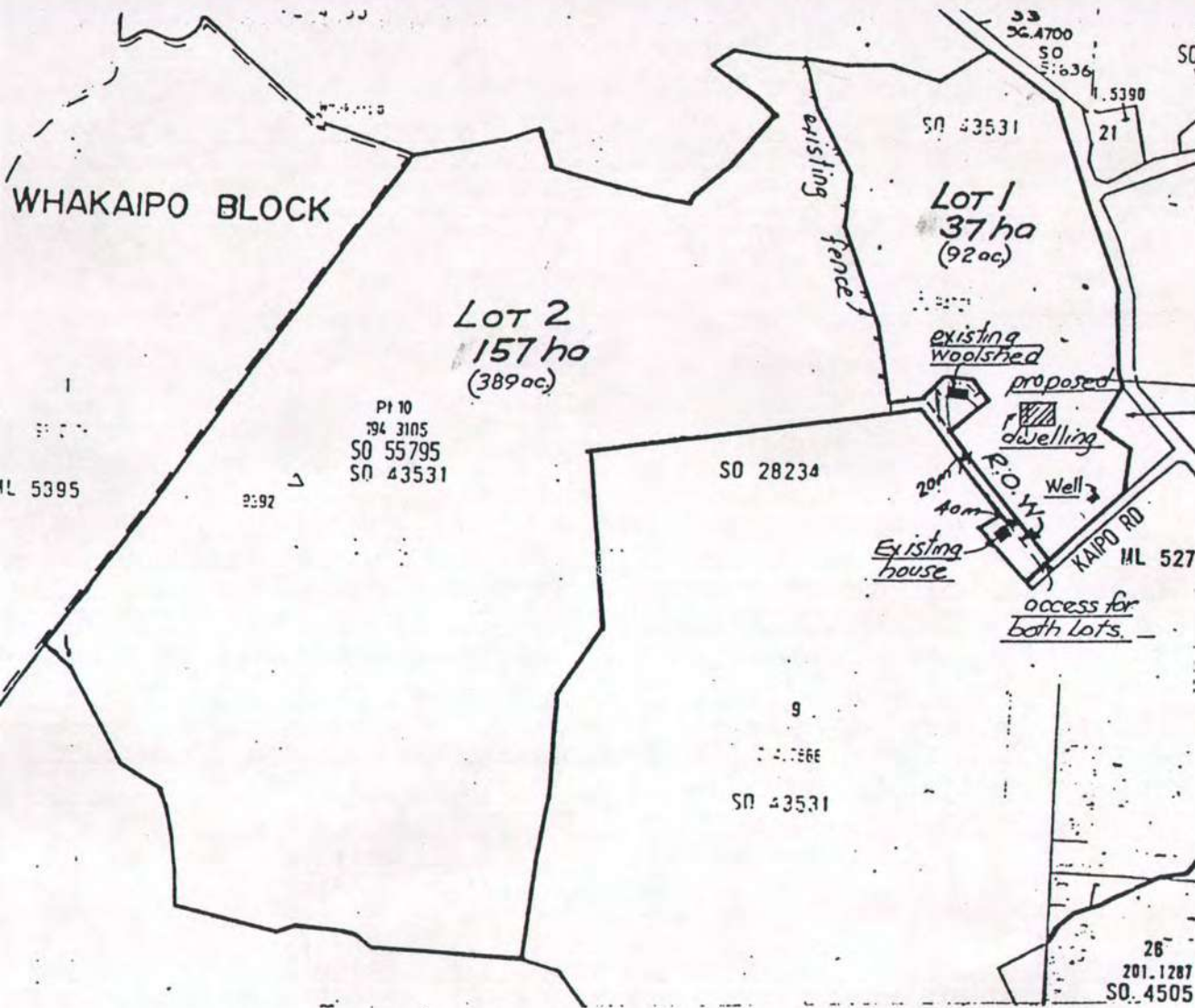
Lot 2 will use the existing connection to the Rural Water supply, while Lot 1 will use the existing well on that property. We enclose a report on the wells capacity etc.

We request your Councils approval to our proposals.

Yours faithfully,
DAGG & THORN.

[Signature]
D.Devine.

195.5826 m
7380/675/6



Lots 1 & 2 being a proposed subdivision for Mr & Mrs. W.A. Patterson-Kaipu Road C.T. 20D-840 (D.P.L). Pt. Sec. 10 Bk IV Tuhingamata East S.D. MAY 1987. DAGG & THORN-Surveyors Napier

Notes:

Distances & Areas were derived from Aerial Photographs and are Subject to final survey.

The R.O.W shown will be granted over Lot 2 in favour of Lot 1

The Well shown will service Lot 1.

Lot 2 will use the existing rural water supply

Reference:

Certificate No. H.633229.2

D.P.L.

P.R. Vol. 20D Folio 840

Transfer No.



CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 20th day of December one thousand nine hundred and eighty five under the seal of the District Land Registrar of the Land Registration District of SOUTH AUCKLAND being a Certificate in lieu of Grant WITNESSETH that WILLIAM ADDIS PATTERSON of Taupo farmer (3/5 share) and VIOLET ELEANOR PATTERSON his wife (2/5 share) are seised of an estate in fee simple as tenants in common in the said shares

(subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, which said land was originally acquired by the abovenamed

as from the 4th day of March one thousand nine hundred and eighty five under Section 54 Land Act 1948 that is to say: All that parcel of land containing 1.2791 HECTARES more or less being Section 31 Block IV Tuhingamata East Survey District



[Signature]
ASSISTANT LAND REGISTRAR

Subject to Section 8 Mining Act 1971

[Signature]
A.L.R.
Subject to Section 5 Coal Mines Act 1979

[Signature]
A.L.R.
H.716886 Transfer to Gary Michael Patterson of Taupo fencer and Sherill Patterson his wife produced 26.3.1987 at 11.20 o'clock

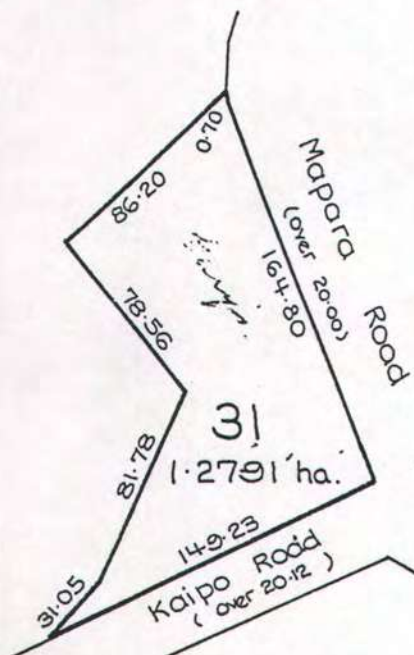
[Signature]
for A.L.R.
Appurtenant hereto is a Right to Convey Water easement over part Section 10 Block IV Tuhingamata East Survey District (pt. C.T. 20D/840) created by Transfer H.716887

[Signature]
for A.L.R.
H.716888.1 Mortgage to Her Majesty The Queen pursuant to the Post Office Act 1959 produced 26.3.1987 at 11.20 o'clock

[Signature]
for A.L.R.
H.716888.2 Statutory Land Charge under the Home Ownership Savings Act 1974 entered 26.3.1987 at 11.20 o'clock

[Signature]
for A.L.R.

Blk IV Tuhingamata East SD



50.55795
Measurements are Metric

No 35A/759

Survey Plan (S223) DPS 52707 - A1478183

SCHEDULE OF EXISTING EASEMENTS				
LETTER	PURPOSE	SERV.TEN.	DOM.TEN	DOC.
C'D	RIGHT TO CONVEY WATER	LOT 1	SEC 31 BLK IV TUHINGAMATA EAST	H 116887

WHAKAIPO No. 1
M.L. 5895

LOT 2
155.4280 ha

P4 Sec 10

S O 43531

Note. This plan is concurrent with LTS 52722

Rec. Reserve
G03.1986 P1304

Sec. 47
S.O. 5585

LOT 1
38.8960ha

Sec. 9

SO 43531

MEMORANDUM OF EASEMENTS			
LETTER	PURPOSE	SERV.TEN.	DOM.TEN.
'A'	R.O.W.	Lot 2	Lot 1
'B & C'	Right to Convey Water & Electricity	Lot 1	Lot 2

S.O. 45051-Kaiapo Bay
Scenic Res. Goz 1984 p 2368

26

LAND DISTRICT SOUTH AUCKLAND
SURVEY BLK. & DIST. IV TUHINGAMATA EAST
NZMS 261 SHT RECORD MAP No 418/1-1

PLAN OF LOTS 1 & 2 BEING A
SUBDIVISION OF PART SECTION 10
BLK IV TURINGAMATA EAST S.D.

TERRITORIAL AUTHORITY TAUPO DISTRICT
Surveyed by David Devine
Scale 1:5000 Date March 1988

Approvals Registered Proprietors

<u>W.A. Patterson</u>	<u>W.A. Patterson</u>
<u>V.E. Patterson</u>	<u>V.E. Patterson</u>

Pursuant to a resolution of the Taupo District Council passed on the 11th day of May 1989 approving under Section 305 of Local Government Act 1974 this plan of Subdivision conditional upon the granting or reserving of the easements shown in the memorandum endorsed hereon and certifying that the plan is in accordance with the requirements and provisions of the operative district scheme the common seal of the Taupo District Council is affixed hereto in the presence of

Mayor

General Manager

Pursuant to Section 304(1)(A) of the Local Government Act 1974, I hereby certify that all the conditions specified or referred to on the scheme plan of the within submission have been complied with to the satisfaction of the Taupo District Council.
Dated at Taupo this 12th day of May 1989

Planning + Inspection Manager

Total Area	194.3240 ha
------------	-------------

Comprised in

1. David Devine

Registered Surveyor and holder of an annual practising certificate for who may act as a registered surveyor pursuant to the proviso to section 25 of the Surveyors Act 1966) hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972.

Dated at Napier this 5th day
of APRIL 1989 Signature E. J. [illegible]

Field Book	p.	Traverse Book	p.
Reference Plans	S.O. 4353,	S.O. 4355,	
	S.O. 55795		

Approved as to Survey

141789  Chief Surveyor

Deposited this day of 19

District Land Registrar

File Received 24/5/89 Instructions	L T S 52707
--	-------------

<u>W.A. Patterson</u>	<u>W.A. Patterson</u>
<u>V.E. Patterson</u>	<u>V.E. Patterson</u>

Pursuant to a Resolution passed at
the 6th day of June 1920
approving business to be done and
the 6th day of June 1920 the same was
being out of the hands of the
State hereon the same was
the 6th day of June 1920 the same was
being out of the hands of the State hereon




 H. D. Noble
 General Manager

Note. This plan is concurrent
with L.T.S. 52707

Total Area	
------------	--

Comprised in

1. David Devine

Registered Surveyor and holder of an annual practising certificate for who may act as a registered surveyor pursuant to the proviso to section 25 of the Surveyors Act 1966 hereby certify that this plan has been made from surveys executed by me or under my directions, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972.

Dated at Napier this 5th day
of APRIL 1989 Signature Devine

Field Book p. Traverse Book p.
Reference Plans SO. 43531, SO. 43554,
SO. 55795
Examined Paul F. Mello Correct J. R. Schumacher 11/2

Approved as to Survey

1717189  Chief Surveyor

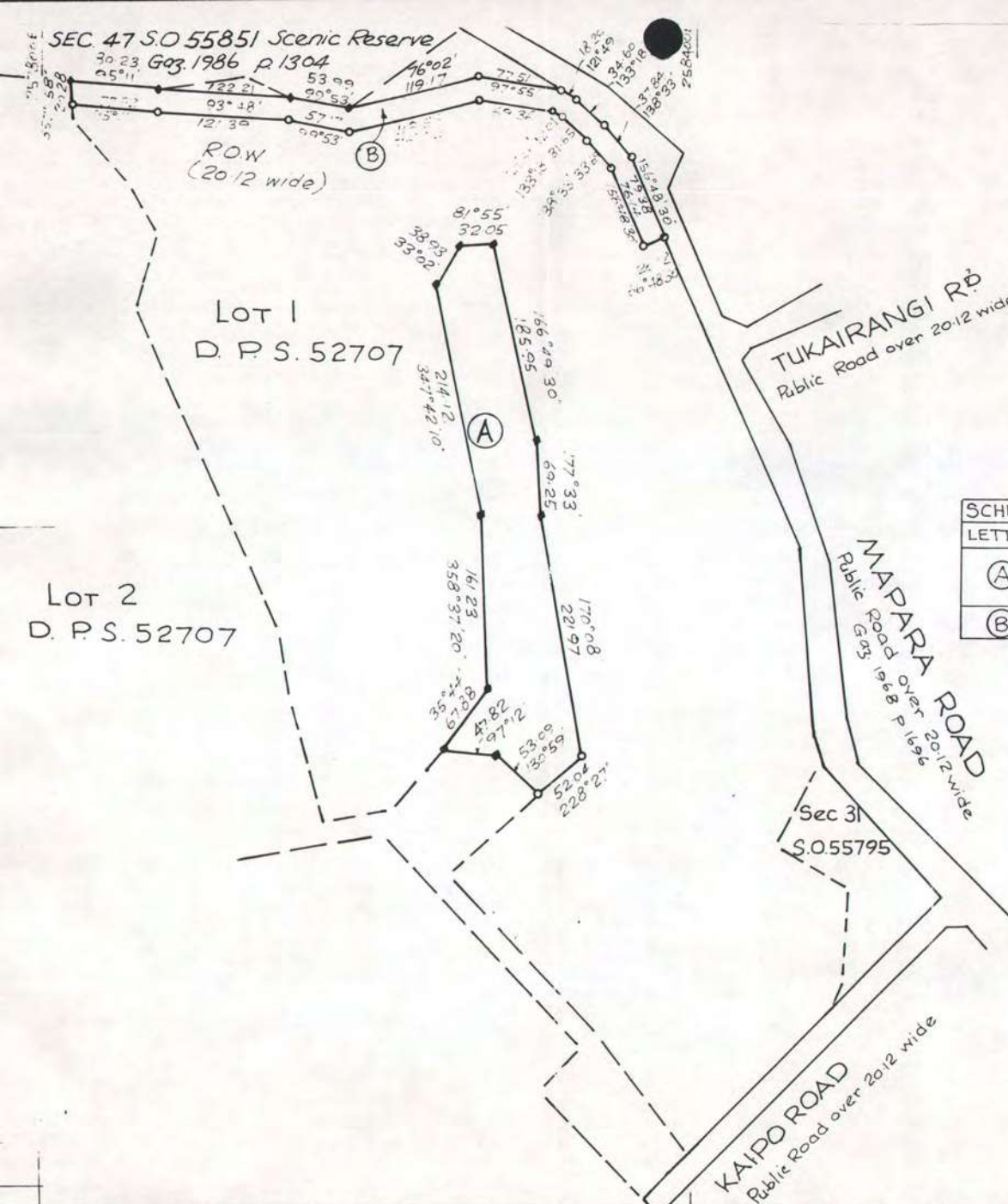
Deposited this	day of	19
----------------	--------	----

File
Received
Instructions

L T S 52722

L & S FORM N93

T24Consult Page 283 of 1585



SCHEDULE OF PROPOSED EASEMENTS			
LETTER	PURPOSE	SERV.TEN.	DOM.TEN.
(A)	AIRSTRIPE EASEMENT	Lot 1 D.P.S 52707	Lot 2 D.P.S 52707
(B)	R.O.W		

LAND DISTRICT SOUTH AUCKLAND
SURVEY BLK. & DIST. IV TUHINGAMATA EAST
NZMS 261 SHT RECORD MAP No 418/8.1
418/1.1

PLAN OF EASEMENTS
OVER LOT 1 D.P.S. 52707

TERRITORIAL AUTHORITY TAUPODISTRICT

Surveyed by David Devine

Scale 1:3000 Date March 1989

PACIFIC
SURVEY FORM
N93

SURVEYOR GENERAL, DEPARTMENT OF LANDS AND SURVEY, NEW ZEALAND

APPENDIX E

SITE PHOTOGRAPHS



PLATE 1: Example of paddock where superphosphate application occurs

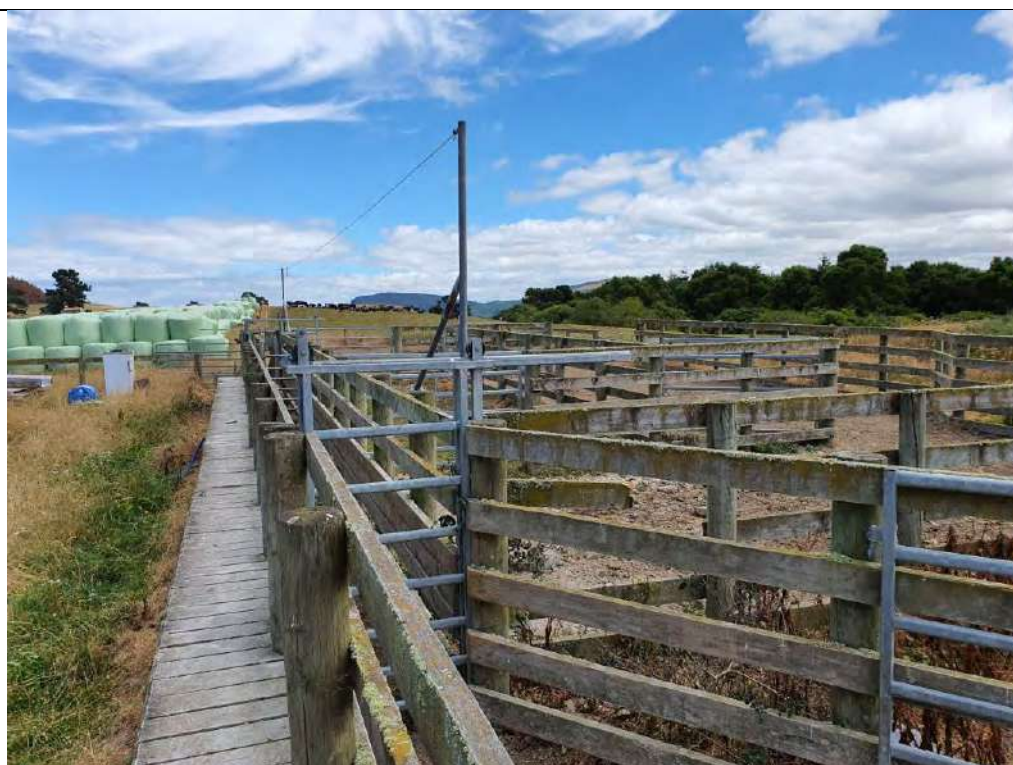


PLATE 2: Stockyards constructed in 2010



PLATE 3: Above Ground Fuel Tank



PLATE 4: Light hydrocarbon staining



PLATE 5: Lower terraces, used for lucerne.



PLATE 6: Residual dendritic overland flowpaths.



PLATE 7: Northern side of central ridge showing steep slope towards Whakaipo Bay.



PLATE 8: View north towards central ridge from lower terrace showing clear differentiation between cut and carry areas and areas of limited access.

APPENDIX F LABORATORY TRANSCRIPTS



CLIENT INFORMATION				Page #	1	2
Client	Geosciences Ltd			Customer Comments/Instructions  22-02140		
Address	PO Box 35366, Browns Bay, Auckland, 0753					
Project Leader	Carl O'Brien					
Project ID	JH0180	PO #				
Site	40 Kaiapo Road					
Sampler	COB					
Phone	06 281 2454					
Email	brodie@geosciences.co.nz ; carl@geosciences.co.nz					
Invoice Email	el@geosciences.co.nz					

LABORATORY USE ONLY							
Laboratory Job #	22-02140			Seal Status		Priority (mark with X)	
Date Received	21/01/2022	Received By	FH	Sample Temp Status		Routine	X
						Urgent	

TESTS REQUESTED													
Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites						Sample Comments
							ICP_S_Cd	Ph_S	SOIL_COMP				
	SC1	0-75MM	19/01/2022	11:30:00 AM	Soil		X	X					Composite of SC1a - SC1d
3	SC2	0-75MM	19/01/2022	12:00:00 PM	Soil		X	X					Composite of SC2a - SC2d
	SC3	0-75MM	19/01/2022	12:30:00 PM	Soil		X	X					Composite of SC3a - SC3d
4	SC4	0-75MM	19/01/2022	1:00:00 PM	Soil		X	X					Composite of SC4a - SC4d
	SC5	0-75MM	19/01/2022	1:30:00 PM	Soil		X	X					Composite of SC5a - SC5d
6	SC6	0-75MM	19/01/2022	2:00:00 PM	Soil		X	X					Composite of SC6a - SC6d
	SC7	0-75MM	19/01/2022	2:30:00 PM	Soil		X	X					Composite of SC7a - SC7d
8	SC1a	0-75MM	19/01/2022	11:30:00 AM	Soil				X				
	SC1b	0-75MM	19/01/2022	11:30:00 AM	Soil				X				
10	SC1c	0-75MM	19/01/2022	11:30:00 AM	Soil				X				
	SC1d	0-75MM	19/01/2022	11:30:00 AM	Soil				X				
12	SC2a	0-75MM	19/01/2022	12:00:00 PM	Soil				X				
	SC2b	0-75MM	19/01/2022	12:00:00 PM	Soil				X				
14	SC2c	0-75MM	19/01/2022	12:00:00 PM	Soil				X				
	SC2d	0-75MM	19/01/2022	12:00:00 PM	Soil				X				
16	SC3a	0-75MM	19/01/2022	12:30:00 PM	Soil				X				
	SC3b	0-75MM	19/01/2022	12:30:00 PM	Soil				X				
18	SC3c	0-75MM	19/01/2022	12:30:00 PM	Soil				X				
	SC3d	0-75MM	19/01/2022	12:30:00 PM	Soil				X				
20	SC4a	0-75MM	19/01/2022	1:00:00 PM	Soil				X				
	SC4b	0-75MM	19/01/2022	1:00:00 PM	Soil				X				
Relinquished by		cob		Relinquished by				Courier					
Date	20/01/2022	Time	19/01/2022	Date		Time		Courier #					



CLIENT INFORMATION				Page #	2			2
Client	Geosciences Ltd			Customer Comments/Instructions				
Address	PO Box 35366, Browns Bay, Auckland, 0753							
Project Leader	Carl O'Brien							
Project ID	JH0180	PO #						
Site	40 Kaiapo Road							
Sampler	COB							
Phone	06 281 2454							
Email	brodie@geosciences.co.nz ; carl@geosciences.co.nz							
Invoice Email	el@geosciences.co.nz							

LABORATORY USE ONLY									
Laboratory Job #				Seal Status		Priority (mark with X)			
Date Received		Received By		Sample Temp Status		Routine	X	Urgent	

TESTS REQUESTED													
Lab ID	Sample ID	Depth	Date	Time	Matrix	# Cont.	Analysis Requests/Suites						Sample Comments
							ICP_S_Cd	PH_S	SOIL_COMP				
22	SC4c	0-75MM	19/01/2022	1:00:00 PM	Soil				X				
	SC4d	0-75MM	19/01/2022	1:00:00 PM	Soil				X				
24	SC5a	0-75MM	19/01/2022	1:30:00 PM	Soil				X				
	SC5b	0-75MM	19/01/2022	1:30:00 PM	Soil				X				
26	SC5c	0-75MM	19/01/2022	1:30:00 PM	Soil				X				
	SC5d	0-75MM	19/01/2022	1:30:00 PM	Soil				X				
28	SC6a	0-75MM	19/01/2022	2:00:00 PM	Soil				X				
	SC6b	0-75MM	19/01/2022	2:00:00 PM	Soil				X				
30	SC6c	0-75MM	19/01/2022	2:00:00 PM	Soil				X				
	SC6d	0-75MM	19/01/2022	2:00:00 PM	Soil				X				
32	SC7a	0-75MM	19/01/2022	2:30:00 PM	Soil				X				
	SC7b	0-75MM	19/01/2022	2:30:00 PM	Soil				X				
34	SC7c	0-75MM	19/01/2022	2:30:00 PM	Soil				X				
35	SC7d	0-75MM	19/01/2022	2:30:00 PM	Soil				X				
Relinquished by		cob		Relinquished by				Courier					
Date	20/01/2022	Time	19/01/2022	Date		Time		Courier #					



Certificate of Analysis

Geosciences Ltd
PO Box 35366, Browns Bay
Auckland 0753

Attention: Carl O'Brien
Phone: 06 281 2454
Email: brodie@geosciences.co.nz

Sampling Site: 40 Kaiapo Road

Lab Reference: 22-02140
Submitted by: COB
Date Received: 21/01/2022
Testing Initiated: 21/01/2022
Date Completed: 27/01/2022
Order Number:
Reference: JH0180

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Elements in Soil

Client Sample ID			Composite SC1 (SC1a,SC1b,SC1c,SC1d)	Composite SC2 (SC2a,SC2b,SC2c,SC2d)	Composite SC3 (SC3a,SC3b,SC3c,SC3d)	Composite SC4 (SC4a,SC4b,SC4c,SC4d)	Composite SC5 (SC5a,SC5b,SC5c,SC5d)
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-29	22-02140-30	22-02140-31	22-02140-32	22-02140-33
Cadmium	mg/kg dry wt	0.005	0.18	0.18	0.20	0.21	0.46

Elements in Soil

Client Sample ID			Composite SC6 (SC6a,SC6b,SC6c,SC6d)	Composite SC7 (SC7a,SC7b,SC7c,SC7d)
Date Sampled			19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-34	22-02140-35
Cadmium	mg/kg dry wt	0.005	0.35	0.31

Soil Aggregate Properties and Nutrients

Client Sample ID			Composite SC1 (SC1a,SC1b,SC1c,SC1d)	Composite SC2 (SC2a,SC2b,SC2c,SC2d)	Composite SC3 (SC3a,SC3b,SC3c,SC3d)	Composite SC4 (SC4a,SC4b,SC4c,SC4d)	Composite SC5 (SC5a,SC5b,SC5c,SC5d)
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-29	22-02140-30	22-02140-31	22-02140-32	22-02140-33
pH*	pH	1	4.8	4.9	4.7	4.8	5.1

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
This test report shall not be reproduced except in full, without the written permission of Analytica Laboratories.

Soil Aggregate Properties and Nutrients

Client Sample ID			Composite SC6 (SC6a,SC6b,SC6c,SC6d)	Composite SC7 (SC7a,SC7b,SC7c,SC7d)
Date Sampled			19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-34	22-02140-35
pH*	pH	1	5.2	5.2

Soil Composite

Client Sample ID			SC1a 0-75mm	SC1b 0-75mm	SC1c 0-75mm	SC1d 0-75mm	SC2a 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-1	22-02140-2	22-02140-3	22-02140-4	22-02140-5
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			SC2b 0-75mm	SC2c 0-75mm	SC2d 0-75mm	SC3a 0-75mm	SC3b 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-6	22-02140-7	22-02140-8	22-02140-9	22-02140-10
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			SC3c 0-75mm	SC3d 0-75mm	SC4a 0-75mm	SC4b 0-75mm	SC4c 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-11	22-02140-12	22-02140-13	22-02140-14	22-02140-15
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			SC4d 0-75mm	SC5a 0-75mm	SC5b 0-75mm	SC5c 0-75mm	SC5d 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-16	22-02140-17	22-02140-18	22-02140-19	22-02140-20
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			SC6a 0-75mm	SC6b 0-75mm	SC6c 0-75mm	SC6d 0-75mm	SC7a 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-21	22-02140-22	22-02140-23	22-02140-24	22-02140-25
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

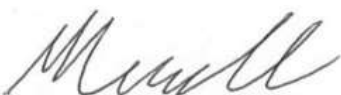
Client Sample ID			SC7b 0-75mm	SC7c 0-75mm	SC7d 0-75mm
Date Sampled			19/01/2022	19/01/2022	19/01/2022
Analyte	Unit	Reporting Limit	22-02140-26	22-02140-27	22-02140-28
Soil - Composite prep - DS			Complete	Complete	Complete

Method Summary

- Elements in Soil** Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
- pH in Soil** 1:2.5 extraction with 0.1M calcium chloride followed by pH probe determination.(Department of Sustainable Natural Resources).
- Soil Composite*** Analytica Laboratories is not accredited for the preparation of composite samples; however, the chemical analysis does hold IANZ accreditation. As composite analysis is conducted when requested by the sampler if they deem fit as per the NES guideline, the results of the chemical analyses still hold proper accreditation based on Analytica's methods.



Sharelle Frank, B.Sc. (Tech)
Technologist



Matthew Counsell, B.Sc.
Inorganics Team Leader

Breda Investments Limited & EF Deadman Limited

37 & 40 Kaiapo Road, Acacia Bay, Taupō

Engineering Services Assessment - Kaiapo Plan Change 44

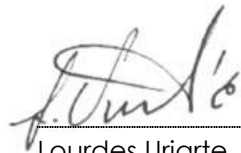
220205
18 May 2026

Breda Investments Limited and EF Deadman Limited

37 & 40 Kaiapo Road, Acacia Bay, Taupō

Engineering Services Assessment - Kaiapo Plan Change 44

Prepared by:



Lourdes Uriarte
Senior Civil Engineer
BEng Tech (Civil)

**Approved
for Release by:**



Thomas Brand
Regional Manager, Chartered Professional Engineer
BSc (Civil), CPEng, CMPEngNZ, IntPE (NZ)

Date: 18 May 2026
Reference: 220205
Status: Final
Revision: -
Previous Revision Date: -

This document is the property of Cheal Consultants Limited. Any unauthorised employment or reproduction, in full or part is forbidden.

This document has been prepared for a specific purpose for the above client and shall not be used for any other unauthorised purpose. Cheal Consultants Limited does not acknowledge any duty of care or responsibility to any other party.

© Cheal Consultants Limited

TABLE OF CONTENTS

1. SCOPE	4
2. SITE DESCRIPTION.....	4
2.1 Development Proposal	5
3. GEOTECHNICAL REPORT.....	6
4. EARTHWORKS	6
4.1 Bulk Earthworks	6
4.2 Building Platforms	7
4.3 Earthwork for Pavement formation.....	8
4.4 Contamination	9
4.5 Erosion and Sediment Control	9
5. STORMWATER	10
5.1 Primary Disposal System	10
5.2 Secondary Overland Flow	11
5.3 Run-Off Coefficient Effects	13
5.4 Stormwater Strategy Options	14
6. WASTEWATER.....	15
6.1 Onsite Effluent Disposal- Rule 3.10 WRC Lake Taupō Catchment	16
6.2 Onsite Disposal Design Allowances	17
6.3 Preliminary Scenarios	17
6.4 Preliminary Risk Reduction Recommendations as per NZS1547:2012 Appendix A	18
6.5 Summary Onsite Wastewater Disposal	18
7. ROADING	18
7.1 Kaiapo and Mapara Intersection - Site Access	18
7.2 Public Roads	19
7.3 Private Roads.....	19
7.4 Footpath and Cycleways	20
7.5 Vehicle Access	20
8. WATER SUPPLY SERVICING	20
9. POWER.....	22
10. STREET LIGHTING	22
11. DISCLAIMER	22

Appendices –

1. Cheal Drawing 220205-CP001: Outline Development Plan
2. WSP Kaiapo Development Water Supply Modelling dated 6 March 2023 with Addendum 1.

1. SCOPE

Cheal Consultants Ltd has been engaged by Breda Investments Limited & EF Deadman Limited to produce an Engineering Services Assessment to support a plan change from Rural to Residential Environment. The proposal seeks to create a staged residential development. A rural subdivision has been previously consented on the western parcel, known as E.F. Deadman Limited Subdivision (RM220151), granted on 21 September 2023.

This engineering services assessment covers required engineering and services in accordance with Taupō District Council and NZS 4404 to support the Plan Change 44 submission.

This review follows the notification of Taupō District Plan Changes 44 & 45 as below:

Plan Change 44 (Residential Zones)

Plan Change 44 makes changes to the bulk and location provisions of the Residential Zones, provides for Comprehensive Housing Developments and rezones some existing areas that have already been developed.

Plan Change 45 (Neighbourhood Centre Zone)

Plan Change 45 includes new neighbourhood centres and makes minor changes to the bulk and location provisions of the Neighbourhood Centre Zone.

2. SITE DESCRIPTION

Breda Investments Ltd and E.F. Deadman Ltd own the properties at the end of Kaiapo Road, Taupō, being approximately 300ha, in three parcels being:

- Lot 1 DP 410435
- Lot 1 DP337255
- Lot 2 DP337255

These properties are located above Kaiapo Bay, adjoining Department of Conservation Scenic Reserve and private land. The properties are currently zoned Rural Environment in the Taupō District Plan with an Amenity Landscape Area (ALA63 -Whakaipo Bay) and Mapara Valley Escarpment area overlay. Plan Change 42 of the Taupō District Plan zoned this land General Rural Environment.



Figure 1 – Site Location

2.1 Development Proposal

It is the intention of the owners that these properties do not remain in the General Rural Environment but instead be considered for Low Density Residential zoning. Therefore a submission on Plan Change 44 is proposed to alter the zoning to Low Density Residential.

The proposed development may create:

- 14 Low Density Lots ranging from 1.13 to 3.50 hectares
- 19 Low Density Lots ranging from 4.00 to 8.29 hectares
- 289 Residential Lots ranging from 5,000m² to 9,590 m²
- Proposed Commercial Area 1,640 m² Lot 323
- Public Road and Recreation reserves will be formed within the development;
- Drainage Reserves associated with Stormwater Management and the existing gullies.

Similar to other Low Density Residential zones on the lands adjoining the site to the east along Mapara Road; Blue Ridge Drive, Lochviews, Dalmore Way and Gillespie Place, this proposed zone will provide for large lot residential housing on properties approximately 5000m², dwellings approx. 250m² to 400m², onsite wastewater disposal via advanced wastewater systems, trickle feed reticulated water supply, semi-rural roads with limited footpaths and some linkage via walkways to other roads. A change to Low Density Residential zone would likely require the upgrades in road network, water supply, telecommunications and power supply in the local area.

The properties have identified fault lines only on the most eastern edges and is not within the geothermal areas of the Taupō district. Specialist assessments were engaged by the client to support and provide independent assessment insights to specific disciplines such as:

- Geotechnical Overview
- Landscape and Visual Assessment
- Water Supply Modelling
- Archaeological Reports
- Traffic Impact Assessment
- Ecological Assessment
- Land Contamination Investigations

Refer to Appendix 1 for Outline Development Plan.

3. GEOTECHNICAL REPORT

Please refer to CMW Geoscience Preliminary Geotechnical Assessment Report (TGA2022-0206AB Rev 0) dated May 2026. This report is available and attached with the submission documents.

We acknowledge the constraints of this site in terms of geology. However, a detailed engineering design supported by geotechnical engineering input will be carried out at each stage of subdivision to ensure the proposed sites are designed adequately, considering the constraints and limitations as stated on the documentation obtained for this site. The geotechnical engineer will incorporate the Plan Changes to the Scheme Plan Layout as necessary.

4. EARTHWORKS

As part of the detail design earthworks will align with the Plan Changes and comply with Taupō District Council regulation as well as Waikato Regional Council.

4.1 Bulk Earthworks

Bulk earthworks in the form of cutting and filling will likely be required on each site and to construct roads for development of land. The civil design had not been completed at the time of producing this report; however, it is assumed that the individual building sites will be formed relatively level with a cut to fill process. The likely cut and fill depths will vary across the site but are anticipated to be minimal (in the order of 1 to 2m) for building platforms and up to 6m for road construction where they cross existing gullies. These levels will be determined during detailed modelling design. However, they are not anticipated to pose significant constraints to residential land development. Indicative earthworks cross sections are included as Figures 2 to 6 below.

Any bulk earthworks that are required shall be undertaken in accordance with NZS4431:1989 – Code of Practice for Earth Fill for Residential Development. Topsoil across the sites should be stripped and

stockpiled beyond the earthworks footprint and can then be reused in the berms and other areas outside the building envelopes as required.

Some acceptable fill material will likely be able to be won from the sites themselves in the process of levelling the gullies and ridges. However, the amount of usable material will need to be calculated during detailed modelling design. Based on the knowledge from other subdivision earthworks in the surrounding areas of Taupō for pumiceous soils, it is anticipated the compaction factor will be in the order of 0.65 to 0.70 when compacted to optimum dry density.

Unsuitable material will need to be cut to waste and disposed of off-site or placed and tagged as uncertified fill. In the event that insufficient fill material can be won from the sites, acceptable fill material will need to be imported.

Any carriageway footprints shall be undercut a further 450mm and recompacted to ensure that an acceptable roadway subgrade is achieved. Other areas, such as footpaths and vehicle crossings, may also require subgrade improvements dependant on the results of onsite testing and verification.

Care should be taken during cut and fill operations to ensure that stormwater flow paths remain intact or that stormwater flows are redirected to other appropriate flow paths or ponds on site.

4.2 Building Platforms

It is anticipated that building platforms will be constructed on each site and will be located in flat areas to avoid significant earthworks. Platforms will also be positioned to maximise views from each site and be designed to minimise visual impact from adjoining sites and other properties. For all lots adjacent to DOC land a minimum setback of 10m from building can be obtained and comply with requirements.

Earthfill for building platforms will be in compliance with terms of NZS 4431 and suitable for design of foundations in accordance with NS3604:2011, The New Zealand Standard for Timber Buildings.

Each building platform will be approximately 400m² in area and be reasonably flat with enough grade to manage stormwater runoff. Cut and fill batters will be kept to a minimum and be no steeper than 1 in 2. See Figure 2 for a cross section through a typical building platform.

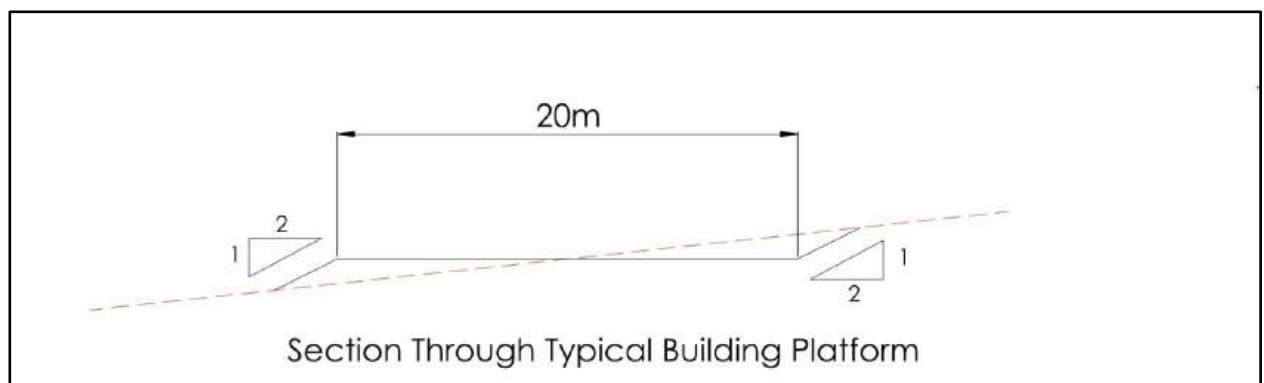


Figure 2

4.3 Earthwork for Pavement formation

Earthworks will be required to enable the construction of a roading network throughout the site. Roads will be positioned to provide access to building sites within the development and will generally follow topography that will minimise the earthworks requirements. Where roads run across the contour of gully systems there will be a need for earthworks to enable construction.

There are several gully systems that run through the site. These generally run in a north south direction towards Lake Taupō. The roading network should be designed to avoid gully crossings as much as possible but it is likely that there will be a need for crossing in a number of places. Gully crossings will need to be designed to enable stormwater flows to be maintained and reduce the risk of erosion in the banks and gully floor. It is anticipated that fill up to 6m deep will be needed for construction of the crossings. Figure 3 shows a typical road cross section for gully crossing.

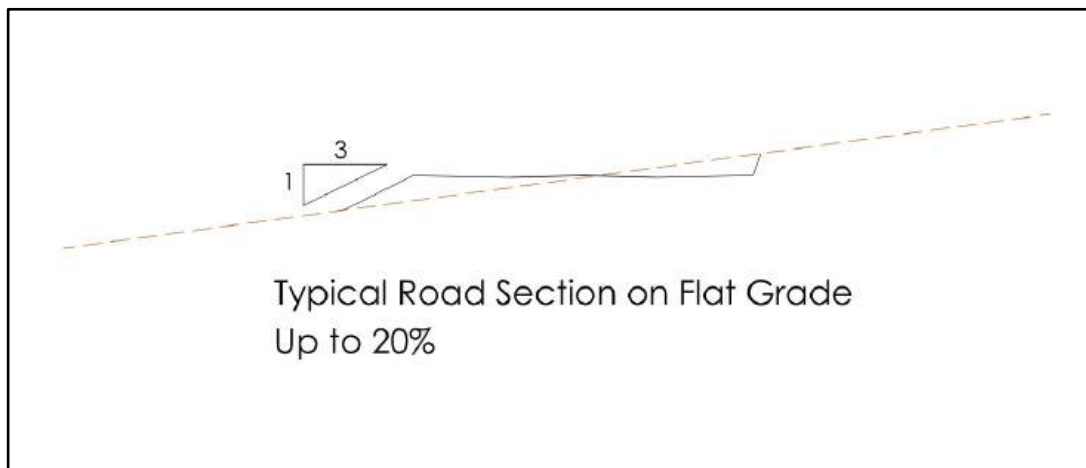


Figure 3

The topography of the varies from flat to reasonably steep (up to 40%). Roads that traverse these slopes will require differing construction methods depending on soil types and the steepness of the land. Figures 4 to 6 show typical cross sections for road on flat, moderate and steep slopes.

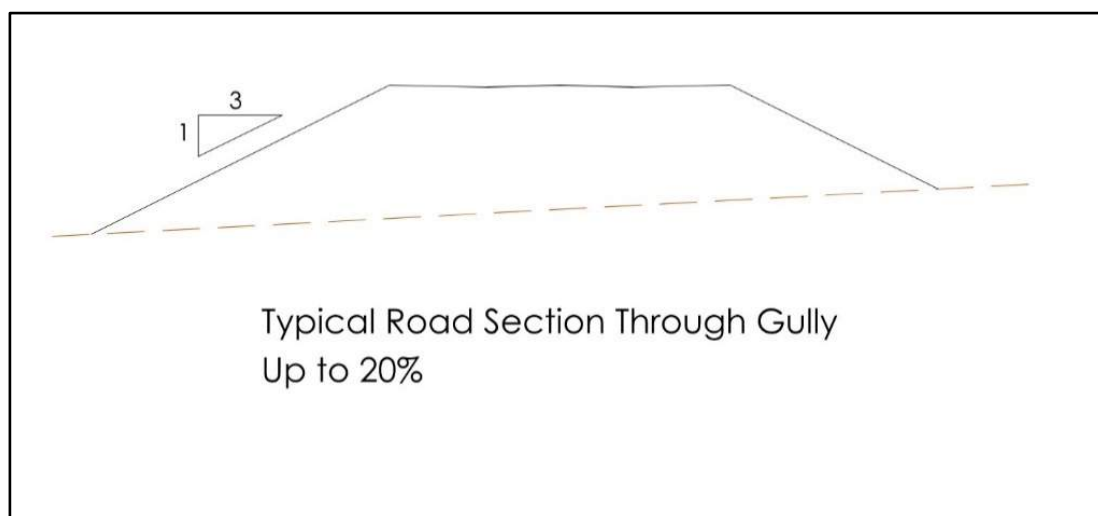


Figure 4

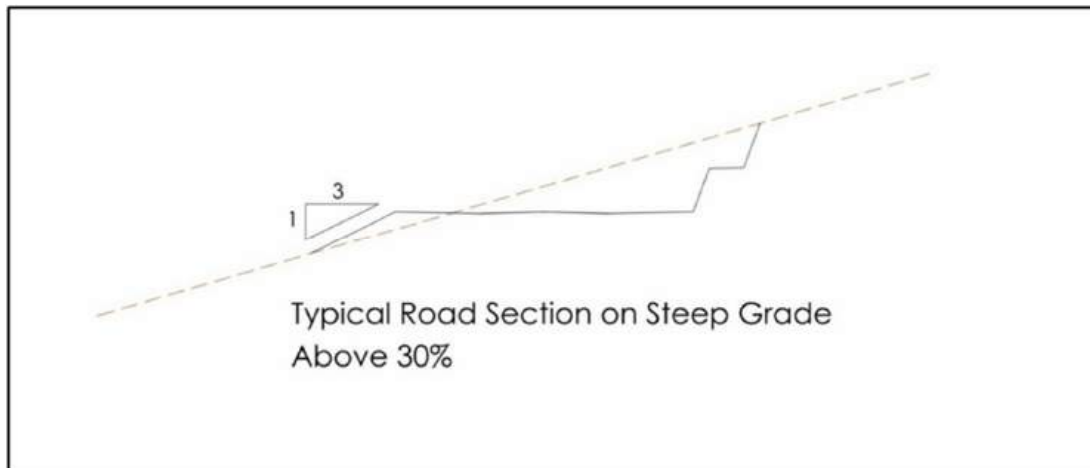


Figure 5

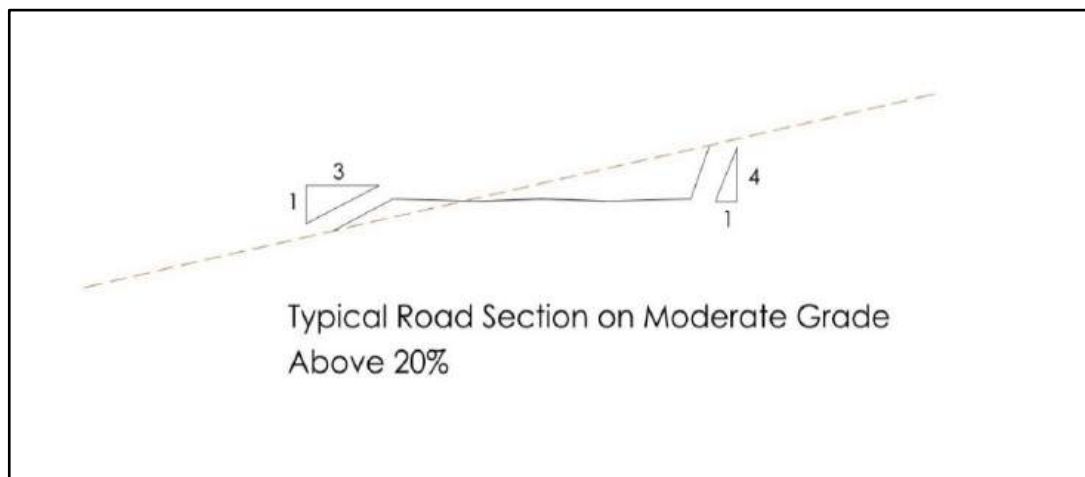


Figure 6

4.4 Contamination

A detailed Contamination Site Investigation Report was prepared by Geohazards Environmental Ltd dated 14 May 2026. This report is available and attached with the application documents.

4.5 Erosion and Sediment Control

Due to the size of the development and the presence of High-Risk Erosion areas is it expected that an Earthworks Resource Consent from the Waikato Regional Council (WRC) will be required in addition to District Council consents. Such consents will be applied for in the relevant stages. Following earthworks modelling, a Site Specific Earthworks Management Plan will be provided to the Waikato Regional Council and Taupō District Council (TDC).

Various controls will be required during construction to manage erosion and prevent sediment discharge during the earthworks process onsite. These controls will likely consist of sediment retention ponds, decanting earth bunds, clean and dirty water diversion bunds, and silt fences. The design, installation, and management of these controls will be completed in accordance with the WRC

guidelines. The design will need to be approved by both WRC and TDC during Engineering Approval stage. Monitoring of controls will be completed by WRC and/or TDC during earthworks.

Detailed design will be completed as required for the various stages of earthworks and a Construction Management Plan will be prepared and provided to Council prior to construction commencing.

5. STORMWATER

The requirements for stormwater management in a Low Density Zone are not affected by the Plan Changes (increase nor reduce), in that the District Plan and Regional Plan requirements require the same principles of management.

5.1 Primary Disposal System

As per the TDC Code of Practice, stormwater runoff disposal from all dwellings and hardstand areas on each lot will be through above ground attenuation tanks with outlet control discharge. These tanks shall be capable of dealing with a 10-year, 1 hour storm event. These will be managed part of an individual building consent.

Therefore, as part of this Proposed residential development, the Stormwater Management will only account for public roads. Consequently, the roads will be split into suitable catchment areas, with runoff collected via swales or water drains, and directed to suitably storage attenuation area. These attenuation areas will be sized for the 10-year, 1 hour storm event as per the TDC Code of Practice and will meet the permitted activity rules for Stormwater Discharge to Ground in the WRC Regional Plan.

In general, the road runoff is proposed to be collected via roadside swales and water drains and discharged to soakage pits within the road corridor at regular intervals. The soakage pits themselves will be kept within the road corridors. Preliminary calculations indicate rock-filled soakage pits will be 2m wide, 6m long, and 0.9m deep, with half a metre of topsoil cover to ensure adequate soil for vegetation above. Soakage pit spacing depends upon the area of pavement and footpath contributing to the soakage pit. Preliminary spacing indicates 60m spacing (both sides of roadway) for a 7m wide roads and 120m spacing for the 5m wide roads. The lengths of interval depend on the gradient of the road. This will be refined during detailed design, along with inlet structures to capture the swale flow and discharge it into the soakage pits.

Furthermore, the soak pits will be connected and conveyed to a series of stormwater reserves. Additional attenuation and flow path will be accommodated within the stormwater reserve. The stormwater reserves have been aligned to maintain flow paths directed from the road and upstream catchment to the receiving environment.

During detailed design specific stormwater modelling will incorporate the size and location required for structures to ensure peak flows can safely passage and prevent flooding issues. The design will also analyse the velocity of these flows with implementation of scour protection necessary on swales,

water drains and overflow paths areas also analyse the velocity of these flows with implementation of scour protection necessary on swales, water drains and overflow paths areas.

5.2 Secondary Overland Flow

Stormwater runoff from roads will be managed via a network of roadside swales, culverts and dry detention basins. For storm events greater than the 10-year, 1 hour event, or should the primary system experience blockages, secondary flow paths are required to safely allow for passage of these flows.

These flow paths will be provided within the road corridors as additional capacity within the roadside swales and/or culvert structures with discharges into the existing flows paths within the site. The design of the primary disposal system will be conservative to ensure that actual storage of runoff exceeds the 10-year, 1 hour requirement and that only extreme events will discharge flows off site and only once significant treatment has occurred for initial flows through filtration and settlement.

The site has a central ridge which divides the site into two catchments. Both catchments are identified in Figure 7 below from Niwa database.

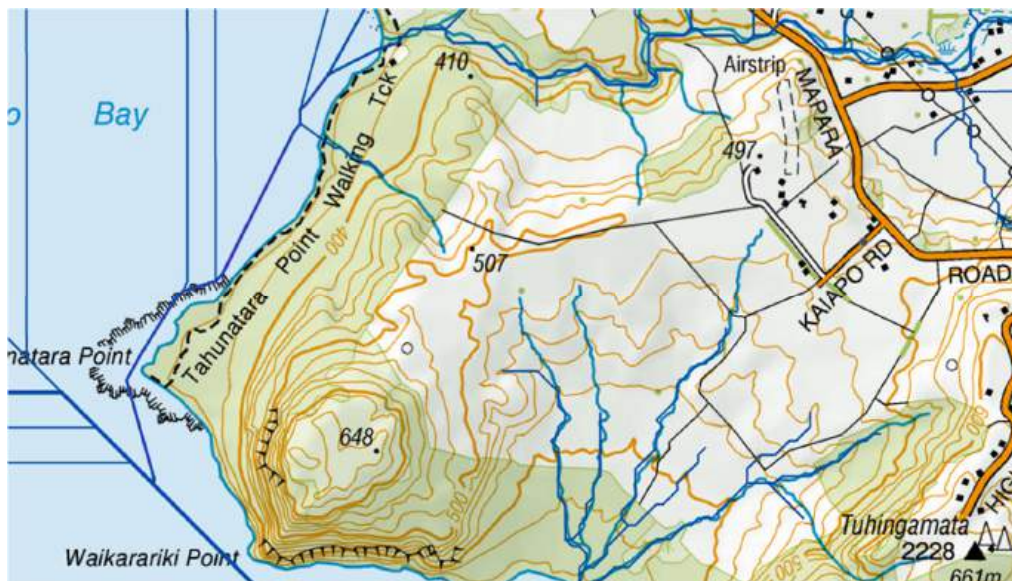


Figure 7 - Full Site Catchment (Source NIWA)

The north catchment drains to the Mapara Stream while the south catchments develop draining southwards to Lake Taupō as shown below in Figures 7, 8 & 9.

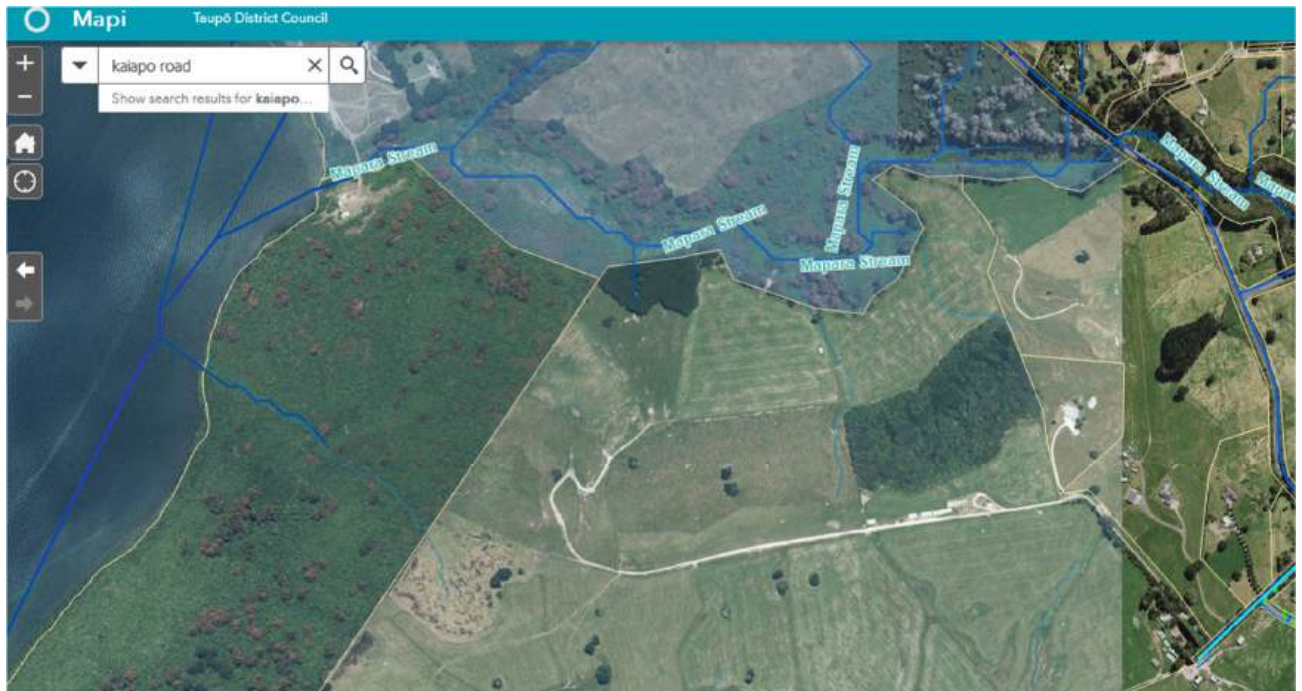


Figure 8 - Northern Catchment (Source MAPI)

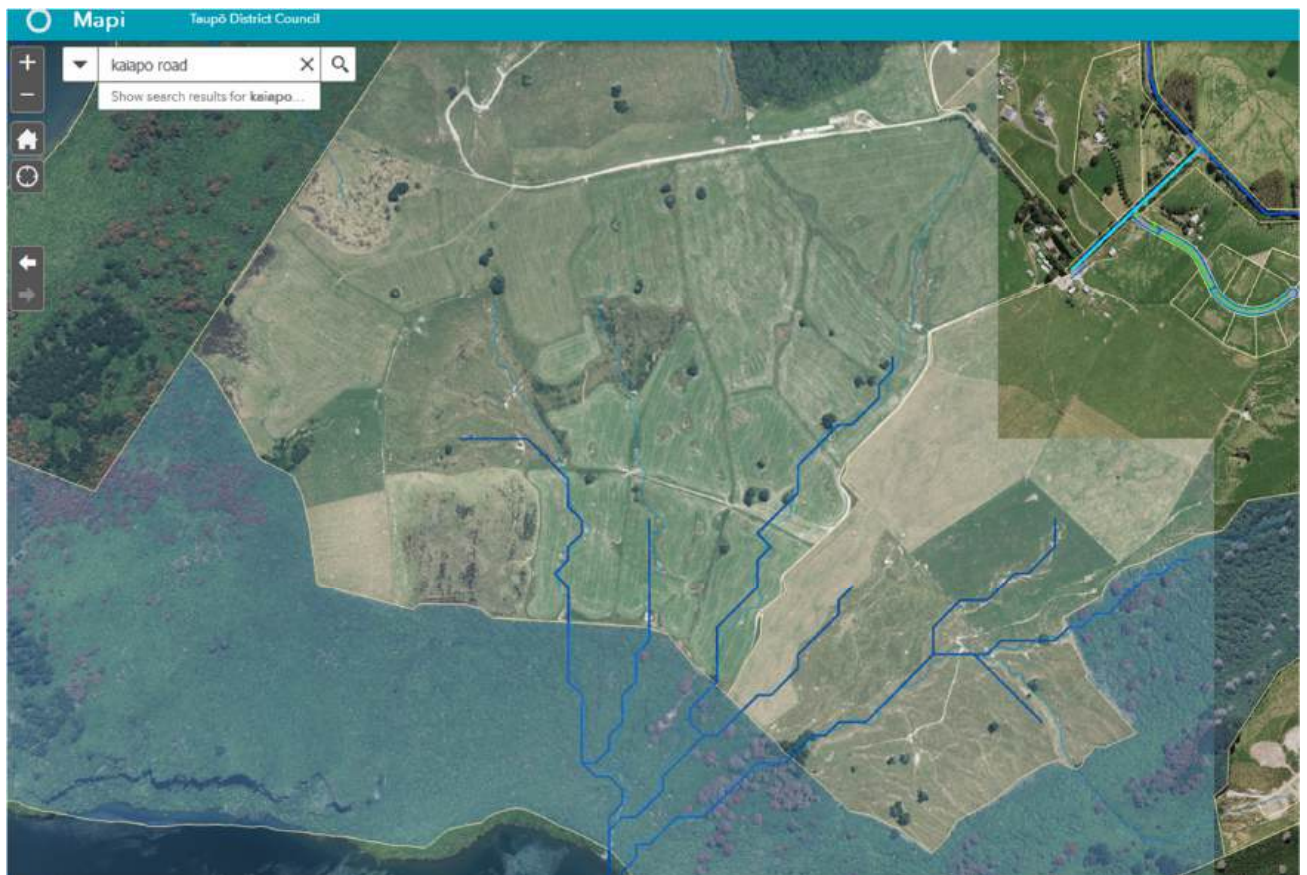


Figure 9 - Southern Catchment (Source MAPI)

The presence of natural flow paths will require adequate attention. The effect of the roads sequestering these flow paths and catchments will be determined by the location of the proposed

roads traversing the existing catchment and gullies. Minor sub catchment will be managed within the road swales, where fall can be obtained, and into designated soak pits. For a bigger catchment or where fall cannot be achieved, stormwater structures like culverts, with headwall and wingwall, will be used to traverse the road and align the flow in the direction of a downstream gully/ flow path.

The design and modelling of secondary overland flow will comply with the TDC Code of Practice and shall meet the permitted activity rules for Stormwater Discharge to Ground in the WRC Regional Plan.

5.3 Run-Off Coefficient Effects

A comparison of the runoff effects has been done to give a perspective of the impact due to changes to the surface coverage for this development. Table 1 below shows preliminary calculation of the changes per area proposed in this development and the effects of those changes of surfaces on the runoff coefficient because of the development. The runoff coefficient increases from 0.2 to 0.25, well below the Runoff coefficient factor used for Residential areas 0.55 from Table 1 Run-off Coefficient from E1/VM1.

Table 1 Run-off Coefficient from E1/VM1

Preliminary Calculation	Areas (m ²)	C _i catchment	C _i x Area _i
Site Area (m ²)	3,241,851		
Number of Lots	322		
Total Area Proposed Lots (m ²)	2,745,612	0.2	523,362
Propose Roof Coverage per Lot (m ²)	400		
Total Proposed Roof Coverage (m ²)	128,800	0.9	115,920
Total Proposed Non- Coverage area (m ²)			
Average Roof Coverage %	5%		
Total Area Reserve (m ²)	257,795	0.2	51,559
Total Area Proposed Roads Reserve (m ²)	238,444		
Proposed Area - Sealed Surface 20m wide road reserve with 7m Carriageway (m ²)	83,455	0.9	75,110
Proposed Berm Areas (road non paved) (m ²)	154,989	0.2	30,998
Road Paved Coverage %	35%		
Proposed Subdivision Coverage Area (Roof and Roads) (m ²)	212,255		
Estimate Subdivision Coverage (Roof and Roads)	7%		
Total C*Area			796,949
Preliminary Development Runoff Coefficient C ⁽¹⁾			0.25

(1) Runoff factor calculated as

$$C = \frac{\sum C_i A_i}{A_c}$$

5.4 Stormwater Strategy Options

Similar to Section 4 Plan Change Docs - Appendix F - Stormwater Management Report covers all stormwater matters i.e. pipe/swales.

Following the recommendations of the Geotechnical report for lined ponds, shallow lined ponds have been used for onsite attenuation for this site. This is an effective option considering the ample reserve areas available to locate the stormwater ponds and create green features to the development. It is expected that ponds will be landscaped with native planting on batters and base, which enhance the outlook and gain erosion control while providing evapotranspiration to the ponds.

Using the proposed area of roading surfaces, we have calculated preliminary storage volumes and similarly ponds surfaces at both base and top of batters. As show on calculations below for the proposed development, stormwater runoff from roads will be managed via a network of roadside swales, culverts and dry detention basins. For storm events 10-year, 1 hour event:

Preliminary Storage Volumes from Roading Areas

<u>1.1 Runoff Post Development</u>		
$i := 45 \frac{\text{mm}}{\text{hr}}$	$i_{\text{pre}} := 30 \frac{\text{mm}}{\text{hr}}$	$i_{\text{peak}} := 114 \frac{\text{mm}}{\text{hr}}$
$C := 0.9$	$C_{\text{pre}} := 0.25$	Roof surfaces (NZBC E1/VM1 Table 1)
$A_{\text{reserve}} := 257800 \text{ m}^2$		Public Reserve Stormwater Areas (green areas)
$A_{\text{R_paved}} := 119000 \text{ m}^2$		Roading surfaces 8m carriageway + 1.4m footpath
$A_{\text{R_berms}} := 126000 \text{ m}^2$		Road Reserve unpaved (berms grass cover)
$Q := C \cdot i \cdot A_{\text{R_paved}} = 1338.75 \frac{\text{L}}{\text{s}}$		Flow 10&AEP 1hour intensity
$\text{Runoff}_{\text{road}} := Q \cdot 1 \text{ hr} = 4819.5 \text{ m}^3$		Onsite attenuation volume required (post development)
$\text{Pond}_{\text{surface}} := \frac{\text{Runoff}_{\text{road}}}{1 \text{ m}} = 4819.5 \text{ m}^2$		Pond surfaces for a 1m depth- Shallow ponds
$\text{Pond}_{\text{area}} := \text{Pond}_{\text{surface}} \cdot 2 = 9639 \text{ m}^2$		Ponds total surface coverage including with batters

In summary, the coverage required for installation of Stormwater Ponds required for onsite stormwater management is approximately 9,700m². While a proposed Reserve Area of 257,800m² is available to install the stormwater infrastructure. Clearly, demonstrates that there is approximately

26 times the area required for ponds in the proposed development, which allow plenty of opportunity to attenuate the post development flows on site.

At this stage, calculations are preliminary but provide some certainty that within the subdivision stormwater management can be attenuated onsite. Following detailed engineering design, the stormwater reserve areas will be defined throughout the stage to ensure that at any stage the stormwater is managed and in allowance for future development. Similarly, landscaping plans will be provided. It is envisaged that the combination of both disciplines, stormwater, and landscaping, will enhance the reserve areas, provide adequate stormwater attenuation and minimise the effect of the post development flows while still plenty of green spaces for public to enjoy.

6. WASTEWATER

Note that the Plan Changes do not affect wastewater requirement as this under the jurisdiction of the Waikato Regional Council.

The proposed development is located within the Lake Taupō Catchment and outside an Operating Reticulation Zone. To minimise further public infrastructure, maintenance and cost for TDC, onsite wastewater treatment and disposal to ground is considered to be the most appropriate solution for the development.

The development therefore will be serviced via onsite disposal in accordance with Waikato Regional Council's:

3.10.6 Implementation Methods - Domestic Wastewater Treatment and Land Application.

3.10.6.3 Permitted Activity Rule- New Nitrogen Removing On-site Wastewater Systems.

Lot sizes were schemed to comply with Permitted Activity Rule 3.6.10 where a new Aerated Wastewater Treatment System with Nitrogen Reducing capabilities (AWTS+NR) is required on each site considering all Proposed Lots are greater than 5,000m².

It should be highlighted this plan change from zoned Rural Environment to Residential Environment for approximately 320 residential lots is able to comply with WRC regulation under permitted activity as there is sufficient nitrogen allowance on the parent parcels.

Statutory and Relevant documents to this proposal are:

- Resource Management Act 1991
- ASNZS 1547:2012 Standard New Zealand On-site Domestic Wastewater Management
- Waikato Regional Council Resource Management Plan

Summary of Wastewater Rules	
On-site Wastewater Discharge	Activity Status
Existing on-site wastewater discharge in Near-shore Zone	Permitted with conditions (Rule 3.10.6.1) until 30 th June 2013 and Controlled activity (Rule 3.10.6.5) thereafter
Existing on-site wastewater discharge outside Near-shore Zone	Permitted with conditions (Rule 3.10.6.2)
New advanced on-site wastewater discharge on properties greater than 5000 square metres (or 2500 square metres if subdivision consent is granted before 9 July 2005)	Permitted with conditions (Rule 3.10.6.3) provided Permitted Land Use Rule 3.10.5.1 is satisfied, or the land use is consented under 3.10.5.3, 3.10.5.4 or 3.10.5.5.
New conventional on-site wastewater discharge on properties greater than 4 hectares	Permitted with conditions (Rule 3.10.6.4) provided Permitted Land Use Rule 3.10.5.1 is satisfied, or the land use is consented under 3.10.5.3, 3.10.5.4 or 3.10.5.5.
New papakainga and Marae wastewater discharges	Restricted discretionary activity (Rule 3.10.6.6) subject to standards and terms
Other on-site wastewater discharges	Discretionary under Rule 3.5.7.7 of the Proposed Waikato Regional Plan

Figure 10: Rule 3.10 WRC Summary of Wastewater Rules (Source: WRC)

6.1 Onsite Effluent Disposal- Rule 3.10 WRC Lake Taupō Catchment

An individual assessment and design will be required as part of the Building Consent application and shall be prepared by an approved designer. The design shall be in accordance with Rule 3.10.6.3 of the Waikato Regional Plan.

- Each lot will be provided with a private New Aerated Wastewater Treatment system with Nitrogen Removal (AWTS+NR) to comply with permitted activity Rule 3.10.6.3. No resource consent is required for lots complying with this Rule 3.10.6.3.
- Allocation of nitrogen entitlements to each new lot to enable a domestic nitrogen reducing wastewater system to be installed on each lot.
- Effluent from wastewater treatment plant (AWTS+NR) shall not exceed concentrations of:
 - 20 g/m³ Biochemical Oxygen Demand
 - 30g/m³ Suspended Solids
 - 25g/m³Total Nitrogen
- The Volume of effluent to be discharged shall not exceed 2 cubic metres per day (2,000L/day).
- Geotechnical input for Site and Soils evaluation process for Subdivisions. Soil classification is required for on-site wastewater disposal via irrigation system, soils across the site still needs to be classified as per AS/NZS 1547:2012 Table 5.2.
- Each individual lot will still require, at the time of building consent, to provide a site-specific site and soil investigation by a qualified designer. Specific design shall be carried out at each lot identifying the soil category on the location of the disposal field and for building layout.
- Disposal System Covered Surface or Shallow Subsurface drip irrigation system can be used depending on the site constraints.

- For those lots Four hectares or larger that satisfied Rule 3.10.5.1. Rule WRC 3.10.6.4 could be used as a “permitted activity” and specific design. For this Rule a Producer Statement PS1 is required.

6.2 Onsite Disposal Design Allowances

- Occupancy Allowance as per Table H3 AS/NZS1547:2012. Two people per room for the first 2 bedrooms and then 1 person per room, except for any other room that cannot be used as a bedroom e.g. Kitchen, Laundry.
- All proposed dwellings are to be connected to the public water supply. Correspondingly, wastewater flow of 200L/person/day minimum is to be used.
- Reserve areas at 100% the size of the disposal field is recommended.
- Drip irrigation rate 5mm/m²/day maximum.
- Setback distances
 - Surface water¹ 20 m
 - Groundwater >0.3m ~0.6m
 - Property Boundaries² >3m
 - Structures >3m
 - Bores groundwater drawing >20m
 - Significant Geothermal Feature >20m

¹Surface water e.g. Streams, dry flow paths, stormwater including open drain, roadside drain.

²Property boundaries to be subject to local regulatory rules and as per specific design.

6.3 Preliminary Scenarios

Scenarios for three and four-bedroom dwellings based on the assumption above the daily maximum wastewater discharge can be calculated as:

(i)	4 Bedrooms plus	6 people
	Game room	2 people
	Office room	1 person
	Total occupancy	9 people
	Wastewater Production	9 people x200 Litres/day = 2,000 L/day per Lot

Disposal Filed Area (4 Bedroom plus) 2000L/day/5mm/m²/day= **400m²**

(ii)	3 Bedrooms plus	5 people
	Game room	2 people
	Office room	1 person
	Total occupancy	8 people
	Wastewater Production	8 people x 200 Litres/day= 1,600 L/day per Lot

Disposal Field Area (3 Bedroom plus) 1600L/day/5mm/m²/day= **320m²**

6.4 Preliminary Risk Reduction Recommendations as per NZS1547:2012 Appendix A

- a) Onsite wastewater disposal and land application areas will need to be located on land not considered at risk of slope instability and should not be located over the hazard zones as per CWM geotechnical report.
- b) Design dosing load maximum 5mm/m²/day using drip irrigation.
- c) Reserve Area Reserve area 100% to be kept as grassed area not to be paved – recommended.
- d) Aerated wastewater treatment system with Nitrogen reducing system e.g. Hynds Lifestyle Ultimate Low Nitrogen system.
- e) No traffic above the disposal field bed or cattle to be allowed on the disposal field. Areas shall be preferably fenced off or alternatively planting barrier to be landscaped to discourage access. WRC recommended plants list suitable for planting on wastewater disposal fields is attached for the homeowner. We encourage planting to improve the performance of the system.
- f) All clearances are within the NSZ 1547:2012 recommended set back distances.
- g) The homeowners shall engage a qualified service technician for a Maintenance Contract. A written record of all servicing and maintenance carried out on the AWTS
- h) An earth bund along the edge of the disposal field shall be constructed to prevent overland flow entering the field.

6.5 Summary Onsite Wastewater Disposal

- All lots will be sized to comply with WRC as a permitted activity following Rule 3.10.6.3.
- A Specific Site and Soil Investigation Design Report as per ASNZS 1547:2012 for Domestic On-Site Wastewater Treatment System by a qualified designer is required for each lot individual lot as part of the Building Consent Application (or a PS1 by a Chartered Engineer).
- For any deviation of the above, it is expected a resource consent to be lodge individually with the WRC.

7. ROADING

In general, roading works will align with the requirements of the TDC Plan Changes and District Council expectations.

7.1 Kaiapo and Mapara Intersection - Site Access

The site is accessed from a single entry point off Mapara Road into Kaiapo Road. Kaiapo Road is a no-exit road formed to 5.5m with two-way unmarked carriageway.

CKL was engaged to provide a transportation report. From Section 7.2, a check of the intersection performance using SIDRA software shows that the T-intersection can accommodate the expected volumes. Land for the intersection upgrade has been set aside within the client's ownership to accommodate this. A T-intersection design plan carried out by Harrison Grierson is attached - refer

to Proposed Intersection Improve and Subdivision Entrance in Appendix D. The SIDRA analysis confirms that this upgrade should also be suitable to accommodate traffic demands arising from the proposed Plan Change.

7.2 Public Roads

Preliminary road layout shows that geometrical standards required by TDC CoP can be achieved. Engineering detailed design would be required for each stage to demonstrate there are no conflicts or if departures are proposed from the Code of Practice on the proposed infrastructures.

Low impact Stormwater features would be incorporated to the streetscape such as vegetated swales and landscaped stormwater ponds to attenuate the flow of the development.

These collectors or local streets will be formed in accordance with the Code with a formation as 20 m wide road reserve, 7.0 m carriageway, 1.2 m strip edging either side where lots are greater than 1ha), 5.3 m berms on either side.

All public roads will be crowned and have a 3% crossfall with a 1.2 m edging strip both sides. Maximum grades will not exceed the limits in the Code. A 1.2 m grass edging on areas where lots are greater than 1 ha.

Where lots are less than 1ha, public road formations will be a road reserve of 20 m, an 8.5 m wide carriageway crowned with a 3% crossfall to upright kerb and channel both sides, and berms of 5.7 m and 5.8 m wide. A bike friendly dedicated 1.8m wide cycleway/footpath will be constructed on one berm.

The remaining roads branch off the main roads to fill pockets of land within the development. These cul-de-sacs service a small number of lots. These cul-de-sacs are proposed as public road to vest and follow the Code with a road reserve of 16m, and 7.0m wide carriageway crowned with a 3% crossfall to a 1.2m strip edging either side where lots are greater than 1 ha), 4.5 m vegetated berms on either side or as required by the CoP.

Sealing of all public road will be 30mm thick asphaltic concrete. It is expected that the basecourse will be 150mm of NZTA AP40 over a 400mm layer of undercut and recompacted pumice soils, as usual within Taupō district. Any existing soils unsuitable for compaction, in the subgrade will be either removed or replaced with imported suitable clean fill will be used.

7.3 Private Roads

Private roads will be formed to match the widths vs number of lots serviced or longer. Pavement will compromise of a single crossfall with a proud nib on the uphill side and mountable kerb and channel on the downhill side to collect runoff from the pavement. In accordance with the Stormwater design code, primary protection from a 10% AEP design storm will be attenuated on-site through deep concrete lines soakholes, soakpits, or similar.

7.4 Footpath and Cycleways

Following environmentally friendly transport choices, a grass combined walkway and cycleway is proposed through the networks of roads on road reserves and along recreation and stormwater reserves. This to allow a safe and convenient walking access for residents to recreations areas. The combined walkway looks to provide connectivity and integrate the existing cycleways in the surrounding area. Providing connectivity to the public and residents into existing scenic reserves, future proof bus-compatible route for school bus picks up and an active mode infrastructure alternative. This is further assessed in the CKL report.

Both Department of Conservation and Bike Taupō have been consulted over this proposal and have provided their feedback.

7.5 Vehicle Access

Given the length of the lot frontage of these Low Density Lots, there is sufficient space for compliant vehicle accesses to be created to all lots.

Therefore, as part of the Building Consent application by Future homeowners. In accordance with TDC CoP Plan 8 Property Access Residential Vehicle access and driveways shall be formed and sealed with an all-weather surface with provision for stormwater to be collected and retained within the site to meet the 10% event.

8. WATER SUPPLY SERVICING

At the time of writing this, Taupō District Council had completed the Capacity Upgrades Water Networks Renewals on Mapara Road extending across the intersection with Kaiapo Road and 20m into Kaiapo Road. The upgrade consists of a New 180mm watermain pressure pipe (DN180 PE100PN16) upgrading existing asbestos cement smaller sizes. The upgrade extends from Kaiapo Road to Highland Drive where the pipe joins to the existing watermain DN225 pressure pipe. The new watermain pipe meet the requirements and standards for delivering safe drinking water of the Water Services Authority, Taumata Arowai, our national drinking water regulator.

The existing water infrastructure cannot service this development. As for other disciplines, a specialist was engaged by Breda to provide a Water Supply Modelling for this additional 320 Lots. WSP (Consultant for Taupō District Council) was engaged to assess the effect of this development on the current water infrastructure, identify infrastructure upgrades, analyse results of the upgrades and provide recommendations for infrastructure upgrade including minimum pipe sizing.

Upgrade		Maximum Flow (L/s)	Internal Diameter (mm) Required For Maximum Headloss of 3 m/km
#1	Blueridge Drive/Mapara Road Intersection → Near Chestnut Grove	15	228
#2	Chestnut Grove → Highland Drive / Mapara Intersection	10.5	197
#3	Highland Drive/Mapara Road Intersection → Kaiapo Road/Mapara Road Intersection	13	215
#4	Kaiapo Road / Mapara Road Intersection → Kaiapo Development	10.5	197

Figure 11: Summary of Tentative Upgrades. (Source: WSP Report)

Recommendation for infrastructure upgrades will be discussed with TDC.

This development is proposed to be connected to the public water supply. This has been modelled to provide trickle feed connection at 1.2 Litres per property per minute with backflow prevention. As part of the detailed design, the network water supply pipe design will be provided to allow for the staging construction to ensure water can be supplied at each stage and there are no issues with water supply for the existing lots. All sites will have a minimum 24hours of water storage in addition to any storage required to manage daily peak demand.

Land can be made available to Taupō District Council for a water reservoir as and when required for improvements.

A new watermain pipe entering and looped around the site with a preliminary size of DN225 PE100 PN16 will be extended throughout this development to provide satisfactory pressure to the series of rider mains. Which in turn will extend along the road and to the head of the cul-de-sacs looping back to avoid dead ends. Future property owners will install a storage water supply tank from the new water metered connection from Council supply 'trickle' feed into the tank, providing enough water to be available from the tank for normal use. This is sometimes pumped out of the tank, or utilising gravity if the tank is placed higher than the house.

There are no requirements to provide firefighting in the network for rural areas. Therefore, no fire hydrants are provided within the site. It is expected that firefighting supply, as with other rural areas, will consist of the storage water tank required on all lots will be used for firefighting. The minimum tank volume of water stored onsite will be define as part of the consent condition in accordance with NZS 4509 for non-sprinklered housing structures, therefore classified as FW2 as per Table 1 NZS4509 and to the requirements of TDC water manager.

Refer to Appendix 2 for WSP Kaiapo Development Water Supply Modelling dated 6 March 2023 with Addendum 1 additional development scenario(this proposal).

9. POWER

We have requested comments from both Chorus and Unison regarding the ability to supply the respective services.

Power Supply

Existing overhead power exists along the northern boundary and along to Kaiapo Road and Mapara Road, some of these were identified as possibly requiring relocation for road access.

It is expected the site to be serviced by underground common services trenches along berms networks of roads and cul-de-sacs. Transformers and other equipment will be located inside the road reserve at the boundary. Unison will be engaged to provide a detailed design of the power reticulation. Easements in gross to Unison will be provided as required by the network operator.

10. STREET LIGHTING

As for rural subdivisions, streetlights will only be provided at the intersection of roads.

The specific lighting post and luminaire design will be carried by a qualified designer including a certificate to the TDC Code of Practice requirements, as part of the detailed design.

11. DISCLAIMER

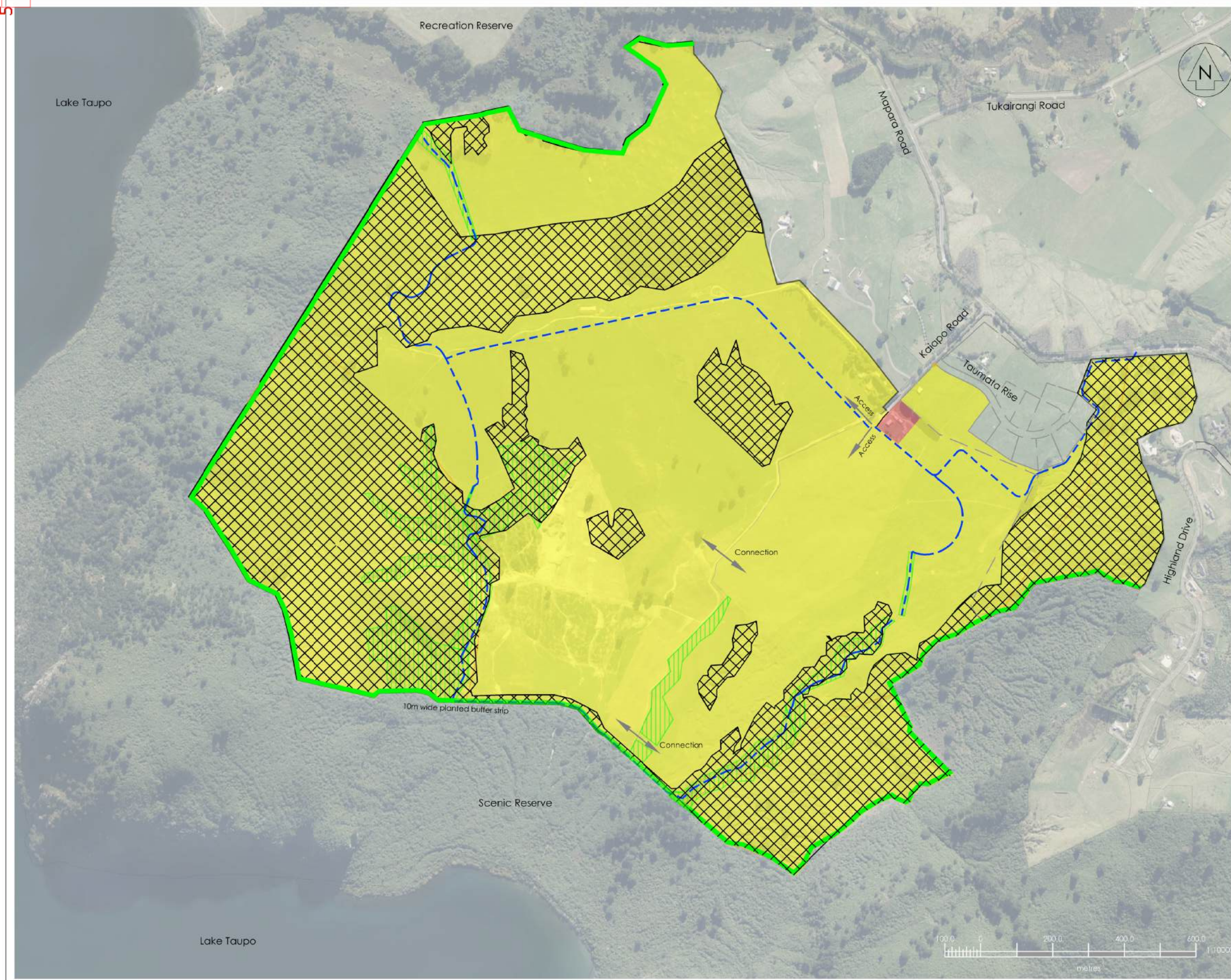
This Report has been prepared solely for the use of our client with respect to the particular brief given to Cheal Consultants Limited.

No liability is accepted in respect of its use for any other purpose or by any other person or entity.

CHEAL CONSULTANTS LIMITED

Appendix 1

Cheal Drawing
220205-CP001: Outline
Development Plan



www.cheal.co.nz

DISCLAIMER

This drawing has been prepared to support a submission for a residential plan change and shall not be used for any other purpose.

Aerial Imagery has been obtained from LINZ Data Service and is provided under a Creative Commons Public License. It has been provided as a guide to where the boundaries or other features are positioned, or proposed on the ground, but may not be absolute.

Key:

- Residential Low Density Zone
- Neighborhood Centre Zone
Maximum floor area 300m²
- Natural Hazard Areas
- Gully planting, stormwater,
Pedestrian/Cycleway access
- Pedestrian/Cycle path
- Access and connectivity
- 10m wide planted buffer strip

A	06/04/26	For Information	AGM	CE	SH
Rev	Date	Amendment	By	Chk	App

Project Title
Breda Investments Limited
and E.F. Deadman Limited
Kaiapo Road, Taupo

Drawing Title
Outline Development Plan

Surveyed			
Designed	A. Moss	06/04/26	AGM
Drawn	A. Moss	06/04/26	AGM
Checked	C. Eagles	06/04/26	CE
Approved	S. Hunt	06/04/26	SH

Status **INFORMATION**

Scale	A1	1:5000	A3
	A3	1:10000	

Drawing Number
220205-CP001
Rev
A

Appendix 2

WSP Kaiapo Development
Water Supply Modelling
dated 6 March 2023 with
Addendum 1

Project Number: 2-38026.02

Kaiapo Development

Water Supply Modelling

6 March 2023

CONFIDENTIAL



Contact Details

Joseph Monk

WSP
Unit 3
Level 1
80 Tūwharetoa Street
Taupō 3330
+64 7 378 0746
+64 27 218 0109
joseph.monk@wsp.com

Document Details:

Date: 6/03/2023
Reference: 2-38026.02
Status: Issued

Prepared by



Joseph Monk

Reviewed by



Jivir Vijakesparan

Approved for release by



Garren Soutar



Document History and Status

Revision	Date	Author	Reviewed by	Approved by	Status
1	21/10/2022	J. Monk	J. Viyakesparan	P. Quinn	Issued
2	31/10/2022	J. Monk	J. Viyakesparan	P. Quinn	Issued
3	24/02/2023	J. Monk	J. Viyakesparan	G. Soutar	Issued

Revision Details

Revision	Details
1	First issue
2	Correcting model error related to Kaiapo development demand pattern
3	Added addendum for additional development scenario



Contents

Disclaimers and Limitations	1
1 Introduction	2
2 Model Setup	3
2.1 General Setup	3
2.2 Current + Future Development Demand	4
2.3 SCADA Data Provided	5
2.4 Current Day Model Issues	6
3 Initial Results	7
3.1 Minimum Pressures	8
3.2 Maximum Pressures	8
3.3 Headloss	8
4 Upgrades Proposed	9
4.1 Headloss Criteria	9
4.2 Reticulation Upgrades	9
4.3 Operational Upgrades	10
5 Results with Proposed Upgrades	11
6 Recommendations	12
7 Additional Model Information	15
7.1 Pump Curves	15
7.2 Demand Patterns	16
8 Polyethylene Pipe Internal Diameters	18
9 Background	20
10 Modelling Setup	20
11 Results	20
12 Conclusion	23

List of Figures

Figure 1 – Development Scheme Plan	2
Figure 2 - Development Location	2
Figure 3 – Network Layout + Assets Within Mapara Supply Area	3
Figure 4 - Blueridge Reservoir + Pump Station Layout	3
Figure 5 - Cherry Lane Reservoir + Pump Station Layout	3
Figure 6 - Development Locations	4



Figure 7 - Reservoir Levels + Pump Station Flowrate	5
Figure 8 - Current Day - Cherry Lane Pumps Station Flowrate	6
Figure 9 - Current Day - Blueridge Reservoir Level	6
Figure 10 - Current Day - Cherry Lane Pump Station Operating Points	6
Figure 11 - Current Day - North End of Kaiapo Road – Pressures (m)	6
Figure 12 - Current Day - North End of Tukairangi Road – Pressures (m)	6
Figure 13 - Future Day (incl Kaiapo Development) - Minimum Pressures (m)	7
Figure 14 - Future Day (incl Kaiapo Development) - Maximum Pressures (m)	7
Figure 15 - Future Day (incl Kaiapo Development) - Maximum Headloss (m/km)	8
Figure 16 - Future Day - Cumulative Flow (L)	9
Figure 17 - Current Day - Cumulative Flow (L)	9
Figure 18 - Current Day - Flowrate (L/s)	9
Figure 19 - Mapara Road (middle) – Existing Pipe Sizes	9
Figure 20 - Mapara Road (middle) - Future Day - Pipe Flow (L/s)	9
Figure 21 - Upper Mapara Road - Pipe Sizes	10
Figure 22 - Upper Mapara Road - Future Day Flow (L/s)	10
Figure 23 - Kaiapo Road - Future Day Flow (L/s)	10
Figure 24 - Pipe Layout – Blueridge Drive	11
Figure 25 - Blueridge Drive – Future Day Flow (L/s)	11
Figure 26 - Future Day (incl Kaiapo Development + Upgrades) - Maximum Headloss (m/km)	11
Figure 27 - Future Day (incl Kaiapo Development + Upgrades) – Maximum Pressure (m)	11
Figure 28 - Future Day (incl Kaiapo Development + Upgrades) – Minimum Pressure (m)	12
Figure 29 - Current Day – (incl Upgrades) - Pressures at Kaiapo Development (m)	12
Figure 30 - Future Day – (incl Upgrades) - Pressures at Kaiapo Development (m)	12
Figure 31 - Cherry Lane Pump – Lowara Xylem 10SV09F040T – Pump Curve	15
Figure 32 - Blueridge Pump – Grundfos CR 15-12 A-F-A-E-HQQE – Pump Curve	15
Figure 33 - Demand Pattern Distribution	16
Figure 34 - Cherry Lane Domestic Metered / Unmetered Demand - Pattern	16
Figure 35 - Farm - Demand Pattern	16
Figure 36 - Expanded Development Area	20
Figure 37 - Hydraulic Grade Line - 6:15 PM - 320 Lots Scenario (Future)	20
Figure 38 - Cherry Lane PS- Future Day Flows (L/s)	21
Figure 39 - Cherry Lane PS - Cumulative Flows (L)	21
Figure 40 - Cherry Lane PS – Excluding Kaiapo Development - Pump Performance	21
Figure 41 - Cherry Lane – Future Day – Excluding Kaiapo Development	21
Figure 42 - Indicatory Upgrade Sizes	22

List of Tables

Table 1 - Reservoir + Pump Information	3
Table 2 – Pump Station Controls – Info	4
Table 3 - Mapara Water Scheme Developments	5
Table 4 - Development Upgrade Summary	12
Table 5 - AS-NZS 4130-2018 Average Internal Diameters	18
Table 6 - Tentative Upgrades	23

Disclaimers and Limitations

This report ('**Report**') has been prepared by WSP exclusively for Taupō District Council ('**Client**') in relation to Water Supply Modelling of Proposed Development ('**Purpose**') and in accordance with the Conditions of Contract for Consultancy Services (CCCS) for professional service engagement signed as part of the Strategic Consultant Panel Contract TDC/2021/383 between Taupō District Council and WSP. The findings in this Report are based on and are subject to the assumptions specified in the Report and our Offer of Services dated 19th August 2022. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

In preparing the Report, WSP has relied upon data, surveys, analyses, designs, plans and other information ('**Client Data**') provided by or on behalf of the Client. Except as otherwise stated in the Report, WSP has not verified the accuracy or completeness of the Client Data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this Report are based in whole or part on the Client Data, those conclusions are contingent upon the accuracy and completeness of the Client Data. WSP will not be liable in relation to incorrect conclusions or findings in the Report should any Client Data be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

1 Introduction

A developer has submitted a resource consent application to Taupō District Council (TDC) to construct a new subdivision in the south-west of Acacia, Taupō. The development is planned to consist of 39 rural lots, be accessed from Kaiapo Road, and connected to the central Taupō water supply scheme.

This water modelling assessment is completed as part of a section 92 request from TDC.

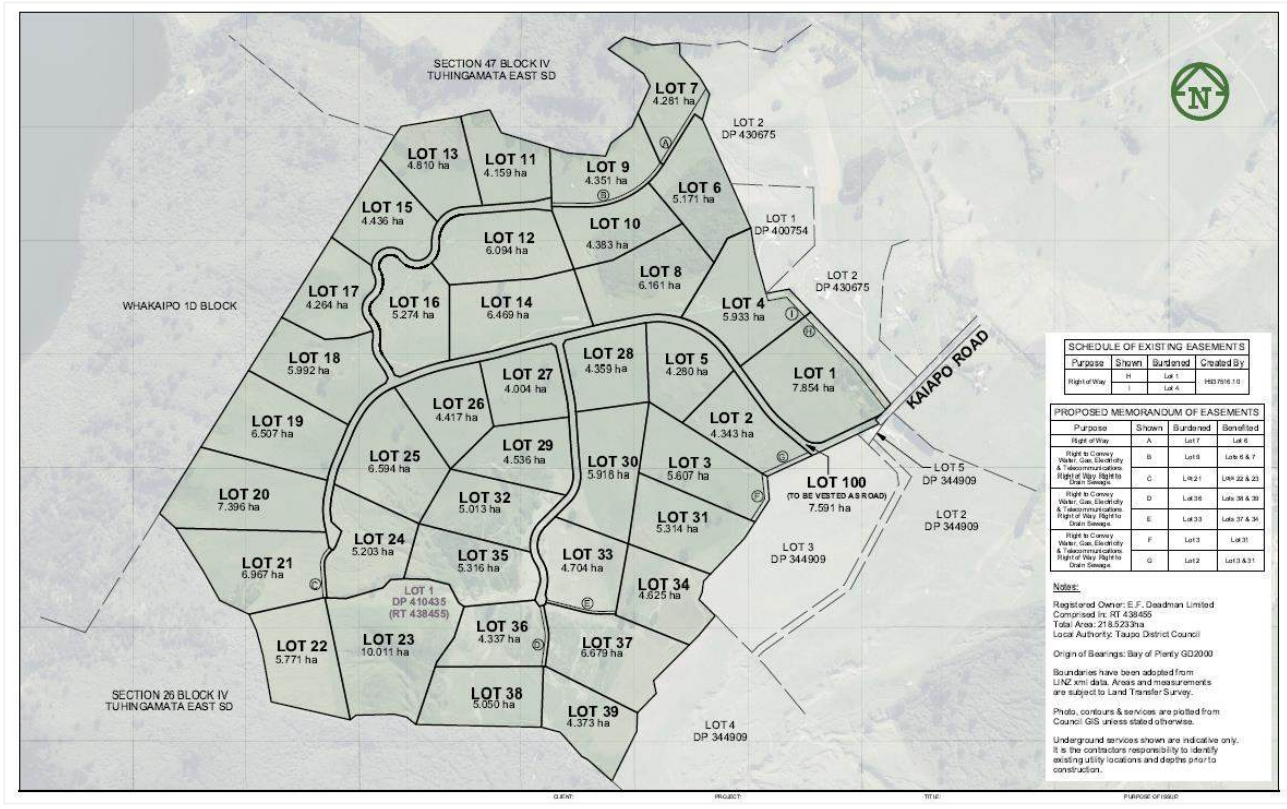


Figure 1 – Development Scheme Plan



Figure 2 - Development Location

2 Model Setup

The existing Taupō Kinloch Infoworks WS Pro 4.5.5 peak current and future day 24 hr models were used. Asset information and controls were re-verified. TDC water asset management team provided asset information, live data, controls and demands to assist in this process.

2.1 General Setup

The following aspects are consistent between the current and future day models.

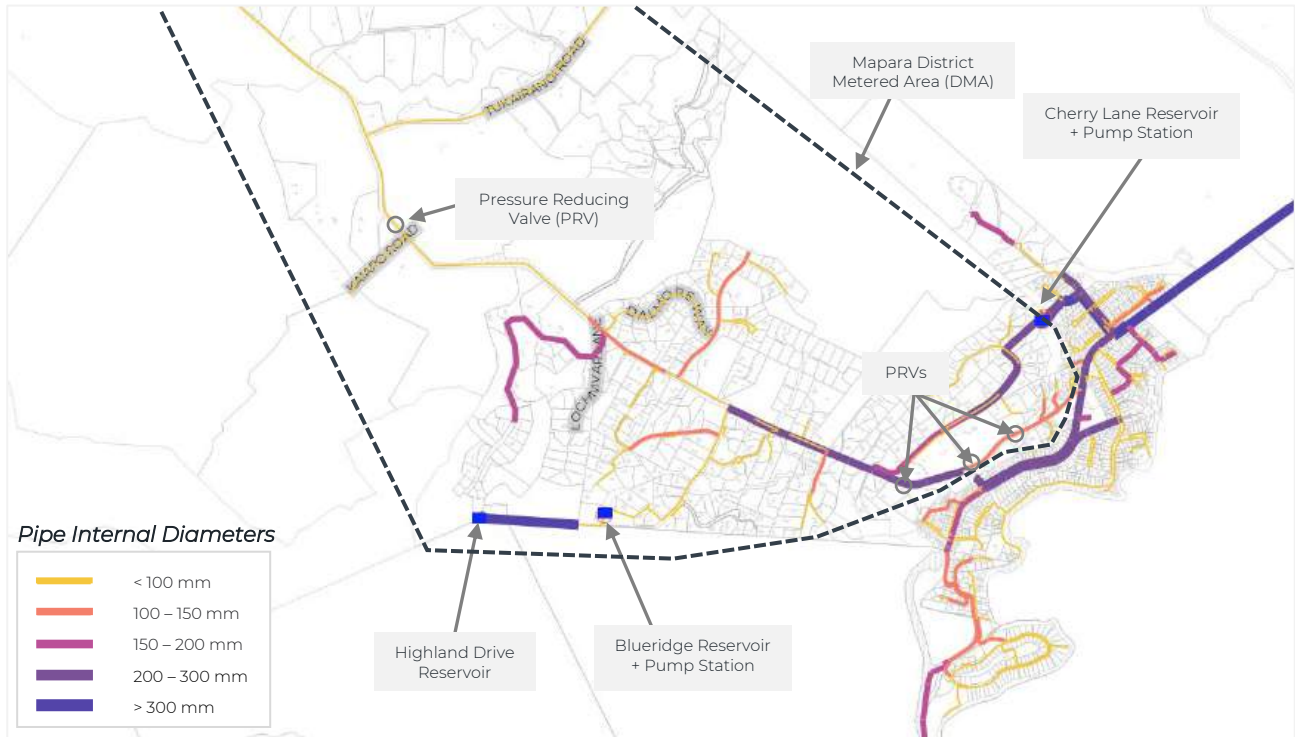


Figure 3 – Network Layout + Assets Within Mapara Supply Area

Table 1 - Reservoir + Pump Information

	Blueridge Reservoir + Pump Station	Cherry Lane Reservoir + Pump Station
Network Layout	Figure 4 - Blueridge Reservoir + Pump Station Layout	Figure 5 - Cherry Lane Reservoir + Pump Station Layout

	Blueridge Reservoir + Pump Station	Cherry Lane Reservoir + Pump Station
Reservoir Volume	45 m ³	2000 m ³
Reservoir Height	2.7 m	7.25 m
Reservoir Elevation	604.57 m AD	437.78
Pump(s)	2x Pumps Lowara Xylem 10SV09F040T Duty // Assist	3x Pumps Grundfos CR 15-12 A-F-A-E-HQQE ¹ Duty // Assist // Assist

The Cherry Lane pump station On/Off levels have been set so that Blueridge Reservoir is filled gradually to minimise high flows and pipe headloss. Table 2 shows the current pump controls.

Table 2 – Pump Station Controls – Info

Name	Level Control	Time Control	Other Control	Control Type	Pumps	On Level	Off Level	Min RPM	Max RPM
Cherry Lane Pump Station	Blueridge Reservoir	X	X	AUTO	#1	70%	85%	3000	3400
					#2	65%	85%		
					#3	50%	85%		
Blue Ridge Pump Station	Highland Drive Reservoir	X	X	AUTO	#1	80%	90%	2950	
					#2				

2.2 Current + Future Development Demand

The following locations are current or future Mapara DMA developments with allocated demand. All development locations have been assigned a constant demand profile as tabulated in Table 3.



Figure 6 - Development Locations

¹ This pump selection is assumed.

Table 3 - Mapara Water Scheme Developments

Development / Location Name	Connection Point	Current Properties	Future Properties	Current Demand (L/property/min)	Future Demand (L/property/min)
Lens Way / Vickers Way	Nearest point on Mapara Road	50	150	1.2	1.2
Highland Drive (North)	Future growth pipe connecting to Mapara Road	18	25	1.2	1.2
Highland Drive (South)	Existing pipe west of Blue Ridge Reservoir	20	50	1.2	1.2
15 Kaiapo Road	Nearest point on Kaiapo Road	12	30	1.7	1.7
37 Kaiapo Road	Nearest point on Kaiapo Road	12	30	1.7	1.7
40 Kaiapo Road	End of Kaiapo Road	0	39	N/A	1.7
Acacia Bay Area B	North end of Loch Views Road	0	20	N/A	1.2
Tukairangi Road	Middle of Tukairangi Road	0	25	N/A	1.2

40 Kaiapo Road is modelled as a single node at elevation 570 m AD.

2.3 SCADA Data Provided

To assist with model setup, pump station flow rates and reservoir levels were provided by TDC over a period of approximately three days (Figure 7). It is unknown when this data was collected.

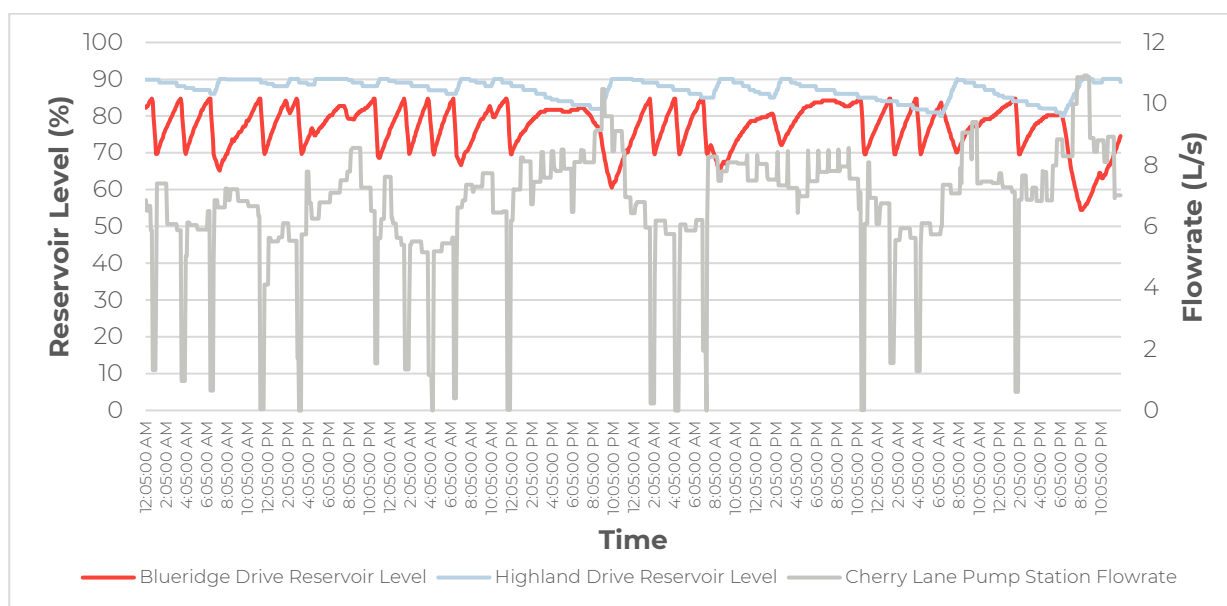


Figure 7 - Reservoir Levels + Pump Station Flowrate

The Blue Ridge Reservoir is refilled approximately five times a day, with the Cherry Lane pump station producing an average flow of ~ 8 L/s, with short ~ 20-minute intervals where the pumps turn off entirely.

This SCADA data closely mirrors the setup of the current day model setup. In the model Blueridge reservoir drains faster as the model's peak day demand is expected to be higher than the average day demand shown in than SCADA data, leading to higher peak flows, more reservoir refills and more erratic pump behaviour.

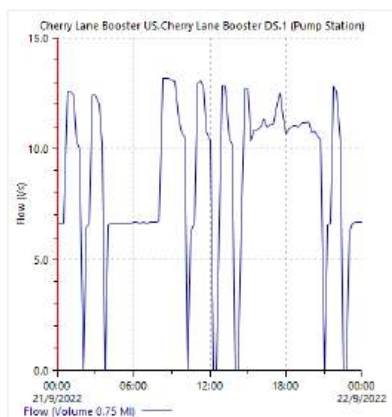


Figure 8 - Current Day - Cherry Lane Pumps Station Flowrate

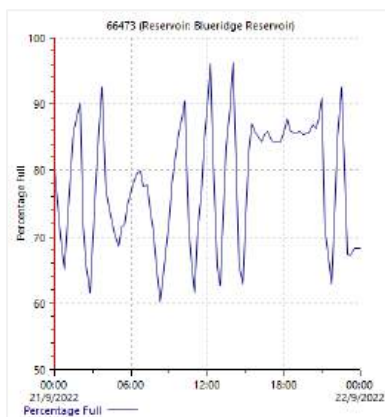


Figure 9 - Current Day - Blueridge Reservoir Level

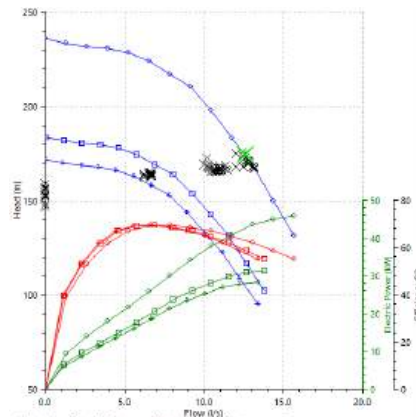


Figure 10 - Current Day - Cherry Lane Pump Station Operating Points

2.4 Current Day Model Issues

The model experiences negative pressures at two locations: at the north end of both Kaiapo Road and Tukairangi Road.

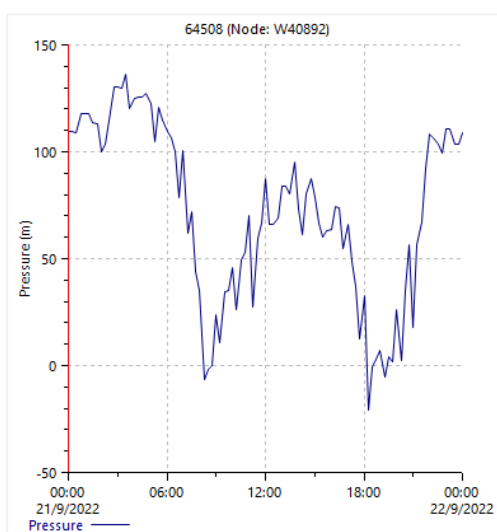


Figure 11 - Current Day - North End of Kaiapo Road - Pressures (m)

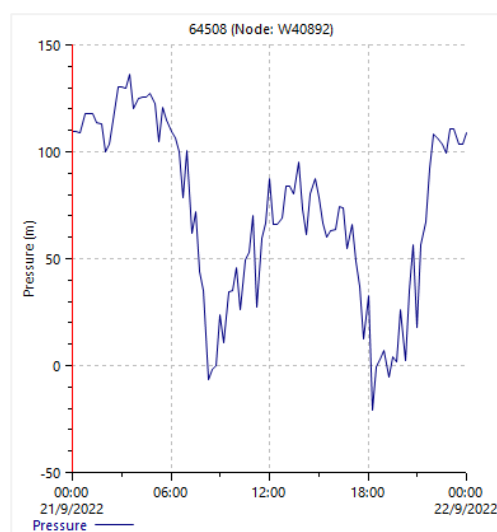


Figure 12 - Current Day - North End of Tukairangi Road - Pressures (m)

This reason for this is undetermined and could be due to a combination of reasons:

- 1) *Inadequate calibration of storage tanks at properties* This could lead to a greater storage capacity in the network than currently modelled. This would lead to a flatter demand profile and lower peak demands.
- 2) *Uncertainty with PRV operation within network* The PRV at the end of Kaiapo Road has been setup as a theoretical curve. This may not operate as expected.

- 3) Inaccuracy in Model Build/Calibration** The Bluebridge reservoir and pump station layout was not confidentially understood at the time of model setup and calibration in 2019. This may operate differently than expected.
- 4) Actual Pressure Issues** The negative pressure issues may be currently experienced by customers and be unreported due to storage tanks at properties.

With regard to these model issues, WSP are confident that the overall network operation is still modelled adequately to make asset recommendations.

3 Initial Results

The following results are for the peak day future model including Kaiapo Development.

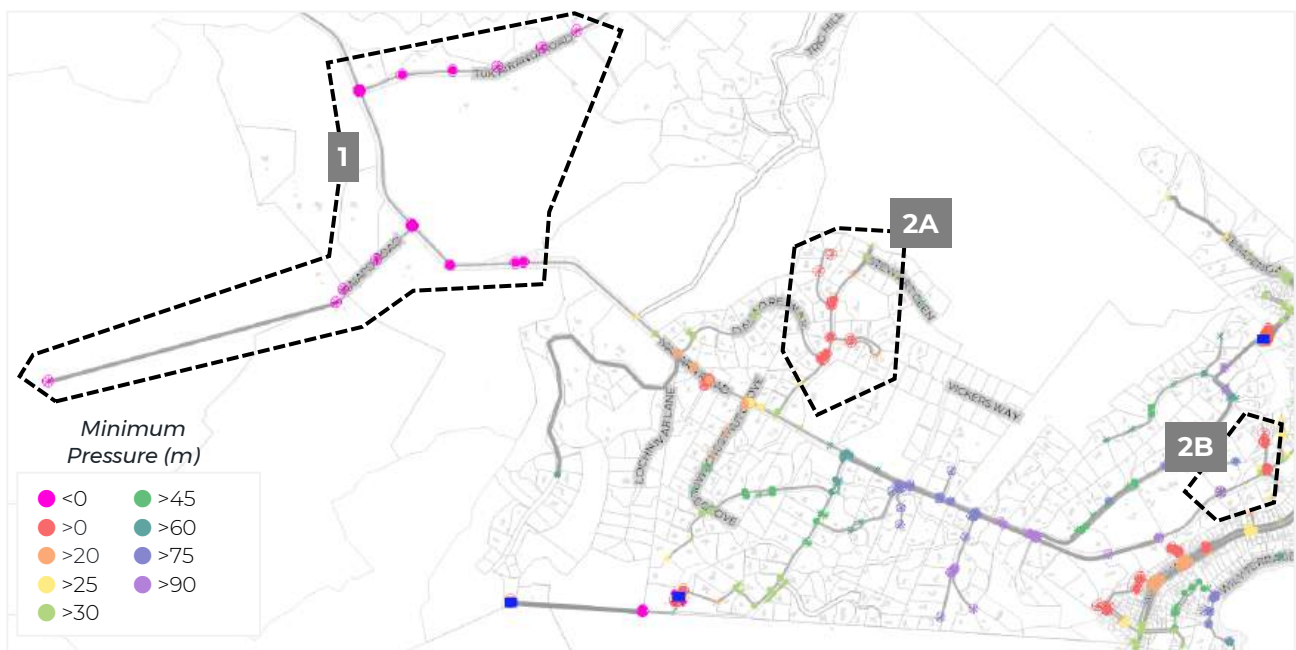


Figure 13 - Future Day (incl Kaiapo Development) - Minimum Pressures (m)

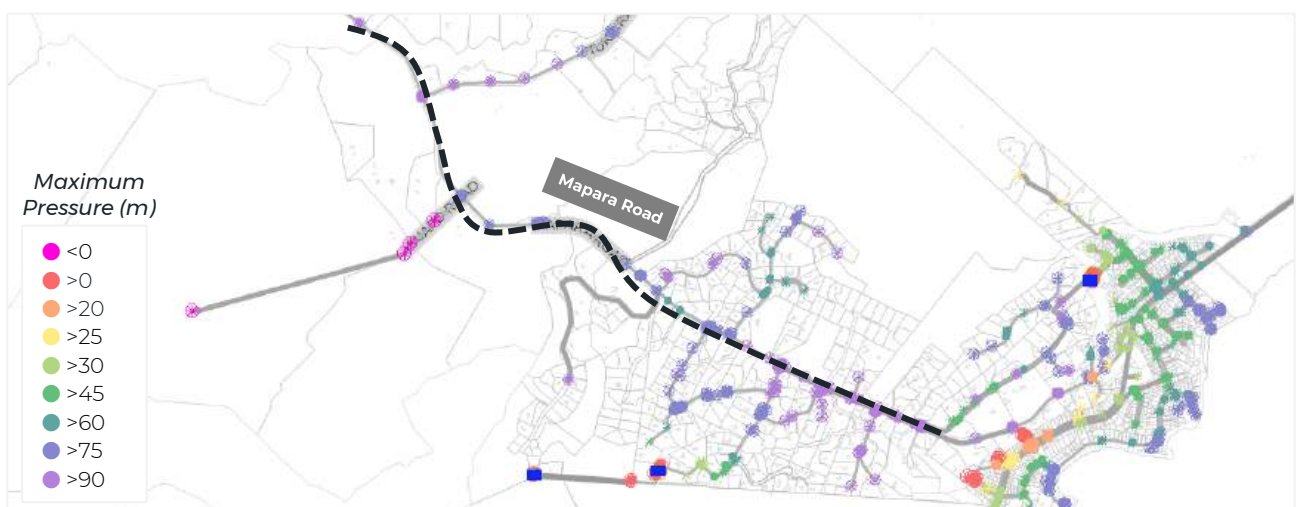


Figure 14 - Future Day (incl Kaiapo Development) - Maximum Pressures (m)

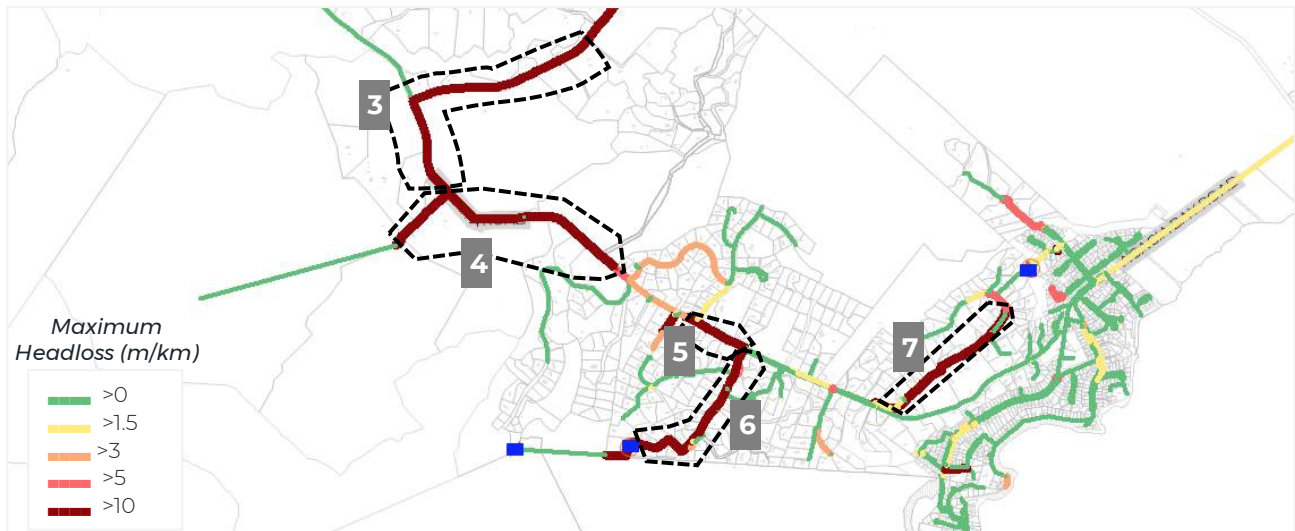


Figure 15 - Future Day (incl Kaiapo Development) - Maximum Headloss (m/km)

3.1 Minimum Pressures

There are multiple locations with minimum pressure issues.

- 1) These areas are the negative pressure issues discussed in section 2.4 and are significantly worse due to the increase in demand.
- 2)
 - (A) The pressures in this area dips significantly when the flow along Blueridge Drive changes direction. This drop in pressure occurs for 10-20 minutes while the network switches from being fed by the pump station versus fed from the reservoir.
 - (B) The pressures in this area do not meet minimum pressures downstream of the pressure reducing valves (PRV).

3.2 Maximum Pressures

The north end of Mapara Road experiences pressures between 0 – 50 m pressure and spikes to pressures of 75 m at the start of the day.

The southern end of Mapara Road typically has average pressures ~ 110 m, with significant dips while the network switches from being fed by the pump station versus fed from the reservoir.

3.3 Headloss

There are several areas where the network experiences high headlosses. Problem areas recommended for upgrade are shown with detail in later sections when assessing the proposed solutions.

- 3) This area is outside the project scope.
- 4) This area is directly affected by the Kaiapo Development and is recommended for upgrades.
- 5) This area is directly affected by the Kaiapo Development and is recommended for upgrades.

6) This area is the pipes along Blueridge Road feeding Blueridge reservoir.

- The total daily flows along this section are not significantly impacted by Kaiapo Development in the current or future models. The development has a minor contribution in making the reservoir operate more erratically.
- The current day peak flows to the Reservoir are not impacted by Kaiapo Development.

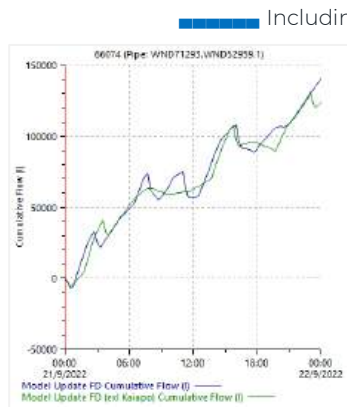


Figure 16 - Future Day - Cumulative Flow (L)

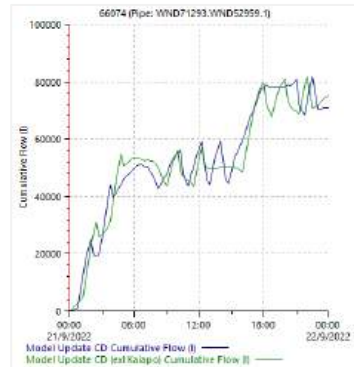


Figure 17 - Current Day - Cumulative Flow (L)

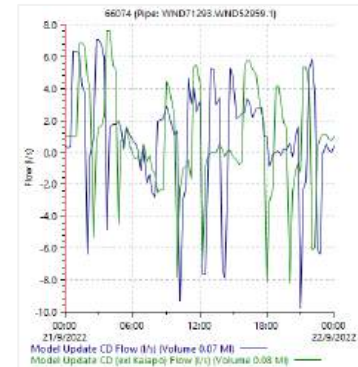


Figure 18 - Current Day - Flowrate (L/s)

7) This area is not impacted by Kaiapo Development. It is a pipe parallel to the rising main that feeds Blueridge Reservoir.

4 Upgrades Proposed

4.1 Headloss Criteria

NZS 4404 6.3.5.4 specifies the following minimum headloss requirements:

- $DN \leq 150 - 3 \text{ m/km}$
- $DN \geq 200 - 5 \text{ m/km}$

A Darcy Weisbach friction factor of 0.1 mm is assumed for new pipe upgrades for the future day modelling. Upgrades have been based on meeting headloss criteria requirements.

4.2 Reticulation Upgrades

5) To meet 5 m/km headloss, a minimum internal diameter of 155 mm at 7.35 L/s is required.



Figure 19 - Mapara Road (middle) - Existing Pipe Sizes

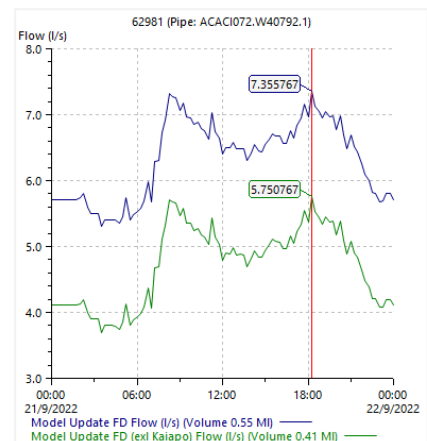


Figure 20 - Mapara Road (middle) - Future Day - Pipe Flow (L/s)

- 4) To meet 5 m/km headloss a minimum internal diameter of 131 mm at 4.9 L/s is required along Mapara Road. This connects from the top of Kaiapo Road to Highland Drive intersection.

To meet 5 m/km headloss a minimum internal diameter of 113 mm at 3.35 L/s is required along Kaiapo Road.

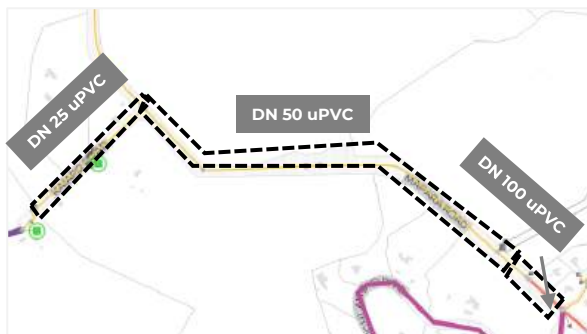


Figure 21 - Upper Mapara Road - Pipe Sizes

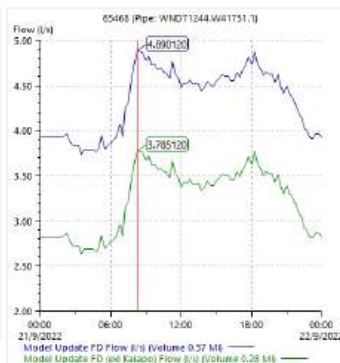


Figure 22 - Upper Mapara Road - Future Day Flow (L/s)

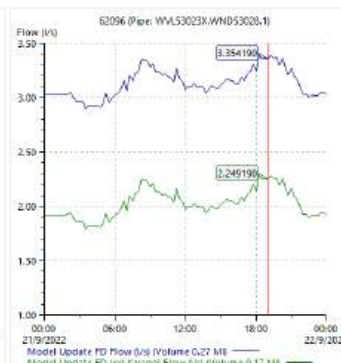


Figure 23 - Kaiapo Road - Future Day Flow (L/s)

4.3 Operational Upgrades

4.3.1 Blueridge Reservoir Size

The existing Blueridge Reservoir is significantly undersized to service this network. The current reservoir refills 4-5 times per day.

New Zealand Industry guidance suggest reservoirs should typically refill 1-2 times per day and have storage for whichever is greater of: 24-hour peak day demand plus 20%; or two times average day demand.

4.3.2 Blueridge Reservoir Supply

There is significant flow reversal and fast drops in pressure while the network switches from being fed by the Cherry pump station versus fed from Blueridge reservoir. This is detrimental to reticulation and can significantly increase leakage at fittings.

There are a number of potential options that could improve supply arrangement. This could include the following suggestions, or other undetermined options.

- Direct rising main from Mapara Road to Blueridge reservoir.
 - This has the potential for a new valve setup at Mapara Road / Blueridge Drive intersection for Blueridge Reservoir to exclusively feed western properties
- Addition of float valve, with Blueridge reservoir operating as emergency storage permanently or at certain times

4.3.3 Blueridge Reservoir Existing Pipeline

To meet 5 m/km headloss a minimum internal diameter of 175 mm at 10 L/s (peak flow) is required along Blueridge Drive. A minimum internal diameter of 115 mm is required at 3.5 L/s (average flow).

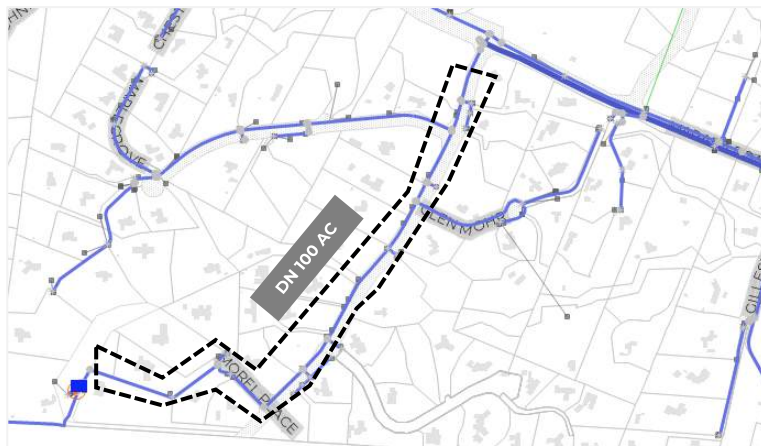


Figure 24 – Pipe Layout – Blueridge Drive

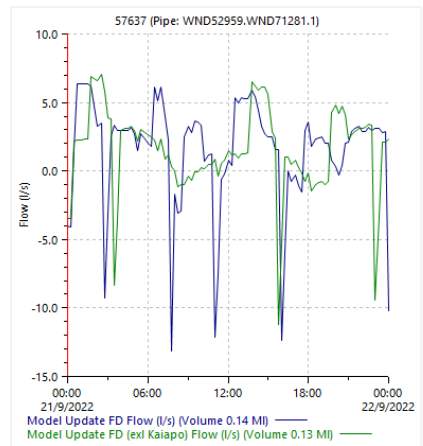


Figure 25 – Blueridge Drive – Future Day Flow (L/s)

5 Results with Proposed Upgrades

All reticulation upgrades discussed in section 4.2 have been modelled in the future peak day model. Operational upgrades have not been included.

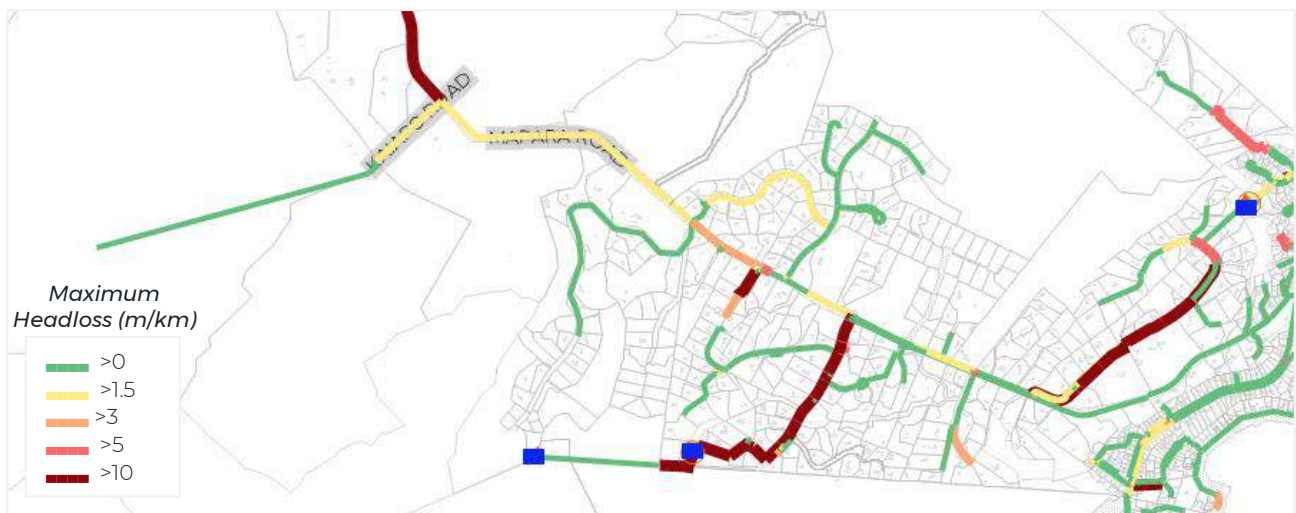


Figure 26 - Future Day (incl Kaiapo Development + Upgrades) - Maximum Headloss (m/km)

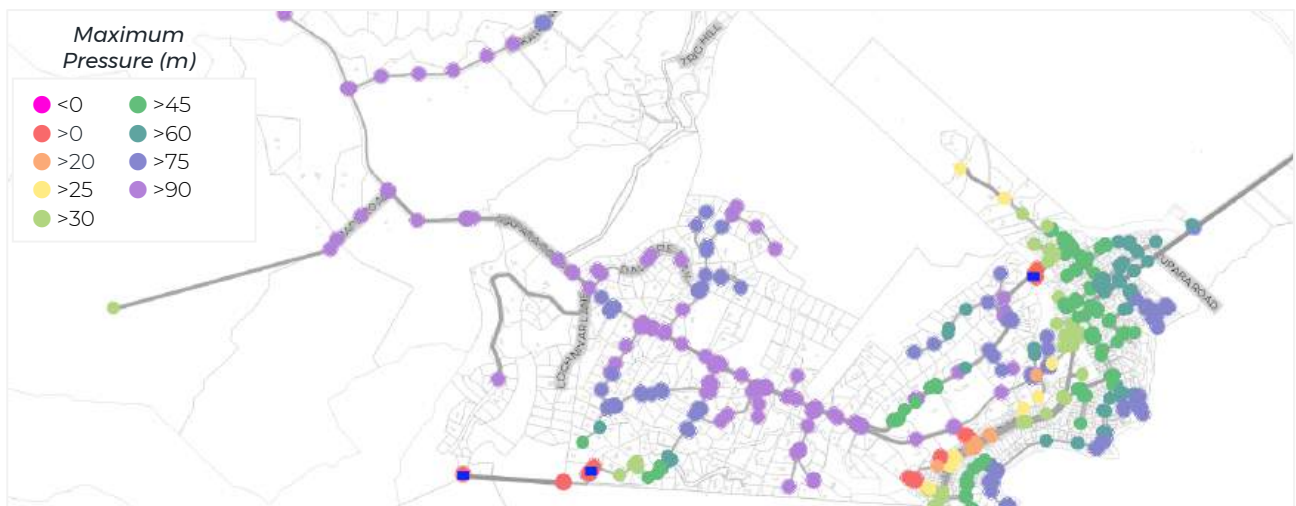


Figure 27 - Future Day (incl Kaiapo Development + Upgrades) – Maximum Pressure (m)



Figure 28 - Future Day (incl Kaiapo Development + Upgrades) – Minimum Pressure (m)

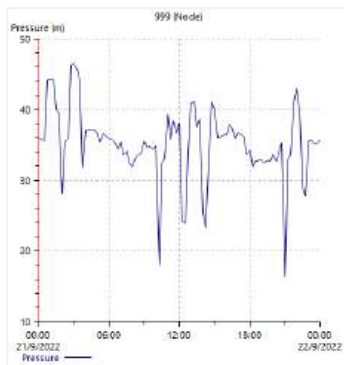


Figure 29 - Current Day – (incl Upgrades) - Pressures at Kaiapo Development (m)

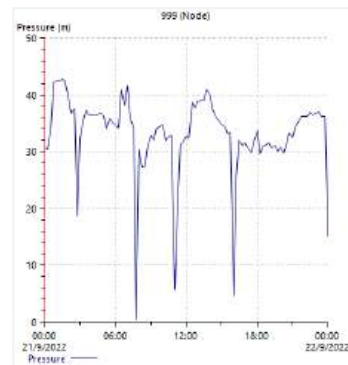


Figure 30 – Future Day – (incl Upgrades) - Pressures at Kaiapo Development (m)

The pressures at Kaiapo development average around 30 m. The significant dips are caused while the network switches from being fed by the Cherry Lane pump station versus fed from Blueridge reservoir.

6 Recommendations

The following upgrade summary should be used when designing upgrades required to service the development.

Table 4 - Development Upgrade Summary

Area	Shown In	Flow (L/s)	Internal Diameter Required For Headloss of:	
			5 m/km	3 m/km
Blueridge Drive/Mapara Road Intersection → Near Chestnut Grove	Figure 19	7.35	155 mm	171 mm

Area	Shown In	Flow (L/s)	Internal Diameter Required For Headloss of:	
			5 m/km	3 m/km
Highland Drive/Mapara Road Intersection → Kaiapo Road/Mapara Road Intersection	Figure 21	4.9	131 mm	145 mm
Along Kaiapo Road		3.35	113 mm	125 mm

With upgrades the development peak day pressures average 30 m with fluctuations to 20 m caused by changes in supply. These fluctuations should be resolved. A combination of options should be considered, these include:

- 1) Mitigation with on-site storage at Kaiapo development
- 2) Increase Blueridge reservoir size
- 3) Change of network supply arrangement/operation:
 - Direct rising main from Mapara Road to Blueridge reservoir.
 - This could include a new valve setup at Mapara Road / Blueridge Drive intersection for Blueridge Reservoir to exclusively feed western properties
 - Increased drawdown on Blueridge reservoir
 - Improving pumping / reservoir discharge scheduling
 - Addition of a float valve, with Blueridge reservoir operating as emergency storage permanently or at certain times
 - Other undetermined options

A surge analysis should be completed on the current network. This should include assessment of the current PRV operation, where accurate flow / headloss graphs should be determined.

Appendix A

Additional Model

Information

7 Additional Model Information

7.1 Pump Curves

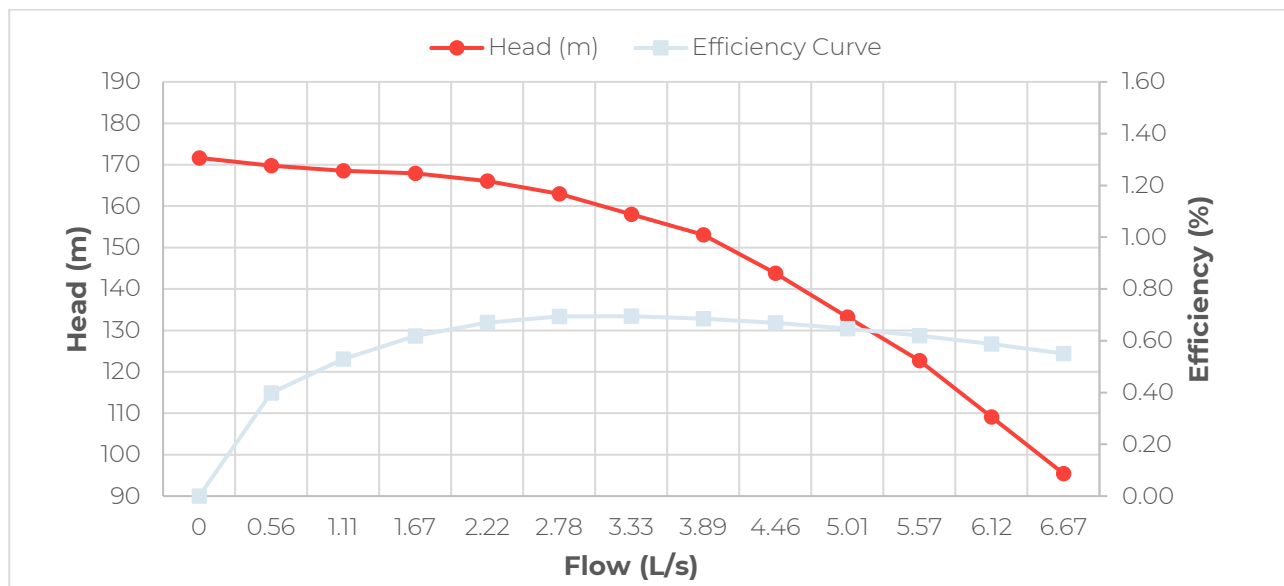


Figure 31 - Cherry Lane Pump – Lowara Xylem 10SV09F040T – Pump Curve

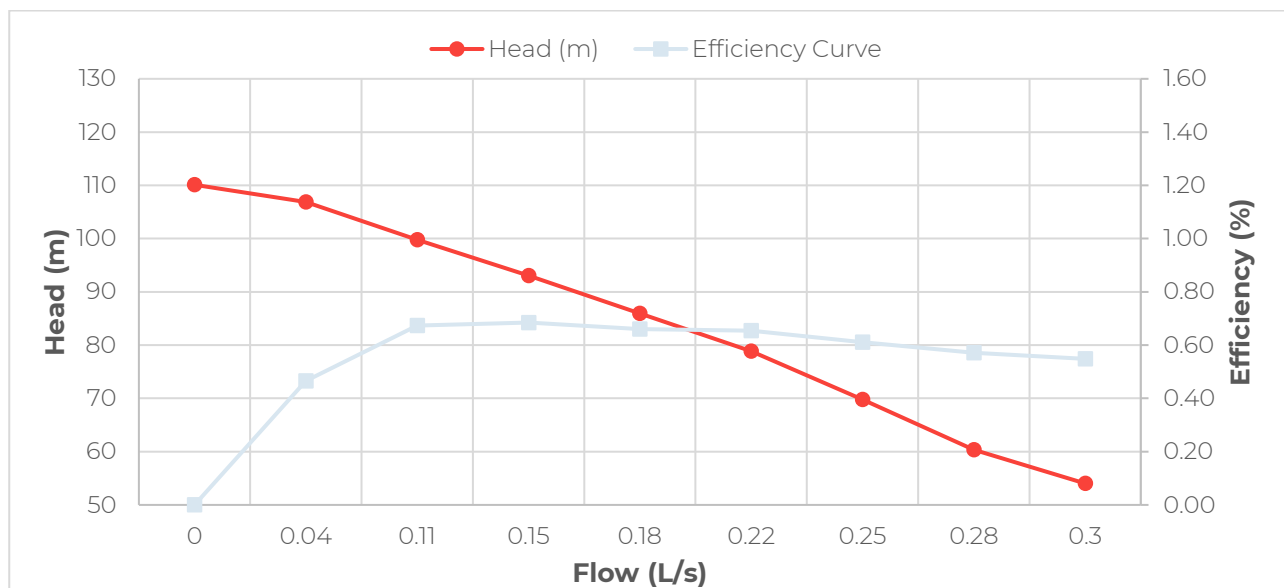


Figure 32 - Blueridge Pump – Grundfos CR 15-12 A-F-A-E-HQQE – Pump Curve

7.2 Demand Patterns

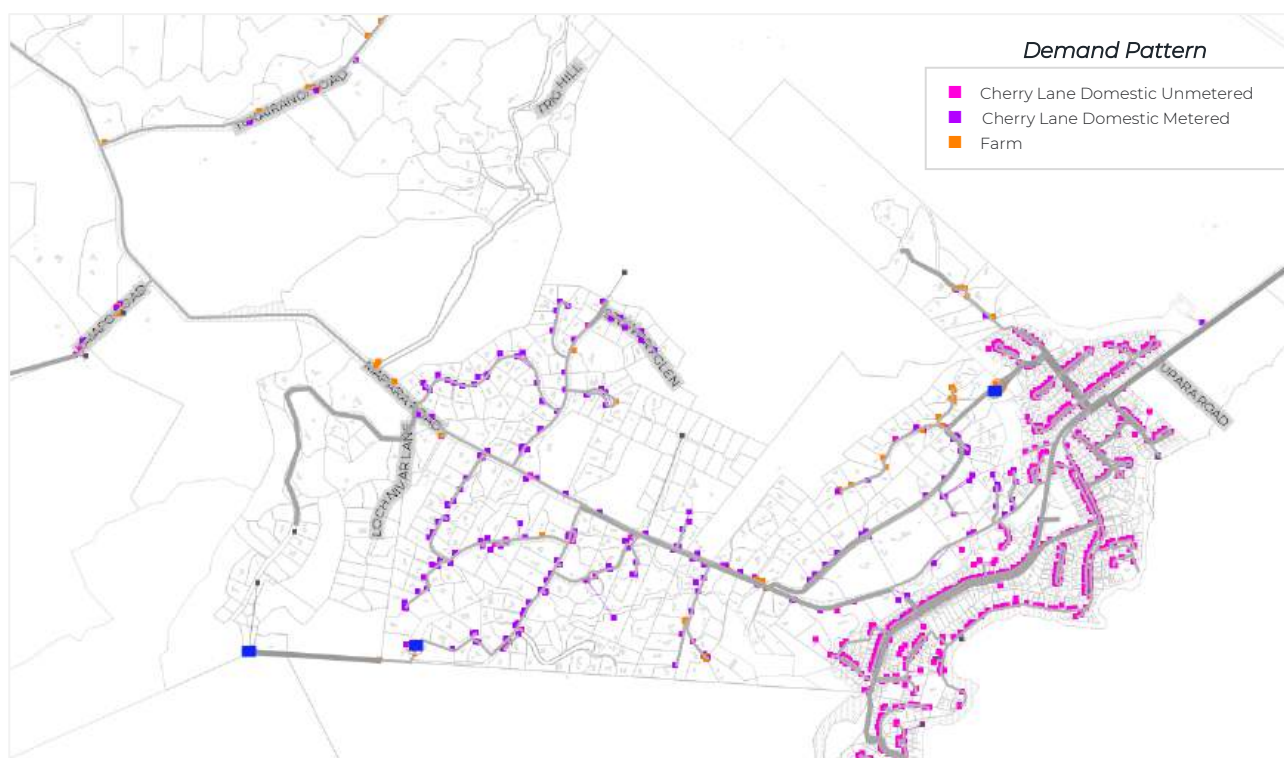


Figure 33 - Demand Pattern Distribution

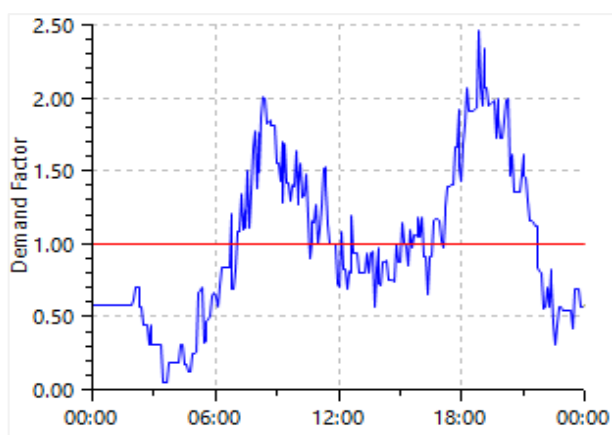


Figure 34 - Cherry Lane Domestic Metered / Unmetered Demand - Pattern

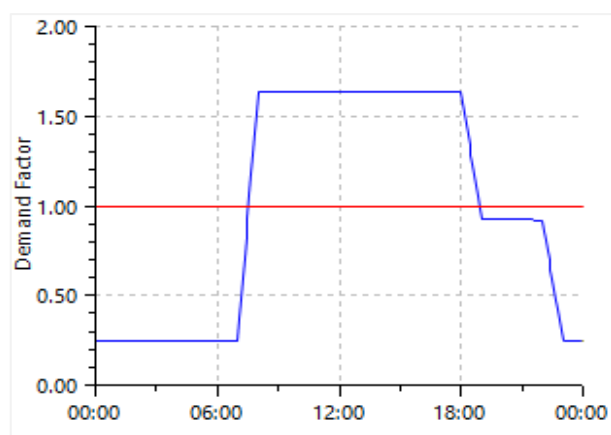


Figure 35 – Farm - Demand Pattern

Appendix B

Polyethylene Pipe Internal Diameters

8 Polyethylene Pipe Internal Diameters

Table 5 - AS-NZS 4130-2018 Average Internal Diameters

Nominal inside diameter DN	Mean outside diameter (D_m)	SDR17	SDR13.6	SDR11	SDR9	SDR7.4
		Mean inside diameter (D_i)	Mean inside diameter (D_i)	Mean inside diameter (D_i)	Mean inside diameter (D_i)	Mean inside diameter (D_i)
		Average	Average	Average	Average	Average
16	16.15	—	—	12.65	12.25	11.35
20	20.15	—	16.65	16.05	15.15	14.15
25	25.15	21.65	21.05	20.15	19.15	17.65
32	32.15	28.05	26.95	25.95	24.45	22.75
40	40.2	35	33.8	32.3	30.6	28.55
50	50.25	43.85	42.35	40.4	38.35	35.65
63	63.3	55.2	53.3	51	48.2	45.1
75	75.35	65.75	63.65	60.95	57.55	53.55
90	90.45	78.95	76.45	73.05	69.05	64.45
110	110.5	96.5	93.35	89.4	84.5	78.6
125	125.6	109.9	106.1	101.5	96.1	89.5
140	140.65	123.05	118.85	113.85	107.55	100.15
160	160.75	140.65	135.85	129.95	123.05	114.65
180	180.85	158.25	152.75	146.25	138.45	129.05
200	200.9	175.8	170.05	162.5	153.7	143.4
225	226.05	197.75	191.05	182.85	173.15	161.25
250	251.15	219.95	212.35	203.35	192.45	179.15
280	281.3	246.3	237.9	227.8	215.4	200.7
315	316.45	276.55	267.55	256.25	242.35	226.05
355	356.6	312.1	301.6	288.8	273.3	254.6
400	401.8	351.9	339.9	325.4	307.8	287
450	452.05	395.85	382.35	366.05	346.45	322.75
500	502.25	439.95	424.85	406.75	384.95	—
560	562.5	492.65	475.85	455.75	430.3	—
630	632.85	554.35	534.95	512.55	484.1	—
710	713.2	624.6	603.4	577.6	546.5	—
800	803.6	703.9	680	651	615.9	—

= Preferred TDC Pipe Sizes

= Conditionally Accepted TDC Pipe Sizes

Addendum 1 Additional Development Scenario

9 Background

Cheal Consultants approached TDC for an additional request to develop 320 new residential lots over 37 and 40 Kaiapo Road, with lot numbers 438,455 and 152,832, respectively. The original modelling assumed 39 lots over the original development area.

10 Modelling Setup

The Mapara scheme demands as outlined in Table 3 are unchanged. The 37 and 40 Kaiapo Road development is modelled with 'trickle feed connections' of 1.2 litres per property per minute, with a constant demand profile and as a single node at elevation 570 m AD. This is consistent with prior modelling.



Figure 36 - Expanded Development Area

11 Results

The Cherry Lane pump station cannot supply adequate head to fill Blueridge Reservoir when 320 lots are included. The increased demand causes the pump station to operate at maximum flow, outputting a lower pump head (Figure 40). At maximum demand (6:15 PM), this induces a 50 m head deficit at Blueridge reservoir.

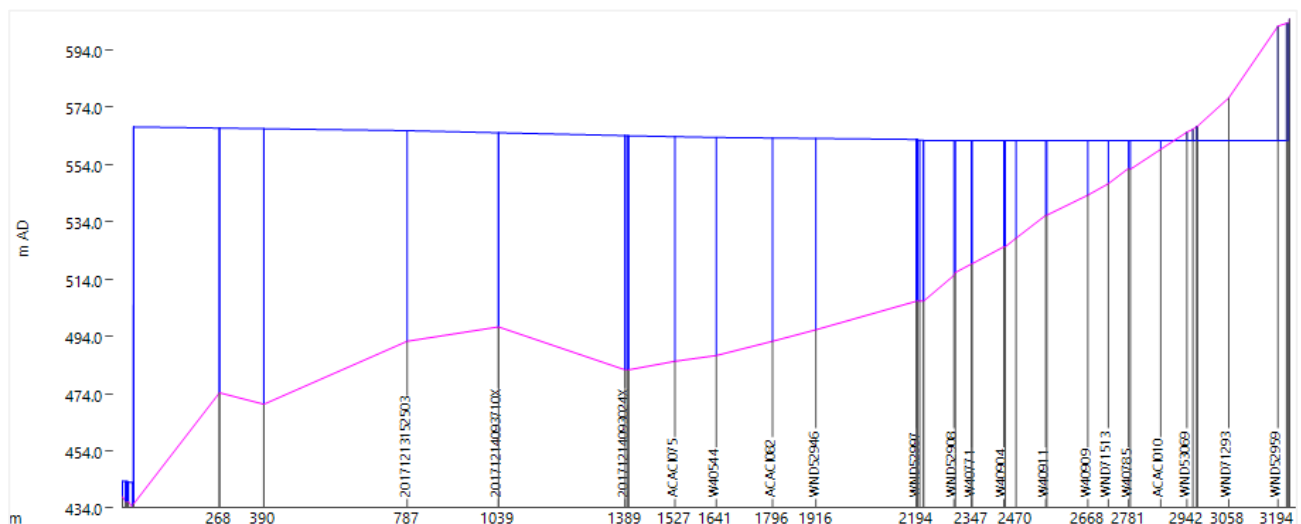
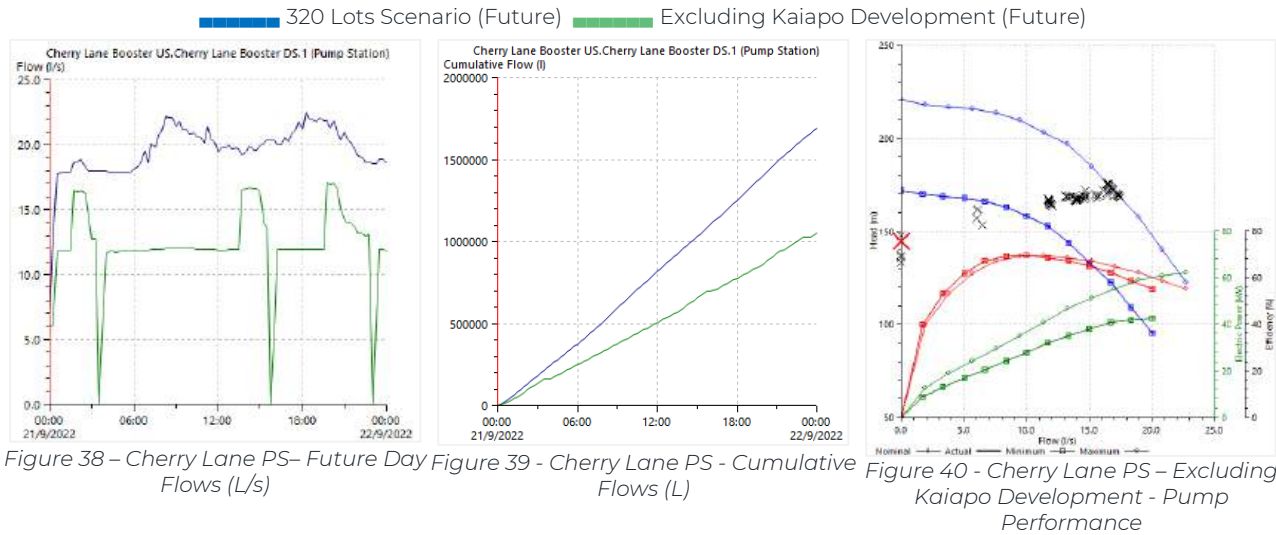


Figure 37 - Hydraulic Grade Line - 6:15 PM - 320 Lots Scenario (Future)

The average flow rate from Cherry Lane Pump station is considerably higher with 320 lots developed (Figure 38).

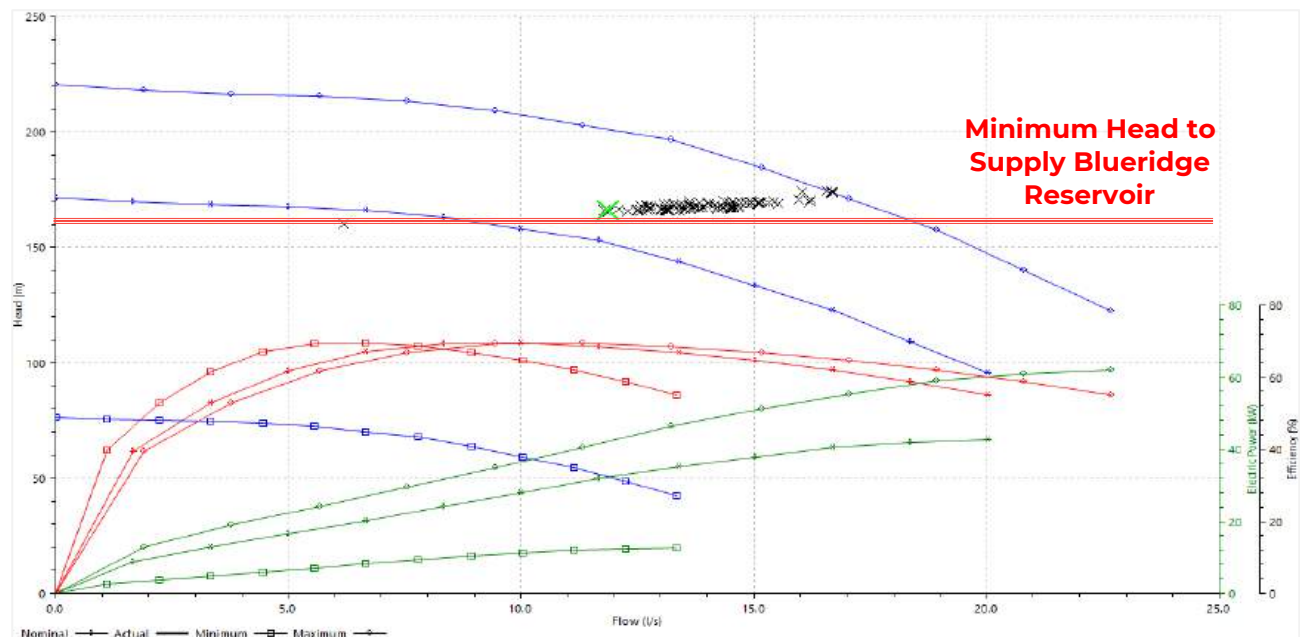
The exact configuration of how Mapara DMA properties connect their private tanks to the network is not recorded by TDC and therefore the high flows in Figure 38 may not occur due to uncertainty with calibration of storage tanks at these properties. Notwithstanding this uncertainty, the network should be designed for the maximum theoretical flow, so that each property can receive its allocated allowance.



The following information was assumed to determine required pump operation to enable constant refilling of Blueridge reservoir.

Cherry Lane pump inlet pressure	7.5 m AD
Blueridge reservoir elevation	604.57 m AD
Cherry Lane pump station	434.10 m AD
Design headloss between reservoir & pump station	10 m
Actual headloss between reservoir & pump station	2.5 – 10 m

Based on this information the pumps should be providing ~160 m head to the ~7.5 m inlet pressure to supply Blueridge Reservoir (Figure 41).



Based on the current pumps, the maximum flow capable by the Cherry Lane pump station to refill Blueridge reservoir is ~17 L/s.

With pumps operating at maximum flows (shown in Figure 38), Blueridge reservoir and the 320 lots cannot be supplied.

An additional pump (4 total) was added to Cherry Lane pump station identical to the pump #3 outlined in Table 2 and Figure 31. This pump has not been sized and is only added to make the development feasible. A full DMA analysis, including analysis of the options recommended in section 6 should be completed when sizing this pump.

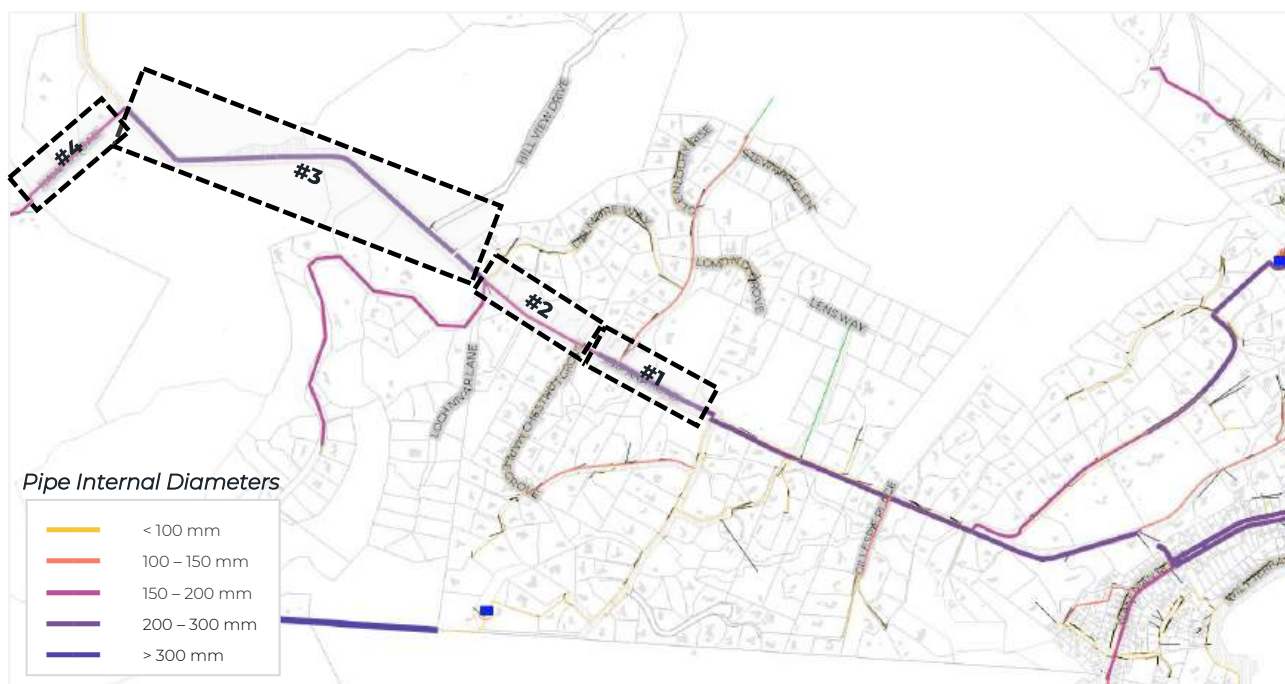


Figure 42 - Indicatory Upgrade Sizes

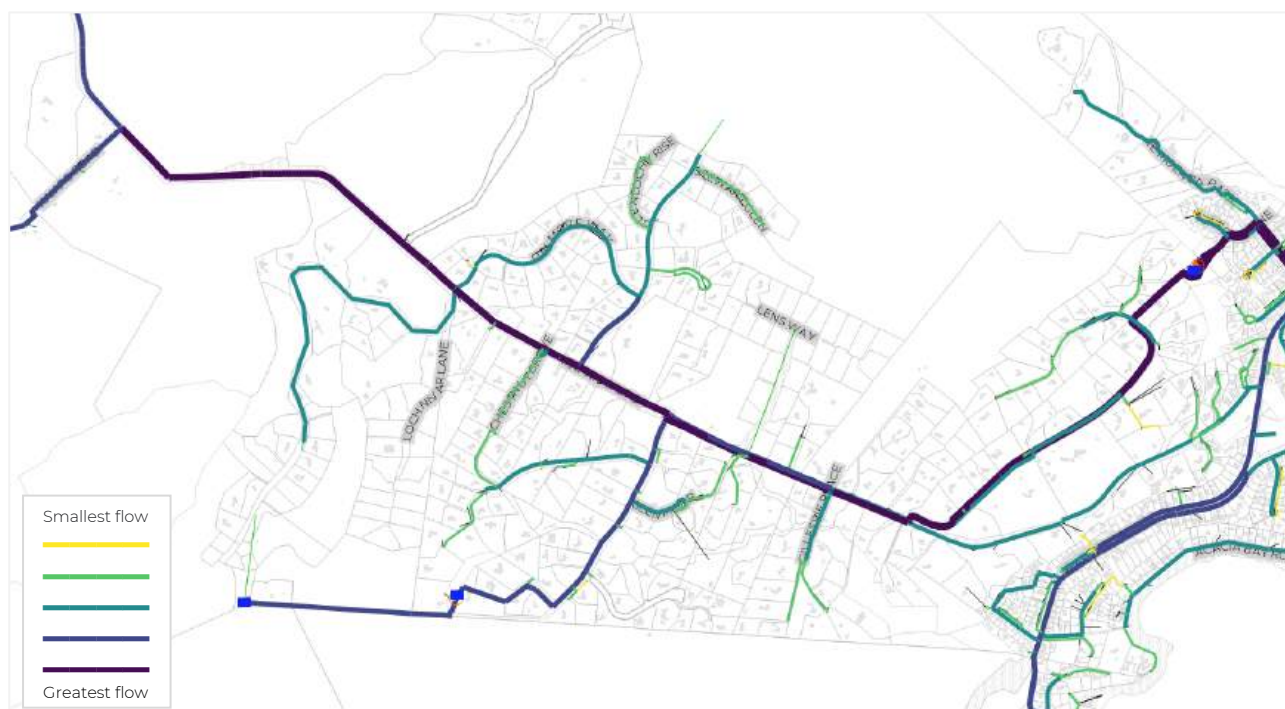


Figure 43 – Relative Cumulative Flows

12 Conclusion

With an additional pump and the following upgrades included, Blueridge reservoir and the future Kaiapo development can be supplied with a consistent 10 m pressure. These pipe size are tentative and should be rechecked after pump sizing at Cherry lane is completed. Higher pressure at the development may be achievable depending on alternative pump sizing.

This conclusion only considers the hydraulic modelling solution to service the development. Further engineering work is required to check the feasibility of adding another pump within the pump station, and any potential change of network supply arrangement (recommended in section 6) should be fully assessed before the development upgrades are finalised.

Table 6 - Tentative Upgrades

<i>Upgrade</i>		<i>Maximum Flow (L/s)</i>	<i>Internal Diameter (mm) Required For Maximum Headloss of 3 m/km</i>
#1	Blueridge Drive/Mapara Road Intersection → Near Chestnut Grove	15	228
#2	Chestnut Grove → Highland Drive / Mapara Intersection	10.5	197
#3	Highland Drive/Mapara Road Intersection → Kaiapo Road/Mapara Road Intersection	13	215
#4	Kaiapo Road / Mapara Road Intersection → Kaiapo Development	10.5	197

15 May 2026

PROPOSED RURAL RESIDENTIAL DEVELOPMENT

15, 37 & 46 KAIAPO ROAD, ACACIA BAY, TAUPO

PRELIMINARY GEOTECHNICAL ASSESSMENT REPORT

Breda Investments Limited & EF Deadman Limited

TGA2022-0206AB Rev 1

TGA2022-0206AB		
Date	Revision	Comments
6 March 2023	A	Initial draft for internal review
22 March 2023	0	Final for client review
15 May 2026	1	Revised to include NHRA

	Name	Signature	Position
Prepared by	Kirstin Brown		Associate Geotechnical Engineer
Reviewed & Authorised by	Dave Morton		Principal Geotechnical Engineer CMEngNZ, CPEng



TABLE OF CONTENTS

1	INTRODUCTION	1
2	AVAILABLE INFORMATION	1
3	SITE DESCRIPTION	2
3.1	<i>Site Location</i>	2
3.2	<i>Landform</i>	2
3.3	<i>Site History.....</i>	2
4	PROPOSED DEVELOPMENT.....	3
5	CONCEPTUAL GROUND MODEL.....	3
5.1	<i>Local Geology</i>	3
5.2	<i>Active Faults</i>	4
5.3	<i>Geothermal.....</i>	5
6.1	<i>Geohazard Assessment.....</i>	6
6.2	<i>Fault Rupture</i>	6
6.3	<i>Liquefaction & Lateral Spread</i>	6
6.4	<i>Slope Stability</i>	7
6.5	<i>Erosion Features</i>	8
6.6	<i>Load Induced Settlement</i>	8
6.7	<i>Foundations.....</i>	8
6.8	<i>Earthworks.....</i>	9
6.9	<i>Stormwater Disposal</i>	9
6.10	<i>On-Site Wastewater Management.....</i>	9
6.11	<i>Civil Works</i>	10
7	FURTHER WORKS	10
8	CLOSURE	10

Appendices

Drawings

Appendix A: Historic Aerial Photographs

Appendix B: Proposed Development Plans

Appendix C: Natural Hazards Risk Assessment

1 INTRODUCTION

CMW Geosciences (CMW) was engaged by Breda Investments Limited & EF Deadman Limited to carry out a preliminary geotechnical assessment to support a proposed land use zone change of a site located at 15, 37 & 46 Kaiapo Road, Acacia Bay, Taupo, which is being considered for a proposed rural residential (low density residential) subdivision.

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal referenced TGA2022-0206AA Rev 0, dated 3 August 2022.

This report provides a summary of the geological setting with comments on the potential geotechnical risks and constraints for future development. It is intended that this report will support a plan change application to Taupo District Council (TDC), as the site is currently zoned as rural.

2 AVAILABLE INFORMATION

The following information was reviewed as part of this report:

- Historic Aerial Photographs from Retrolens¹ and Google Earth Pro;
- Taupo District Council Online GIS²;
- Waikato Regional Council Online Regional Hazards Portal³;
- Institute of Geological and Nuclear Sciences (GNS Science) New Zealand Active Faults Database⁴;
- Geology of the Rotorua Area, 1:250,000 Maps⁵;
- GNS Science Report, Acacia Heights CMP – Geology and Geomorphology⁶;
- GNS Science Report, Active Fault Hazards in the Taupo District⁷;
- Landcare Report, Stormwater and erosion in the urbanising Acacia Heights Catchment, Taupo⁸;
- Sigma Prima Geoengineering, Preliminary Geotechnical Assessment Report for 46 Kaiapo Road⁹;
- ENGEO, Residual Geotechnical Risk Assessment Report, Stage 2 – 100 Loch Views Road¹⁰;
- Cheal, Preliminary Geotechnical Assessment Report for 15 Kaiapo Road¹¹.

A site walkover by a CMW Engineering Geologist and Geotechnical Engineer was undertaken to evaluate the landform with respect to the proposed development.

¹ <https://retrolens.co.nz/>

² <https://taupo.maps.arcgis.com/apps/webappviewer/index.html?id=0248094929a04d01bb0c3144560264f6>

³ <https://waikatoregion.maps.arcgis.com/apps/MapSeries/index.html?appid=f2b48398f93146e8a5cf0aa3fddce92c>

⁴ <https://data.gns.cri.nz/af/>

⁵ Geology of the Rotorua Area, Map 5 1:25,000 series, GNS Science (ed. Leonard, Begg & Wilson) 2010

⁶ GNS Science Consultancy Report 2006/228, Acacia Heights CMP – Geology and Geomorphology dated September 2006

⁷ GNS Science Consultancy Report 2020/31, Active Fault Hazard in the Taupo District, dated August 2020

⁸ Landcare Research Contract Report: LC0607/034, Stormwater and erosion in the urbanising Acacia Heights Catchment, Taupo, dated November 2006.

⁹ Sigma Prima Geoengineering, Preliminary Geotechnical Assessment Report for Proposed Subdivision of Lot 1 DP 410435, 46 Kaiapo Road (ref: PJ – 065 – 2022), dated April 2022.

¹⁰ ENGEO Ltd, Residual Geotechnical Risk Assessment Report, Stage 2 – 100 Loch Views Road, Acacia Bay, Taupo (ref: 18997.000.001_04) dated 25 February 2022.

¹¹ Cheal Consultants Limited, Preliminary Geotechnical Assessment Report for 15 Kaiapo Road, Taupo (ref:17144) dated 19 March 2018

3 SITE DESCRIPTION

3.1 Site Location

The proposed development encompasses three properties, legally described as Lot 1 DP 337255, Lot 2 DP 337255 and Lot 1 DP 410435, which are collectively referred to as the site. The site comprises an area of approximately 324 hectares and is located west of Taupo township, on Kaiapo Road as shown on Figure 1 below.



Figure 1: Site Location Plan (Topomap.co.nz)

3.2 Landform

The current general landform, together with associated features located within and adjacent to the site is presented on **Drawing 01**, with existing slope gradients presented on **Drawing 02**.

The site is positioned between two steep elevated Rhyolite domes to the east (Tuhingamata) and west respectively, that rise to between RL630m and RL640m (Moturiki Datum) from the shoreline of Lake Taupo located to the south at RL360m. The sites' landform is divided by an east-west trending elevated ridge (Mapara Escarpment) spanning between the domes, creating a large amphitheatre shaped landform falling at moderate gradients (10 to 15 degrees) to the south and more steeply (up to 35 degrees) to the north. The Mapara Escarpment contains a number of large relic landslide scarps.

The amphitheatre exhibits a distinct dendritic drainage pattern forming surface erosional gully features, which are typically steep sided, between 5m and 10m deep with overland flow paths / ephemeral streams in the base.

A fault controlled terrace feature at approximately RL560m to RL520m is situated over the eastern side of the amphitheatre, below Tuhingamata. The escarpment below this terrace feature has several deeply incised erosional gully features with gradients generally between 30 and 45 degrees.

The Mapara Escarpment grades out onto a gently graded terrace that extends to the northern boundary where the Mapara Stream has been incised several metres into the landform.

3.3 Site History

Based on our review of the historic aerial photographs (**Appendix A**), the landform appears to have undergone modifications, with the following land changes noted:

- The 1945 (earliest available) image shows the site to be undeveloped with tussock, shrubs and scattered lone trees. A series of significant erosional gully features are present, which appear to fall towards Lake Taupo in the south and the Mapara Stream to the north. No roads are present;
- By the early 1960's, Mapara Road and Kaiapo Road are formed. Significant earthworks incorporating both cuts and fills appear to have been undertaken to form these roads. The 1963 image clearly shows the scale and extent of the erosional and gully features across the amphitheatre;
- An area of the eastern amphitheatre appears to have been earthworked including backfilling of the erosional gully features sometime during the early 1980's;
- Between 2005 and 2017 the central amphitheatre appears to have been earthworked progressively, including backfilling of erosional gully features. It appears the lower terrace adjacent to the Mapara Stream may have also been earthworked during that period, although the scale of earthworks is relatively minor compared to the central portion of the site.

4 PROPOSED DEVELOPMENT

It is currently proposed to change the current land zoning from Rural to Low Density Residential.

No scheme plans have been provided at this stage, and it is understood that the findings from this report will be used to support a feasibility assessment for future residential development.

Given the rural residential nature of the proposed development, wastewater and concentrated stormwater flows will be managed on site. It is anticipated that all wastewater flows, as well as stormwater flows generated from roofs, will be managed within individual lots, with centralised stormwater systems for the proposed network of sealed roads.

5 CONCEPTUAL GROUND MODEL

5.1 Local Geology

The geological map for the site (refer **Drawing 01**) depicts the regional geology as comprising:

- Holocene-aged "alluvium reworked from Taupo Pumice Formation" of the Taupo Pumice Alluvium. Generally located near the margin of Lake Taupo downslope of the amphitheatre;
- Holocene-aged "non-welded, loose to poorly consolidated to sintered, white to pale grey rhyolite ignimbrite with white to pale pink pumice clasts; commonly includes charcoal fragments and logs; fall deposits; minor alluvium" of the Taupo Pumice Formation. Unit thickness is topographically controlled, thinner over sloping ground and thicker in valleys. Generally located in the southern portion of the amphitheatre and northern terrace;
- Late Pleistocene aged "non-welded, cream to pale pink-brown rhyolite ignimbrite with pumice clasts in a sandy ash matrix; minor fall deposits" of the Oruanui Formation. The Oruanui Formation is typically up to 200m thick. The eruption resulted in Lake Taupo re-forming at approximately RL500m with subsequent erosion of the Oruanui Formation resulting in the lake level falling by approximately 100m. Generally located across most of the amphitheatre and Mapara Escarpment;
- Pleistocene to Holocene aged "silty, commonly diatomaceous, millimetre-laminated, and dominated by pumice, rhyolite lava fragments and felsic crystals" of the Tauranga Group lake sediments. These deposits have been up thrown by the Kaiapo Fault. Generally located near the margin of Lake Taupo, below the western dome and north of Tuhiangamata;

- Mid- to Late Pleistocene aged “rhyolite lavas with highly variable crystal content and phenocryst assemblages”. A rhyolite lava dome forms Tuhingamata to the east of the development area, which intruded through the Kaiapo Fault following the formation of a caldera beneath the northern portion of Lake Taupo. Rock outcrops inferred to be rhyolite, were observed beyond the eastern and south western site boundaries during our site walkover with boulders observed on the terraces below.

The surficial geology generally contains various volcanic ash layers and paleosols (buried soil horizons), which were observed in exposures to be mantling parts of the landform. These soils are typically less permeable than the surrounding pumiceous deposits.

Based on the known history of the site and surrounding land levels, fill is anticipated.

Due to the elevated nature of the site and the location of the site with respect to Lake Taupo, ground water table is anticipated to be several tens of metres below the existing ground level.

5.2 Active Faults

The site is located within the Taupo Volcanic Zone (TVZ), an area of tectonic extension characterised by the Taupo Rift fault system, typically comprising closely spaced NNE-SSW to NE-SW trending normal faults.

The GNS Science active faults database identifies a series of northeast trending faults within and surrounding the site, with the southern extent of the Kaiapo Fault situated along the eastern boundary of the proposed development area. Recent paleoseismic data obtained from a trench across the Kaiapo Fault trace indicates a recurrence interval ranging from 3,360 years to greater than 10,000 years.

Ground deformation / displacement was observed along the Kaiapo Fault following a swarm of earthquakes during 1922-1923 and 1983. It was concluded that displacements of less than 500mm occurred during those events¹².

Taupo District Council commissioned GNS Science to provide an update to the active fault information within the Taupo district including advice on active fault hazards. The active faults identified as part of that study and their associated Fault Avoidance Zones are shown on **Drawing 01**.

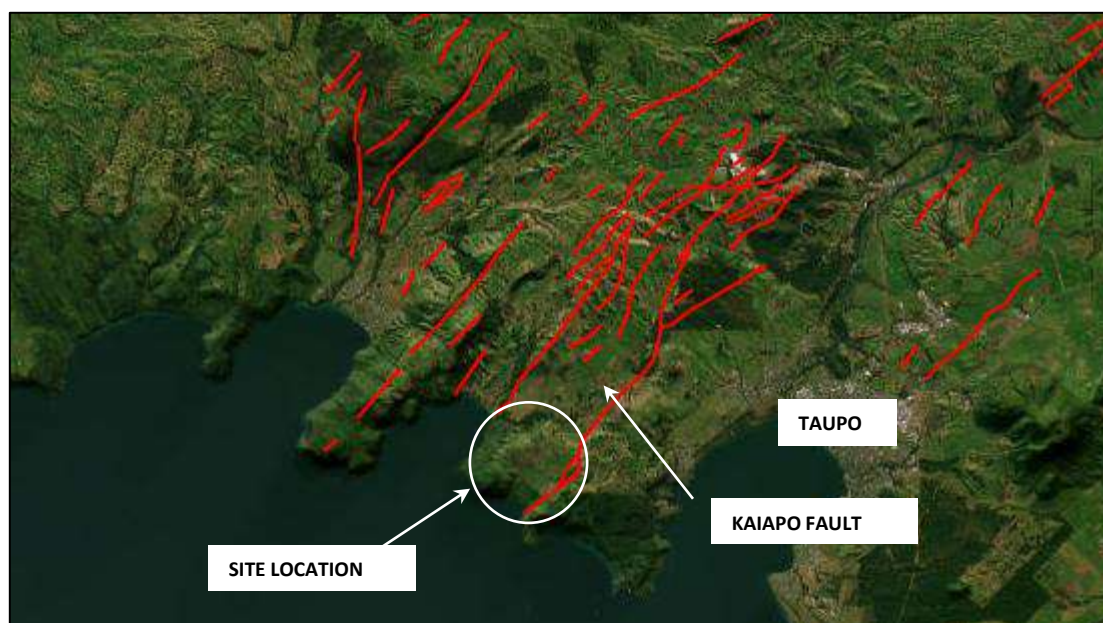


Figure 2: Active Faults (Image obtained from GNS Science Active Fault Database)

¹² GNS Science Consultancy Report 2020/31, Active Fault Hazard in the Taupo District, dated August 2020

5.3 Geothermal

Another characteristic of the TVZ, is the presence of high temperature geothermal systems. The closest known to the site are the Horomatangi Geothermal System approximately 4km to the south and the Wairakei-Tauhara Geothermal System approximately 6km to the east, as shown on Figure 2 below.



Figure 3: Geothermal Areas (Image obtained from Waikato Regional Hazards Portal)

The TDC Mapi identifies “Hot Ground Hazard” areas within the Taupo District, as shown on Figure 3 below. These areas are situated with the Wairakei-Tauhara Geothermal System, which are located more than 6km from the proposed development area.

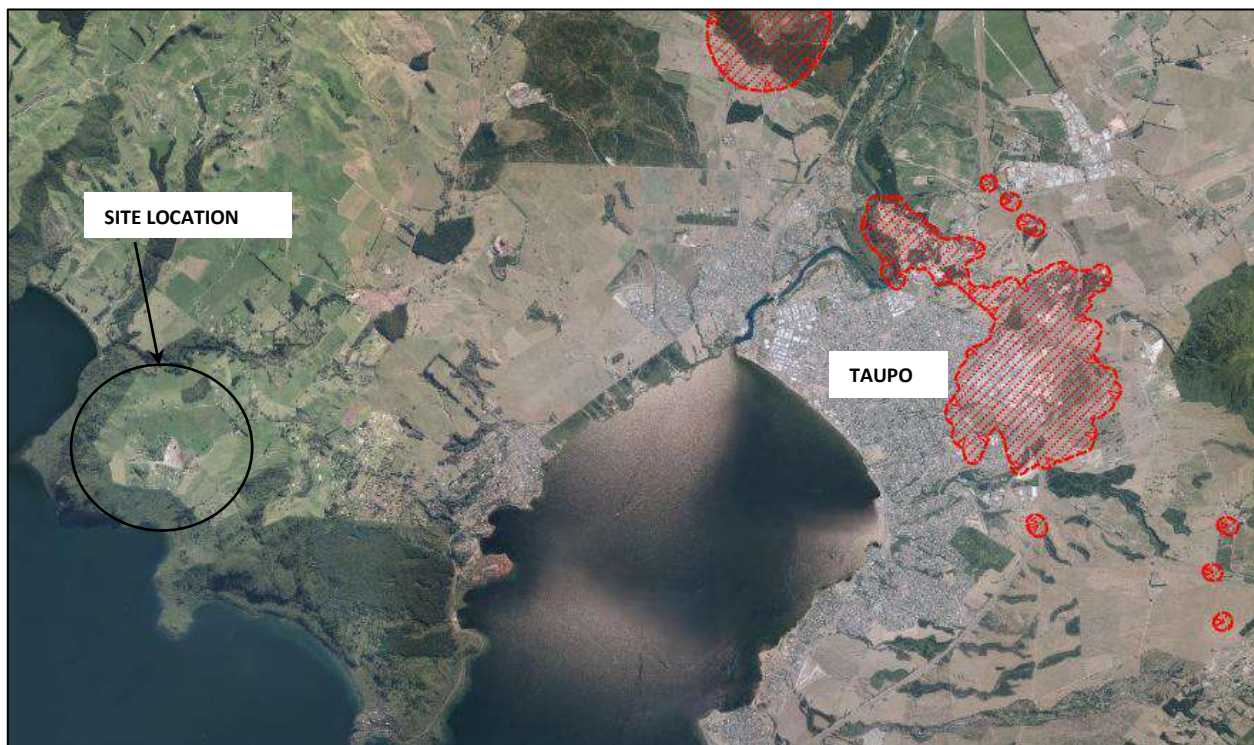


Figure 4: Hot Ground Hazard Areas (Image obtained from Taupo District Council Mapi)

6 DEVELOPMENT CONSIDERATIONS

6.1 Geohazard Assessment

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land or structures (consequence).

The following sections of this report provide an assessment of the geohazards relevant to the Plan Change area and provides the basis for the Natural Hazards Risk Assessment in accordance with the National Policy Statement for Natural Hazards 2025 presented in **Appendix C**.

6.2 Fault Rupture

The active faults shown on the maps accompanying the GNS Science Active Fault Hazards Report and as shown on **Drawing 01** have mostly been inferred from LiDAR and geological maps, with only localised identification of the faults by trenching. Fault avoidance zones shown on maps accompanying the GNS Science Active Fault Hazards Report and **Drawing 01** have been developed by GNS Science for these faults giving consideration to the Ministry for the Environment (MfE) guidelines¹³ as well as the uncertainty of the location of the faults. Due to the uncertainty of the location of the faults, the fault avoidance zones shown on **Drawing 01** vary from 30 metres to 45 metres either side of the fault trace.

Regardless of where the faults are shown on the maps, the number and proximity of the faults in this part of the Taupo district is such that it is recommended that a specific investigation be completed to verify their location. Targeted fault investigations (fault trenching, geophysical methods) would therefore be required to further define the faults in the eastern area of the site to confirm their location and the appropriateness of the nominated Fault Avoidance Zones as depicted on **Drawing 01**.

The GNS Science Active Fault Hazards Report recommends using the MfE guidelines to avoid building across hazardous faults. Studies have shown that the most intense deformation and secondary ruptures are commonly experienced as a result of fault movement up to approximately 20 metres from the primary fault plane. As such, a minimum 20 metre wide avoidance zone is required either side an identified active fault, where the active fault is identified by targeted fault investigations as discussed above. The 20 metre avoidance zone acts as a buffer zone to prevent major damage to structures and loss of life. Subject to specific investigation, the fault avoidance zones shown on **Drawing 01** may be reduced to 20 metre wide zones either side of the fault.

Subject to specific investigation, the risk of damage from fault rupture beyond the mapped Fault Avoidance Zones is considered low.

6.3 Liquefaction & Lateral Spread

Liquefaction occurs in loose saturated cohesionless soils that are subject to cyclic shear loading during an earthquake. This process leads to pore pressure build-up, soil grains moving into suspension and temporary loss of strength causing vertical and lateral ground deformation.

A review of the Waikato Regional Hazards Portal indicates most of the site is classified as liquefaction being “unlikely” to occur, with the southern portion classified as “undetermined” as shown on Figure 5.

¹³ Kerr et al, 2004. Planning for Development of Land on or Close to Active Faults: A guideline to assist resource management planners in New Zealand. Ministry for the Environment.



Figure 5: Liquefaction Hazard Categories (Image obtained from Waikato Regional Hazards Portal)

In accordance with MBIE/NZGS guidance¹⁴ the liquefaction susceptibility of the soils at this site was assessed with respect to geological age and compositional (soil fabric and density) criteria.

The site is elevated at least 40m above Lake Taupo with a predominantly granular soil profile being several to tens of metres thick with no evidence of perched water tables. Since liquefaction cannot occur in unsaturated soils, the risk of significant damage as a result of liquefaction and/or lateral spreading is considered low.

6.4 Slope Stability

The steep Rhyolite domes and Mapara Escarpment have formed as a result of faulting and lake level changes, and the steep gully slopes formed from progressive erosion and shallow slumping to rest at gradients close to their natural angle of repose. The slopes are considered relatively stable in their current condition but are susceptible to continued erosion during and following rainfall events and are unlikely to provide adequate slope stability factors of safety with respect to current building codes and standards.

Those parts of the site that could be affected by potential undermining due to downslope instability or are at risk of landslip debris inundation / impact from above have been identified on the attached **Drawing 03** as a Slope Stability Hazard Zone.

The potential for boulder rock fall emanating from the Rhyolite domes is a risk to the development. The approximate extent of the site at risk is shown on **Drawing 03**.

Building construction in these zones requires further specific geotechnical investigation, analyses and design by a geotechnical engineer. Likely mitigation measures could include escarpment crest setbacks, debris arresting structures, such as walls or flexible fences, or landform modification in the form of bunds or trenches.

Consideration should be given to the slope stability hazard zones when developing the scheme plan, whereby larger rural residential lots could be situated in these zones to accommodate slope stability mitigation measures.

¹⁴ Earthquake Geotechnical Engineering Practice, Module 3: Identification, assessment and mitigation of liquefaction hazards", (November 2021)

6.5 Erosion Features

The surface erosion gully features across the site are readily evident and can be actively managed during bulk cut to fill earthworks through the installation of appropriate drainage, where necessary, and diversion of surface water flows to piped networks or stabilised flow paths. However, past gully filling earthworks have effectively hidden some of these features, which presents a risk to future development.

The pumice rich soils are also highly susceptible to subsurface erosion, which can create underground water flow paths, particularly where impermeable layers are present, leading to preferential flow paths along low permeability lenses. The flowing subsurface water leads to piping erosion, which can develop over time to circular collapse structures or Tomo's at the ground surface. Piping features are not readily apparent at the ground surface and present a potential risk to the development.

Specific investigation such as test pitting and / or geophysical methods is recommended in order to identify the extent of erosional cavities and to provide recommendations for future development. Possible mitigation measures for dwellings are discussed further in Section 6.7 below, with recommendations regarding earthworks methodologies and stormwater disposal provided in Sections 6.8 and 6.9, respectively.

6.6 Load Induced Settlement

Load-induced settlements occur in subsoils that are subject to static loading (eg. by filling and / or building loads) where the magnitude of settlement is governed by the soil stiffness and the load applied.

Based on the predominantly granular ground model outlined in Section 4.1 above, load induced settlements are anticipated to be mostly elastic (immediate) and therefore largely built out during construction.

Where existing fill is present, there is a risk of settlement occurring within these areas of the site. Typically, fill placed without engineering supervision can be variable, with the quality depending on type of material placed and earthworks methodology. It is anticipated that fill material was sourced onsite. Geotechnical investigations within the previously earthworked areas are required to assess the quality and extent of the existing fill.

Should the existing fill be considered unsuitable to support future residential structures, ground improvement works such as excavation and replacement with engineered fill or piled foundations may be required, subject to specific investigation.

6.7 Foundations

While it is anticipated that, where away from any areas of existing fill, no particularly weak natural subsoils that could give rise to significant foundation settlement issues will be encountered. The upper few metres of the soil profile are anticipated to comprise geologically recent and unconsolidated volcanic ash where reduced geotechnical ultimate bearing capacities may be required or undercut and replacement works undertaken beneath building platforms.

The identified potential for erosional cavities to exist within the pumice soil profile requires further investigation to quantify where and at what depth these occur. Should voids be encountered within the proximity of building foundations, mitigation measures may include:

- For small to medium sized shallow voids, a TC2 or equivalent raft is considered appropriate as this may cantilever up to 2m and internally span 4m;
- For large, extensive voids, foundations may be piled to intercept competent soil/rock deposits at depth, which are proven to be free of voids, or the cavities filled with injection grouting or similar.

For areas of the site where voids are encountered, specific assessment and subsequent foundation recommendations for each structure would be required at detailed design stage.

6.8 Earthworks

An Earthworks Specification will need to be developed based on the results of specific geotechnical investigations and laboratory testing. That specification should generally comply with the Taupo District Council Code of Practice for Development of Land (2009) and NZS 4431.

Existing fill must be fully investigated and either certified or remediated to engineered fill standards.

Exposure of high permeable pumice soils at design subgrade level will elevate the piping and rilling erosion susceptibility. Earthworks will therefore need to be carefully managed to ensure that stormwater infiltration into exposed pumice soils is minimised. Such techniques could include:

- Limiting the lateral extent of earthworks exposing pumice soils at any one time;
- Shaping the profile to encourage sheet flow rather than concentrated flows;
- Diverting stormwater away from exposed areas of pumice soil during construction; and
- Immediately placing nominally 150mm of hardfill as a protective surface once subgrade is exposed.
- Installing flow path barriers during construction such as baffles or fences.

If piping and / or rilling does occur, this will need to be identified and remediated. Remediation will involve the over-excavation of the erosion feature, with the excavation backfilled with engineer certified fill.

6.9 Stormwater Disposal

The addition of concentrated water into pumice soils is highly undesirable from a slope stability and internal erosion perspective. It is anticipated that the most suitable method of stormwater disposal for individual dwellings will be rainwater tanks with low flow outlets to surface or subsurface seepage systems.

Details will be confirmed with onsite permeability testing.

For paved surfaces such as roads and hardstand areas, an above ground stormwater disposal method, such as a lined stormwater pond and/or series of lined swales are considered appropriate, provided outlet structures are designed to prevent erosion and consideration is given to slope instability. The use of deep soakholes (up to approximately 10m depth) is relatively common in the Taupo region, and may be considered suitable for this site, dependent on the outcome of onsite permeability testing.

The design of stormwater disposal systems should be preceded by specific geotechnical investigations and analyses.

6.10 On-Site Wastewater Management

Onsite domestic wastewater systems and land application areas will need to be located on land not considered at risk of slope instability and should not be located over the hazard zones shown on **Drawing 03**.

Due to the land gradients, risk of erosion and collective discharge of wastewater from a significant number of proposed households over highly permeable pumice soils, advanced or secondary wastewater treatment systems are recommended.

The effluent treatment and disposal system should be designed and constructed in accordance with the accepted national standards of AS/NZS 1547:2012 or the third edition (2004) of Technical Publication 58 – On-site Wastewater Systems: Design and Management Manual, Third Edition.

6.11 Civil Works

The upper few metres of the soil profile are likely to provide relatively low roading subgrade CBR's, which may require a subgrade improvement layer depending on the subgrade density requirements.

A programme of penetration resistance testing should be carried out when the roads and pavement areas are being formed to their final levels to confirm CBR values.

Pavement subgrades will likely be susceptible to degradation where over-trafficked and to erosion and rilling damage from uncontrolled stormwater flows. Particular care should be taken to avoid over-trafficking and to manage stormwater flows during roading earthworks and preparation.

7 FURTHER WORKS

The above geotechnical considerations and recommendations are based on available information described above and a site walkover. To confirm the ground conditions for the site it will be necessary to undertake further work including site investigations, ground modelling, engineering analyses and specific design as necessary to address relevant geotechnical issues.

Recommended further work to advance development plans and resource consent application are as follows:

- Intrusive investigations including machine boreholes, test pits, hand auger boreholes, and Cone Penetrometer Tests (CPTs) to assist in developing an appropriate ground model for the site;
- Shallow investigations (additional hand augers and test pits) to define the quality, extent and thickness of the existing fill within the former gullies;
- Trenching to verify the location of active faults;
- Geophysics investigations to assist in assessing scale and extent of tomos and location of active faults;
- Permeability testing to assist in determining the suitability for the disposal of concentrated stormwater flows via soakage to ground;
- Geotechnical analyses for the proposed development including slope stability, rockfall assessments, bearing capacity and static settlement;
- Preparation of a Geotechnical Investigation Report with recommendations supporting the proposed development and a resource consent application to Taupo District Council.

8 CLOSURE

Additional important information regarding the use of your CMW report is provided in the '*Using your CMW Report*' document attached to this report.

This report has been prepared for use by Breda Investments Limited & EF Deadman Limited in relation to the proposed rural residential development at 15, 37 & 46 Kaiapa Road, Acacia Bay, Taupo project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Breda Investments Limited & EF Deadman Limited seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report. In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing. The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

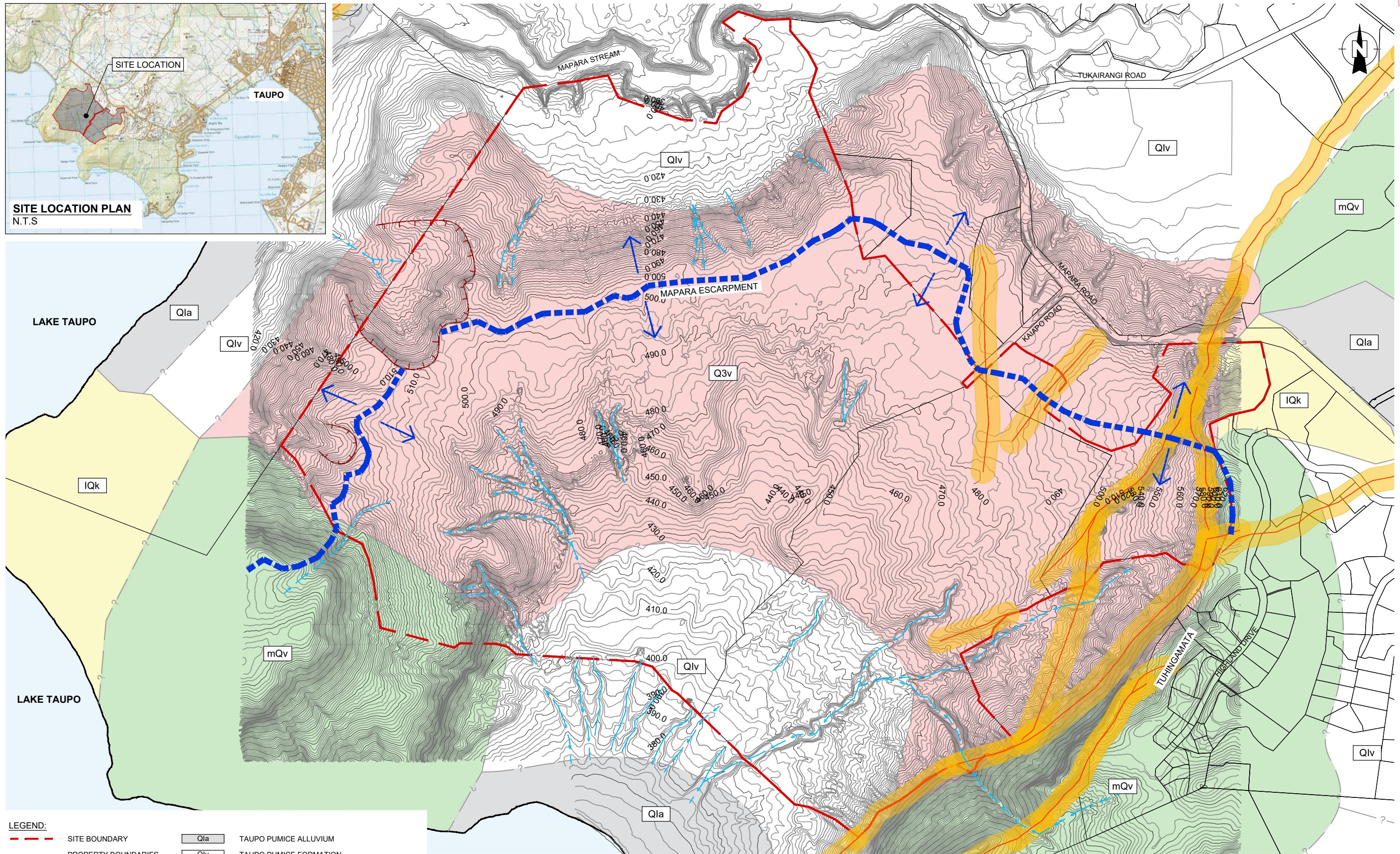
Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site. A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental Matters Are Not Covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation. The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

Drawings

Title	Reference No.	Date	Revision
Geological Site Plan	01	23/03/2023	0
Slope Gradient Plan	02	23/03/2023	0
Geotechnical Hazard Plan	03	23/03/2023	0



LEGEND:

- SITE BOUNDARY
- PROPERTY BOUNDARIES
- FAULT LINE (GNS SCIENCE CONSULTANCY REPORT 2020/31, AUGUST 2020)
- FAULT AVOIDANCE ZONE (VARIES 55-85m SETBACK)
- SLIP SCARP
- OVERLAND FLOW PATH / EPHEMERAL STREAM
- Qla TAUPO PUMICE ALLUVIUM
- Qlv TAUPO PUMICE FORMATION
- Q3v ORUANUI FORMATION (NON-WELDED IGIMBRITE)
- IQk TAURANGA GROUP (LAKE SEDIMENTS)
- mQv TAUPO GROUP (RHYOLITE LAVAS)
- RIDGELINE

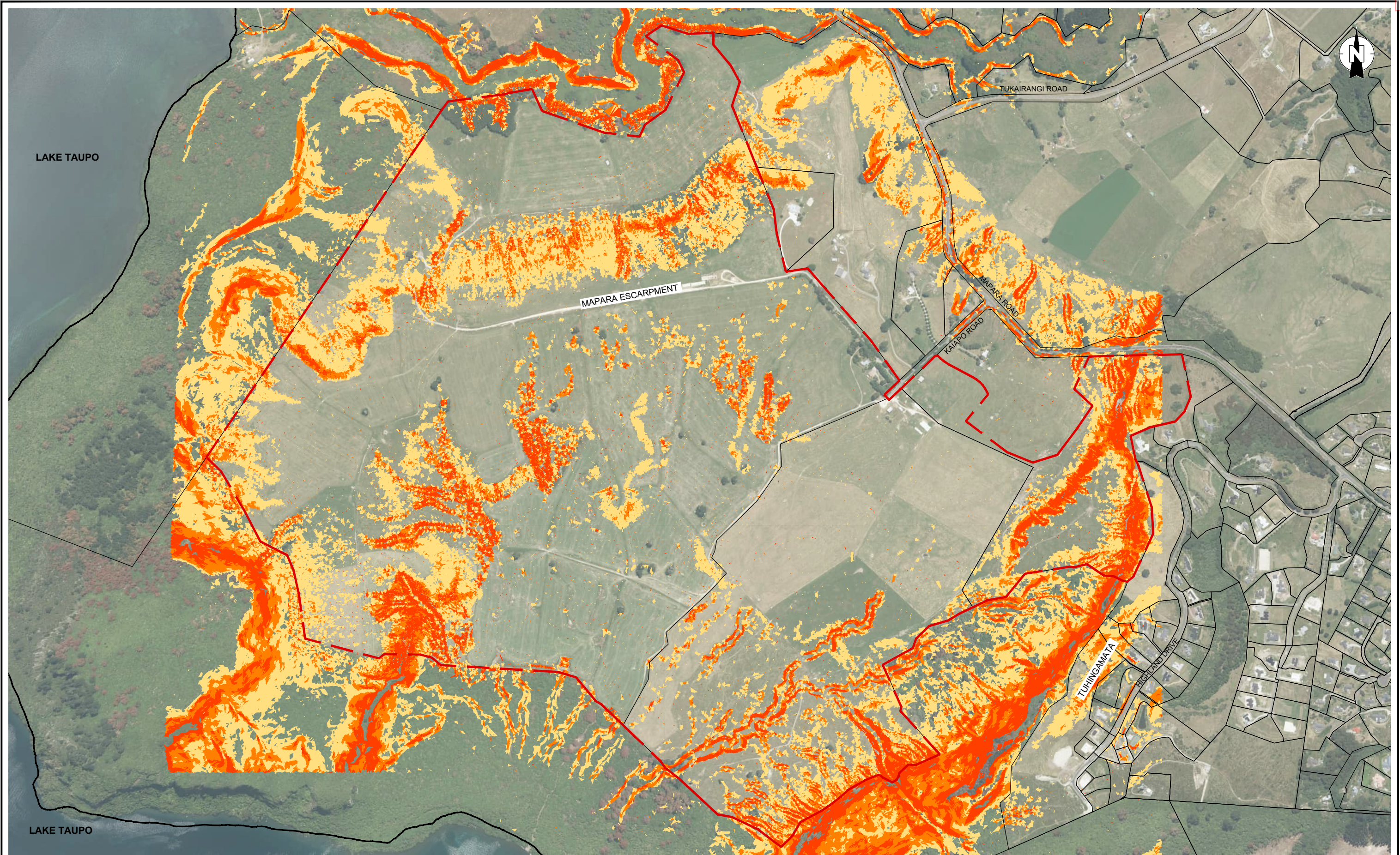
NOTES:

1. PROPOSED SITE BOUNDARY AND CONTOURS EXTRACTED FROM REF. ACAD-220205-SC001-MODEL.
2. CONTOURS AT 2.0m INTERVALS, IN TERMS OF MOTURIKI DATUM.
3. GEOLOGICAL UNITS ADAPTED FROM GNS QMAP, SHOWN INDICATIVELY.
4. FAULT LINE AND FAULT AVOIDANCE ZONE ADAPTED FROM TAUPU DISTRICT COUNCIL MAP1.

1:10 000

0 100 200 300 400 500 m

CLIENT:	BREDA INVESTMENTS LTD & EF DEADMAN LTD		DRAWN:	IW	PROJECT:	TGA2022-0206
PROJECT:	15, 37 & 46 KAIAPO ROAD, ACACIA BAY, TAUPŌ		CHECKED:	KB	DRAWING:	01
TITLE:	GEOLOGICAL SITE PLAN		REVISION:	0	SCALE:	1:10000
			DATE:	21/03/2023	SHEET:	A3 L



LEGEND:

- SITE BOUNDARY
- PROPERTY BOUNDARIES
- SLOPE GRADIENTS 1(V):3(H) - 1(V):2(H)
- SLOPE GRADIENTS 1(V):2(H) - 1(V):1.5(H)
- SLOPE GRADIENTS 1(V):1.5(H) - 1(V):1(H)

NOTES:

1. PROPOSED SITE BOUNDARY EXTRACTED FROM SUPPLIED ACAD-220205-SC001-MODEL.
2. SLOPE GRADIENT ADAPTED FROM SUPPLIED CONTOURS FROM SUPPLIED ACAD-220205-SC001-MODEL.
3. AERIAL IMAGE COURTESY OF LINZ WAIKATO-03M-RURAL-AERIAL-PHOTOS-2021-2023

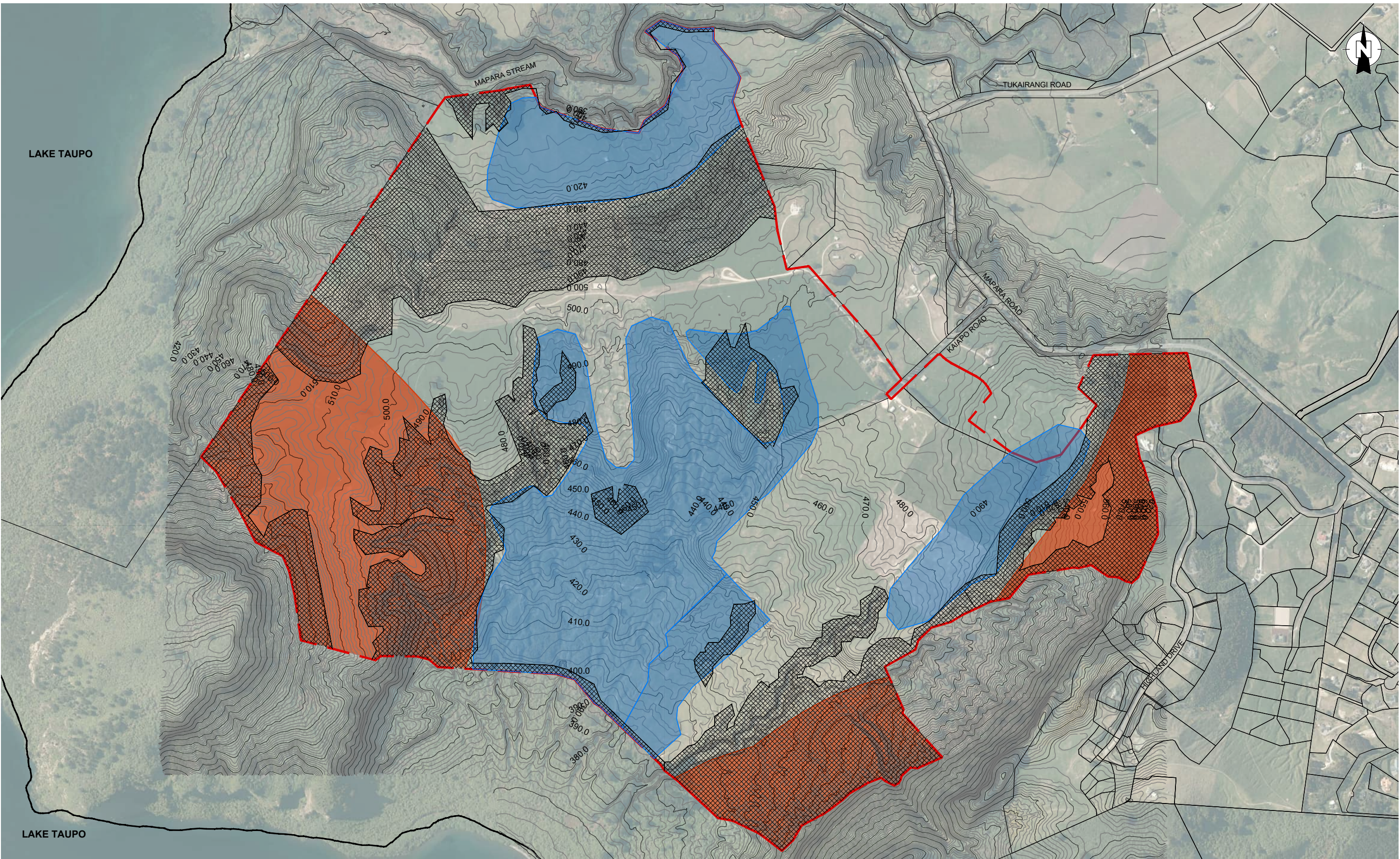
0 100 200 300 400 500 m

1:10 000



CMW Geosciences

CLIENT:	BREDA INVESTMENTS LTD & EF DEADMAN LIMITED		DRAWN:	IW	PROJECT:	TGA2022-0206
PROJECT:	15, 37 & 46 KAIAPO ROAD, ACACIA BAY, TAUPŌ		CHECKED:	KB	DRAWING:	02
TITLE:	SLOPE GRADIENT PLAN		REVISION:	0	SCALE:	1:10000
			DATE:	21/03/2023	SHEET:	A3 L



LEGEND:

- SITE BOUNDARY
- PROPERTY BOUNDARIES
- EROSIONAL FEATURES MASKED BY EARTHWORKS
- POTENTIAL ROCK FALL HAZARD ZONE
- SLOPE STABILITY HAZARD ZONE

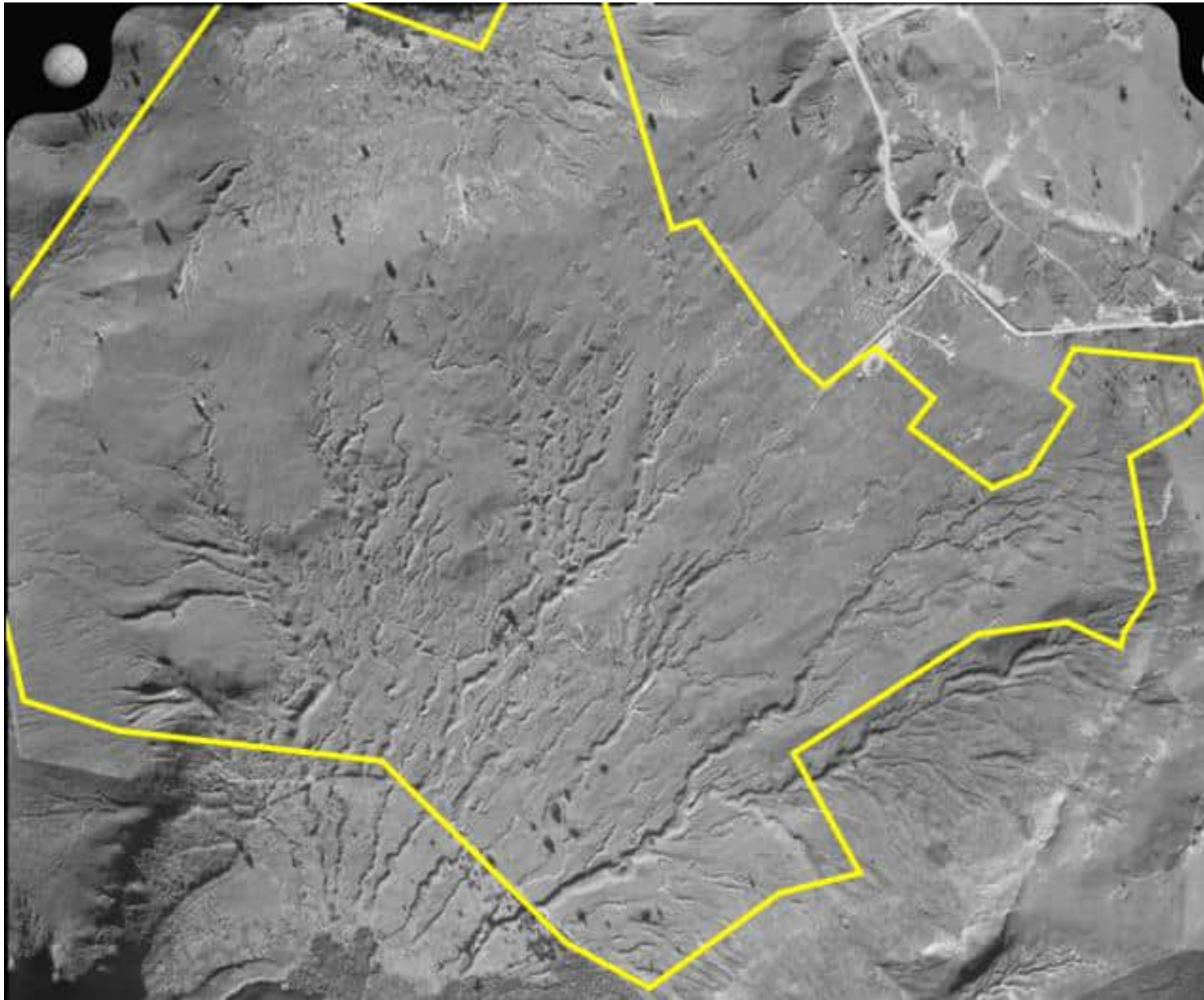
NOTES:

1. PROPOSED SITE BOUNDARY AND CONTOURS EXTRACTED FROM REF. ACAD-220205-SC001-MODEL.
2. AERIAL IMAGE COURTESY OF LINZ WAIKATO-05M-RURAL-AERIAL-PHOTOS-2012-2013.
3. CONTOURS AT 2.0m INTERVALS, IN TERMS OF MOTURIKI DATUM.

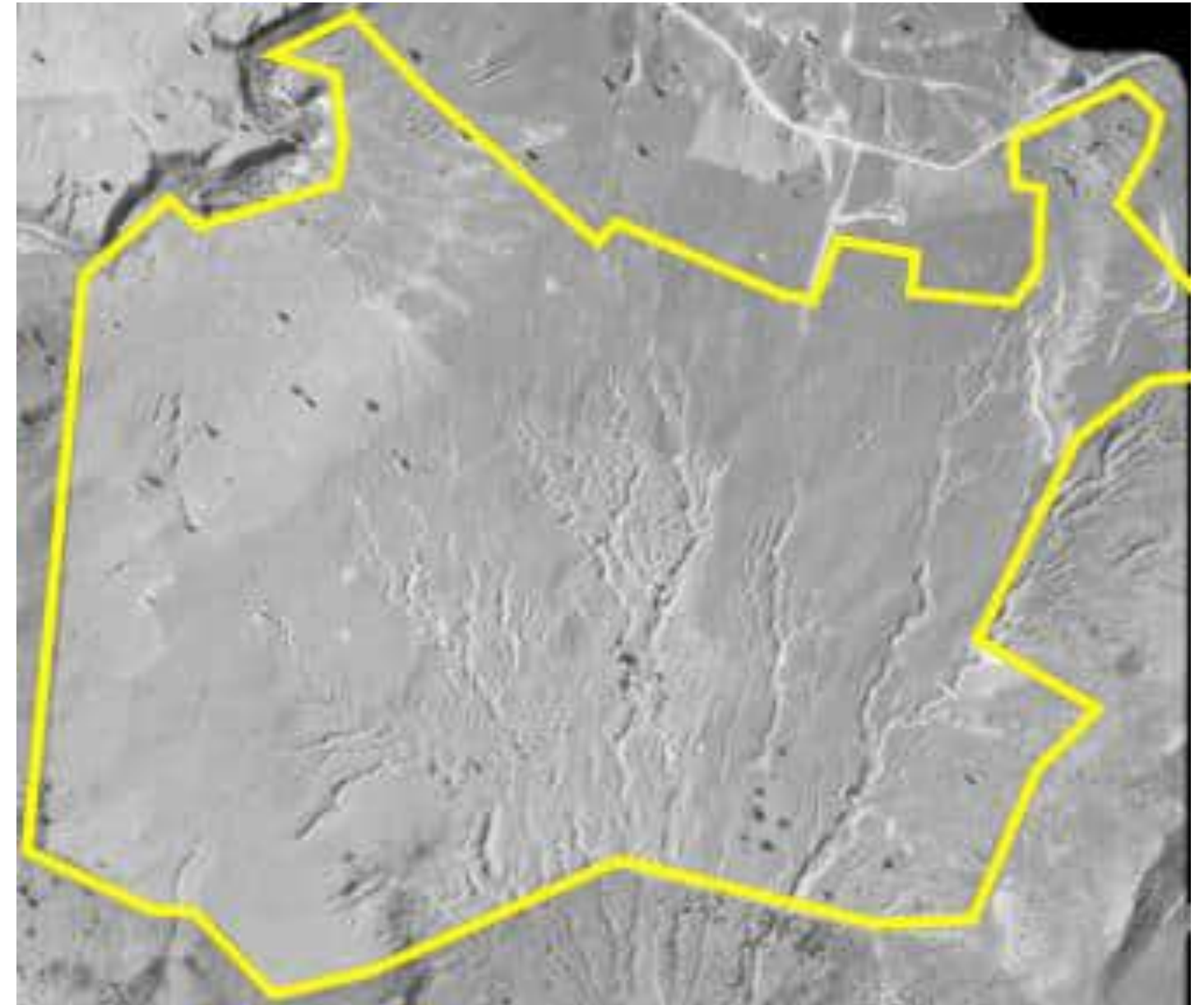


CLIENT:	BREDA INVESTMENTS LTD & EF DEADMAN LIMITED		DRAWN:	IW	PROJECT:	TGA2022-0206
PROJECT:	15, 37 & 46 KAIAPO ROAD, ACACIA BAY, TAUPŌ		CHECKED:	KB	DRAWING:	03
TITLE:	GEOTECHNICAL HAZARD PLAN		REVISION:	0	SCALE:	1:10000
			DATE:	21/03/2023	SHEET:	A3 L

Appendix A: Historic Aerial Photographs



Photograph 1. Aerial photograph 1963



Photograph 2. Aerial photograph 1965



Photograph 3. Aerial photograph 1979



Photograph 4. Aerial photograph 1986



Photograph 5. Aerial photograph November 2005



Photograph 6. Aerial photograph January 2011



Photograph 7. Aerial photograph March 2013



Photograph 8. Aerial photograph August 2014



Photograph 9. Aerial photograph April 2019



Photograph 10. Aerial photograph November 2019

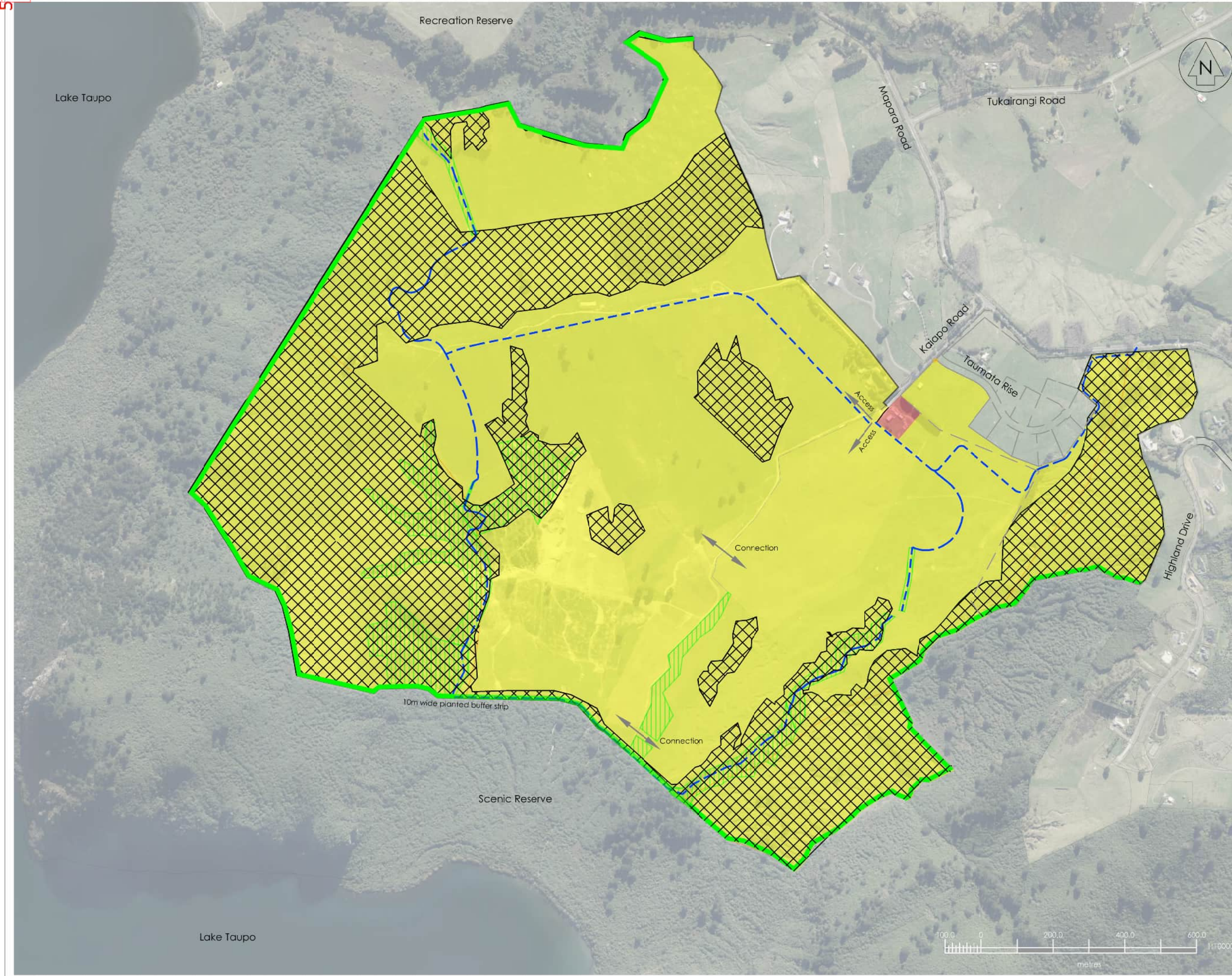


Photograph 9. Aerial photograph September 2020



Photograph 10. Aerial photograph February 2022

Appendix B: Proposed Development Plans



www.cheal.co.nz

DISCLAIMER

This drawing has been prepared to support a submission for a residential plan change and shall not be used for any other purpose.

Aerial Imagery has been obtained from LINZ Data Service and is provided under a Creative Commons Public License. It has been provided as a guide to where the boundaries or other features are positioned, or proposed on the ground, but may not be absolute.

Key:

- Residential Low Density Zone
- Neighborhood Centre Zone
Maximum floor area 300m²
- Natural Hazard Areas
- Gully planting, stormwater,
Pedestrian/Cycleway access
- Pedestrian/Cycle path
- Access and connectivity
- 10m wide planted buffer strip

Rev	Date	Amendment	By	CHK	APP
A	05/04/26	For Information	AGM	CE	SH

Project Title
Breda Investments Limited
and E.F. Deadman Limited
Kaiapo Road, Taupo

Drawing Title
Outline Development Plan

Surveyed			
Designed	A. Moss	06/04/26	AGM
Drawn	A. Moss	06/04/26	AGM
Checked	C. Eagles	06/04/26	CE
Approved	S. Hunt	06/04/26	SH

Status	INFORMATION		
Scale	A1 1:5000	A3 1:10000	A3
Drawing Number	220205-CP001		
Rev	A		

Appendix C: Natural Hazards Risk Assessment

NATURAL HAZARDS RISK ASSESSMENT FOR LANDUSE CHANGE

PLAN USE CHANGE, 15,37 & 46 KAIAPO ROAD, ACACIA BAY, TAUPO

1 CONTEXT

This appendix to CMW report reference TGA2022-0206AB Rev 1 sets out the criteria for and presents the results of an assessment of the geotechnical-related natural hazards associated with this proposed subdivision development.

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land, other land, or structures (consequence).

Section 2 of the RMA defines natural hazards as any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

The National Policy Statement for Natural Hazards 2025 (NPS-NH) provides direction under the Resource Management Act 1991 for assessing the risk associated with natural hazards for subdivision, use and development.

2 BASIS OF ASSESSMENT

2.1 Risk Classification

The occurrence of natural hazards and their potential impacts on the proposed subdivision development is assessed in terms of risk significance, which is based on likelihood and consequence factors. A risk matrix is used to assess the likelihood and consequence factors, the form of which used by CMW for this project is presented in Table B1 which is derived from Appendix 1 of the NPS-NH.

Table B1: Risk Matrix

	Almost certain Up to 10 AEP 10% or more	Very Likely 10-20 10% to 5%	Likely 20 – 50 5% to 2%	Possible 50 – 100 2% to 1%	Unlikely 100 – 500 1% to 0.2%	Rare 500 – 5000 0.2% to 0.02%	Very rare >5000 <0.02%
Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
Major	Very High	Very High	High	High	Medium	Medium	Medium
Moderate	High	High	High	Medium	Medium	Low	Low
Minor	Medium	Medium	Medium	Medium	Low	Low	Low
Negligible	Low	Low	Low	Low	Low	Low	Low

2.2 Likelihood

With respect to assessing the likelihood or chance of the risk occurring, the qualitative definitions used by CMW for this project are provided in Table B2 for each likelihood classification, which is derived from Appendix 1 of the NPS-NH.

Table B2: Likelihood Classification (extract from NPS-NH)

Likelihood level	Annual exceedance probability (AEP)	Average recurrence interval (ARI) or 'return period'
Almost certain	10% or more	Up to and including 10 years
Very likely	10% to 5%	Over 10 and up to and including 20 years
Likely	5% to 2%	Over 20 and up to and including 50 years
Possible	2% to 1%	Over 50 and up to and including 100 years
Unlikely	1% to 0.2%	Over 100 and up to and including 500 years
Rare	0.2% to 0.02%	Over 500 and up to and including 5,000 years
Very rare	Less than 0.02%	More than 5,000 years

2.3 Consequence

In terms of determining the consequence or severity of the natural hazard occurring, the qualitative definitions used by CMW for this project are provided in Table B3 for each consequence classification, which is derived from Appendix 1 of the NPS-NH.

Table B3: Consequence Table (extract from NPS-NH)

Consequence Level	Damage to Property	Potential for Injury or Fatalities
Catastrophic	Severe damage to land and building(s), potential for collapse or total destruction if structures. Building(s) need to be demolished, rebuilt or relocated.	High threat to life safety, with probable fatalities and/or critical injuries.
Major	Major damage to land and building(s), including structural damage. Loss of use and substantial repair required.	Unsafe for people, with potential for many injuries, or critical injuries and/or fatalities.
Moderate	Some damage to land and non-structural damage to building(s). Limited loss of use, repairs required.	Unsafe for people, with potential for injuries, although expected to be minor.
Minor	Minor damage to land and building(s). No loss of use, minimal repairs required.	Isolated minor injuries possible.
Negligible	No loss of use, no building repairs required.	No injuries.

2.4 Proportionate Management of Natural Hazard Risk

It is recognised that the natural hazard risk assessment provided herein is qualitative and, due to the wide range of possible geohazards that could occur, is somewhat subjective. Decision-makers must consider the scale and detail of information necessary to assess the risk by having regard to the anticipated level of risk.

Other methods are available to quantitatively assess an acceptable level of geotechnical related natural hazard risk, such as defining an acceptable factor of safety with respect to slope stability or acceptable differential ground settlements with respect to recommended building code limits.

When managing natural hazard risk associated with subdivision, use and development, decision-makers must apply mitigation measures, including location and design, for the purposes of ensuring that:

- (a) very high natural hazard risk is avoided;
- (b) high or medium natural hazard risk is avoided or mitigated proportionate to the level of risk; and
- (c) any creation of, or increase in, significant natural hazard risk on other sites is avoided or mitigated proportionate to the level of natural hazard risk.

3 RISK ASSESSMENT

The natural hazards relevant to this proposed subdivision development and adjacent, potentially affected land have been assessed with respect to the criteria outlined above.

Assessment is based on proposed post development ground conditions with and without any geotechnical controls. The latent risk was first assessed with the site in its proposed developed state to consider the risks to the development and surrounding land, including assessment of land modifications from the pre-existing natural state, without any implemented geotechnical controls. The specific geotechnical mitigation measures and engineering design solutions outlined in the table below and CMW report, where relevant, were then considered to determine the natural hazard residual risk remaining after the proposed controls have been implemented.

Results of this assessment are presented in Table C1 below.

Table C1: Natural Hazard Risk Assessment Results								
NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Earthquake	Fault Rupture	Rare	Major	Medium	Site is located within the TVZ Zone, with the Kaiapo Fault crossing through the site with an estimated recurrence interval of 3,360 to 10,000 years. Future dwellings to be located beyond Fault Avoidance Zones.	Rare	Moderate	Low
	Liquefaction Subsidence	Rare	Minor	Low	Deep groundwater table, low risk of surface manifestation. No geotechnical controls warranted.	Rare	Minor	Low
	Lateral Spread	Rare	Negligible	Low	Deep groundwater table. No geotechnical controls warranted.	Rare	Negligible	Low
Volcanic Activity	Ash & Pyroclastic Falls	Rare	Moderate	Low	No geotechnical controls warranted	Rare	Moderate	Low

Table C1: Natural Hazard Risk Assessment Results

NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
	Lava flows & Lahars	Very Rare	Moderate	Low	No geotechnical controls warranted	Very Rare	Moderate	Low
Geothermal Activity	Formation of geysers, hot springs, fumaroles, mud pools	Very Rare	Moderate	Low	Site located outside Horomatangi and Wairakei-Tauhara Geothermal System. Low risk due to distance from closest known geothermal area.	Very Rare	Moderate	Low
Erosion	Cut and Fill Batters	Almost Certain	Minor	Medium	Cut and fill batters to be designed by geotechnical engineer	Unlikely	Minor	Low
Landslip	Global Slope Instability	Possible	Major	High	Implementation of a slope stability hazard zones (rockfall and downslope hazards) and mitigation measures such as crest setbacks, debris arresting structures, such as walls or flexible fences, or landform modification in the form of bunds or trenches.	Rare	Moderate	Low
	Soil Creep	Possible	Minor	Medium	Implementation of slope stability hazard recommendations	Unlikely	Minor	Low
	Bearing Capacity Failure	Possible	Moderate	Medium	Bearing Capacity to be assessed by Geotechnical Engineer and foundations designed to suit	Rare	Moderate	Low
	Cut & Fill Batter Instability	Possible	Moderate	Medium	Cut and fill batters to be designed by geotechnical engineer	Rare	Moderate	Low

Table C1: Natural Hazard Risk Assessment Results

NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Subsidence	Soft soils leading to foundation subsidence	Possible	Moderate	Medium	Undercut and remove any surficial soft soils, existing topsoil and /or uncontrolled fill and replace with engineered fill. Geotechnical engineer to observe building preparation works during construction.	Rare	Moderate	Low
	Sinkholes / Tomo / Erosional Cavities	Possible	Moderate	Medium	Foundations design to considered tomo/void size. Further investigations to quantify location and depth.	Rare	Moderate	Low
	Effects of Dewatering	Unlikely	Moderate	Medium	Dewatering unlikely to be required due to deep groundwater table	Rare	Moderate	Low
Sedimentation	Rockfall, Debris Inundation	Possible	Major	High	Implementation of a slope stability hazard zones (rockfall hazards) and mitigation measures such as setbacks, debris arresting structures, such as walls or flexible fences, or landform modification in the form of bunds or trenches.	Rare	Moderate	Low
Coastal Erosion & Coastal Inundation	Erosion and Inundation	Very Rare	Negligible	Low	Site is >100km away from coastal marine environment.	Very Rare	Negligible	Low
Tsunami	Tsunami	Very Rare	Negligible	Low	Elevated site. Site is >100km away from coast	Very Rare	Negligible	Low

Table C1: Natural Hazard Risk Assessment Results

NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Flooding	Inundation	Unlikely	Minor	Low	Elevated site, future dwellings to be located away from any identified overland flow paths, or overland flow paths diverted during earthworks. Stormwater disposal design for concentrated flows from roads and roof areas.	Unlikely	Minor	Low

Notes:

- Assessments include the impact of the proposed subdivision works on adjacent properties.
- The following reference(s) contain information on the hazards contained in this assessment and the non-geotechnical hazards that have not been included:
 - Waikato**
<https://waikatoregion.maps.arcgis.com/apps/MapSeries/index.html?appid=f2b48398f93146e8a5cf0aa3fddce92c>

Plan Change 44 - Kaiapo Road LRZ

Landscape and Visual Assessment Report

This Landscape and Visual Assessment Report has been prepared in support of a submission to the Council to rezone Lot 1 DP 410435, Lot 2 DP 337255 and Lot 12 DP 582081 to Low-Density Residential Zone and Neighbourhood Centre Zone with a Development Plan (Kaipo Outline Development Plan) as part of Plan Change 44.

All work was undertaken and/or reviewed by a Registered NZILA Landscape Architect.

Report prepared by:

Lisa Burge
BLA (Hons)

and

Michael Graham
B Sc, BLA
Registered NZILA Landscape Architect
Director



Registered Member
of the
New Zealand Institute of Landscape Architects.

Report Version: R2

Date: May 2026



Table of Contents

INTRODUCTION	4
ASSESSMENT APPROACH	4
SITE LOCATION	5
PLAN CHANGE 44.....	6
Background	6
Overview of Development Enabled by the Low-Density Residential Zone (LRZ) and the Neighbourhood Centre Zone (NCZ)	6
Low Density Residential Zone (LRZ)	7
Neighbourhood Centre Zone (NCZ)	7
EXISTING LANDSCAPE CONTEXT AND VALUES.....	8
The Landscape Context	8
The Wider Landscape Context.....	8
The Subject Site	10
Identified Outstanding and Amenity Landscape Attributes and Values	15
Taupō District Landscape Assessment.....	15
Key Attributes of the Identified ANFL and ONFLs	15
Existing Landscape Value	17
SITE SUITABILITY ANALYSIS	18
Topography.....	18
Streams and Ephemeral Waterways	19
Slope and aspect.....	19
Vegetation patterns.....	20
Landscape Overlays (ONFL, ANFL, SNA)	20
Land Use Capability	21
Development Patterns, Density and Surrounding Lot Sizes	21
Visibility	23
Site Suitability Summary	23
Development Proxy.....	24
ASSESSMENT OF EFFECTS ON LANDSCAPE NATURAL CHARACTER AND VISUAL AMENITY.....	25
Effects of the Development Enabled by the Requested Plan Change on Landscape Character.....	25
Kaiapo Valley	25
Waikarariki Point Ridgeline /Mapara Escarpment	25
Existing Pastoral Characteristics of the Site	26
Existing Topography and Features	27
Effects on the Nighttime Environment (Dark Sky).....	27
Development Density and Integration	27
Outstanding Natural Features and Landscapes (ONFLs) and Amenity Natural Features and Landscapes (ANFL)	28
Key Values and Attributes of the ONFLs.....	28
Key Values and Attributes of the ANFL.....	31
Summary of Effects on Landscape Character.....	32
ASSESSMENT OF VISUAL EFFECTS	32
Visual Effects Method	32
Visual Catchment	32
Visual Absorption Capability	38
Potentially Affected Viewers.....	38
Investigated View Locations.....	39
Potential Visual Effects.....	39
Potential Visual Effects – Mapara Valley.....	40
Highland Drive.....	41
Potential Visual Effects – Kaiapo Valley and Embayment.....	42

Summary of Visual Effects.....	44
ASSESSMENT OF EFFECTS ON NATURAL CHARACTER	44
Natural Character Values	45
Existing Natural Character Values	46
Physical Factors: Natural Elements and Processes (Abiotic and Biotic)	46
Experiential Factors: How the Natural Elements and Processes are Perceived and Experienced	46
Cumulative Existing Natural Character Value	47
Effects On Natural Character	48
Overall Natural Character Effect Rating.....	51
RELEVANT STATUTORY AND NON-STATUTORY PROVISIONS	52
Resource Management Act 1991	52
Waikato Regional Policy Statement	53
LF-O3, Riparian areas and wetlands	53
ECO-O1, ECO-P1 and ECO-P2, Indigenous biodiversity	53
IM-O9 and IM-P5, Amenity.....	54
NATC-O1 and NATC-P1, Natural character	55
Operative Taupō District Plan	55
Existing General Rural Zone.....	56
Proposed Low Density Residential Zone framework.....	56
Comparison between the GRUZ and LRZ frameworks	57
Neighbourhood Centre Zone	57
Section 11, Subdivision	57
Section 10.2, Natural Character	58
Section 10.3, Natural Features and Landscapes.....	58
Relationship with adjacent ONFL and SNA areas	59
Appropriateness of the Requested Plan Change (Landscape, Natural Character and Visual Amenity)	60
RECOMMENDATIONS	60
Subdivision layout and lot pattern	60
Roading and access.....	61
Earthworks and building platforms	61
Existing vegetation, restoration planting and mitigation planting.....	61
Built form, height, colours and materials	62
Lighting	62
Pedestrian and cycle connections	62
FINDINGS AND CONCLUSION	62
 APPENDIX ONE: METHODOLOGICAL FLOW CHART.....	 65
APPENDIX TWO: LANDSCAPE AND VISUAL AMENITY EFFECT - RATING SYSTEM	66
APPENDIX THREE: VISUAL ABSORPTION CAPABILITY RATINGS	67
APPENDIX FOUR: PLAN CHANGE AREA AND DISTRICT PLAN OVERLAYS	68
APPENDIX FIVE: VIEW LOCATION PHOTOGRAPHS	70
APPENDIX SIX: RELEVANT PLANNING PROVISIONS – OTDP	80

INTRODUCTION

Breda Investments Ltd and E.F Deadman Limited are seeking to have Lot 1 DP 410435, Lot 2 DP 337255 and Lot 12 DP 582081 rezoned under Plan Change 44. Mansergh Graham Landscape Architects Ltd (MGLA) has been engaged to assess the suitability of the site for Low-Density Residential Zone and Neighbourhood Centre Zone development (Kaiapo Outline Development Plan) and to assess the potential effects of the rezoning on existing landscape, natural character, and visual amenity.

The following assessment examines the potential effects of the requested plan change on the existing landscape and visual amenity values of the surrounding rural environment, within the context of relevant planning provisions.

ASSESSMENT APPROACH

This assessment has been prepared to assist with evaluating the appropriateness of the requested rezoning from General Rural Zone (GRUZ) to Low Density Residential Zone (LRZ), with a small area of Neighbourhood Centre Zone (NCZ). It considers whether the landscape, natural character and visual amenity effects of development enabled by the requested zoning can be appropriately managed through the requested zoning and the wider provisions of the Operative Taupō District Plan.

The assessment has been undertaken in a manner consistent with the *NZILA Te Tangi a te Manu, Aotearoa New Zealand Landscape Assessment Guidelines* (TTatM). It identifies the physical, perceptual and associative attributes of the site and surrounding landscape, describes the existing landscape, natural character and visual amenity values, and assesses the nature and magnitude of change that could result from the requested rezoning.

The assessment is not limited to the immediate change in zoning. It also considers the consequential effects of the activities that would be enabled by the requested zoning, including subdivision, dwellings, roads, rights of way, earthworks, infrastructure, fencing, lighting, domestic curtilage, planting, and the more concentrated built form and activity associated with both the LRZ and the NCZ.

To assist with this evaluation, a development proxy has been prepared. The proxy is not a final subdivision design for application purposes, rather it provides a reasonable and suitably conservative basis for testing the likely landscape, natural character and visual effects of the requested zoning. It translates the development enabled by the requested zoning into a spatial form, showing how lots, building platforms, roads, open space, planting, neighbourhood centre activity and community-scale buildings could be arranged across the site.

The proxy has been assessed against the site's landscape opportunities and constraints, including topography, landform sensitivity, ridgelines, the Mapara Escarpment, gullies, overland flow paths, riparian areas, vegetation patterns, visibility, surrounding development patterns, and the site's relationship with adjacent Significant Natural Areas, Outstanding Natural Features and Landscapes, and Amenity Natural Features and Landscapes.

The assessment also considers the relevant statutory planning framework. The Operative Taupō District Plan is particularly important because it identifies the landscape, natural character and amenity outcomes anticipated under both the existing GRUZ and the requested LRZ and NCZ zoning.

It also contains the wider objectives, policies and rules that would manage the effects of future subdivision and development, including provisions relating to natural character, natural features and landscapes, subdivision, earthworks, lighting, residential development and rural character.

The existing GRUZ provisions have been considered to understand the current landscape and amenity expectations for the site. These provide the baseline for assessing the degree of change that would occur if the site were rezoned. The relevant LRZ and NCZ provisions have then been considered to understand the nature, scale and intensity of development that would be enabled by the requested zoning. The wider district-wide provisions have been considered to determine whether the consequential effects of that enabled development can be appropriately managed.

The assessment therefore addresses three related questions:

- a. what landscape, natural character and visual amenity values currently exist within the site and its surrounding landscape;
- b. how those values would be affected by the type and scale of development enabled by the requested zoning; and
- c. whether the requested zoning, together with the relevant objectives, policies, rules and recommended mitigation measures, provides an appropriate framework for managing those effects.

Mapping analysis, including visibility analysis, has been used alongside field assessment to identify the likely visual catchment and the locations from which development enabled by the requested zoning may be visible. Representative viewing locations have been considered having regard to viewer type, viewing distance, viewing frequency, viewing context, intervening landform and vegetation, and the likely ability of the landscape to absorb change.

The level of effect has been assessed using the seven-point rating scale recommended by TTatM. The assessment considers both the magnitude of change and the sensitivity of the receiving landscape or viewing audience. Where appropriate, the assessment distinguishes between short-term effects, before mitigation planting has established, and longer-term effects, once any required planting and landscape integration measures have become effective.

The recommendations in this report have been developed to respond directly to the assessment findings. They identify the siting, design, earthworks, planting, lighting, building colour, fencing and subdivision layout measures necessary to manage the landscape, natural character and visual amenity effects of future development. These recommendations are intended to inform the plan change evaluation and to assist with any future subdivision and land use processes that may follow if the requested rezoning is approved.

SITE LOCATION

The site subject to the PC44 rezoning submission is located on elevated land at the northern end of Lake Taupō, adjoining Kaiapo Bay, Kaiapo Bay Scenic Reserve and Whakaipo Bay. It is currently farmed for pastoral grazing and lucerne cropping. Access is from Kaiapo Road. Existing development within the site is limited to a dwelling, ancillary buildings and associated curtilage planting.



Figure 1: Site Location

PLAN CHANGE 44

Background

Plan Change 44 - Residential Zones, seeks to update the residential provisions of the Taupō District Plan by amending bulk and location controls, providing for Comprehensive Housing Developments, and rezoning selected areas for residential development. In landscape and visual terms, the most relevant purpose of the plan change is that it would enable a greater level of residential development, including associated buildings, roads, accessways, lighting, domestic curtilage and planting, than is currently anticipated under the existing zoning.

While the PC44 does not include the rezoning of the application site, it does provide for a submission to be lodged seeking rezoning.

Overview of Development Enabled by the Low-Density Residential Zone (LRZ) and the Neighbourhood Centre Zone (NCZ)

The request to rezone the subject site under PC44 would enable a clear change in the anticipated landscape character of the site, from a predominantly rural land use pattern to a more settled low-density residential environment, supported by a neighbourhood centre.

From a landscape perspective, the key outcomes enabled by the plan change that have the potential to change existing landscape character include a substantial increase in the density and extent of residential subdivision, dwellings, domestic accessory buildings, roads, rights of way, utility infrastructure, earthworks, fencing, lighting, and garden and amenity planting compared with what is anticipated under the GRUZ provisions. Within any Neighbourhood Centre Zone area, the plan change would also enable a more concentrated node of commercial, community and supporting built form.

Low Density Residential Zone (LRZ)

The implementation of an LRZ over the site would enable a low-density residential pattern across the site, rather than a rural pattern of land use. In landscape terms, this would introduce a more domestic and settled character, including dwellings, accessory buildings, driveways, roads, fencing, lighting, garden planting and associated residential occupation.

The LRZ provisions would enable a relatively open residential pattern, while still providing for a greater level of built development than is currently present on the site. For this site, the relevant LRZ standards provide for maximum combined coverage of 10% of the gross site area, minimum front and other boundary setbacks of 10 m, 0 m setbacks for common wall boundaries, and a maximum building height of 8 m. Height in relation to boundary is controlled by a 2.5 m height at the boundary, with a 45 degree recession plane, except for common wall boundaries. These provisions would enable dwellings and associated residential development within a low-density framework, with separation between buildings and space available for planting, open areas and landscape integration.

The practical effect of those standards is that the zone would enable visible residential development, but within a relatively open development pattern. Compared with the existing rural baseline, the plan change would increase the number of buildings, accessways, formed roads, domestic curtilage areas and night-time lighting. However, the low site coverage, large setbacks and likely retention of substantial open space between buildings provide a planning framework within which development can be set into the landform and integrated through existing and any required vegetation planted for mitigation purposes.

Neighbourhood Centre Zone (NCZ)

The Neighbourhood Centre Zone (NCZ) would enable a different character of development from the LRZ. Its purpose is to provide for small clusters of convenience based commercial activities and food and beverage outlets that serve the day-to-day needs of the surrounding neighbourhood. The provisions state that Large-scale commercial and long-stay activities are not anticipated in this zone.

The activity framework is broad. NCZ-R1 provides for “Any activity, building, or structure”, subject to compliance with the relevant standards and provided the activity is not otherwise identified as controlled, restricted discretionary, discretionary or non-complying. Ground floor residential activity is identified as a discretionary activity.

The relevant NCZ standards would enable a more intensive and visibly urban built form than the LRZ. The standards include maximum building coverage of 55%, nil setback to all boundaries other than common side or rear boundaries with a Residential Zone or Open Spaces Zone, where a 1.5 m setback applies, and a maximum building height of 8 m. Height in relation to a common boundary with a Residential Zone, or Open Spaces Zone, is controlled by a 2.5 m height at the boundary with a 45 degree recession plane.

Where a NCZ adjoins a residential or open space site, the provisions require screening by a solid fence or wall no less than 1.8 m high, and /or planting capable of growing to 1.8 m high and 1.5 m wide within five years and providing a continuous screen.

In landscape and visual terms, the NCZ would be expected to have a more concentrated effect than the surrounding LRZ. The most relevant potential effects would arise from larger or more prominent buildings, higher site coverage, hardstand, parking, signage, lighting, servicing, and the movement and activity associated with commercial, food and beverage, community or neighbourhood-

supporting uses. Those effects would be localised, but potentially more visually apparent than the surrounding residential development.

EXISTING LANDSCAPE CONTEXT AND VALUES

The following section examines the physical, perceptual, and associative attributes of the site and its surroundings that contribute to existing landscape and natural character values.

The wider landscape surrounding the site is described to provide the context within which the application site and its surroundings (i.e. that part of the landscape potentially affected by the proposal) is experienced. While the requested plan change development is not likely to affect the existing wider landscape context (in a discernible way), it is important to understand the relationship between it and the landscape characteristics of the site and its immediate surroundings.

This approach is consistent with the current best practice approach and the recommendations contained within the *Te Tangi a te Manu - Aotearoa New Zealand Landscape Assessment Guidelines*.

The Landscape Context

The Wider Landscape Context

The site, subject to the request for rezoning, is located on the northern side of Lake Taupō, approximately 6km southeast of the small township of Kinloch and 7km west of Taupō Town Centre. The northern edge of the lake consists of a series of south-facing bays and rising headlands and peninsulas. The prominent ridgelines and escarpments which adjoin these landforms contain the broad stream valley systems, such as the Mapara Valley.

Lake Taupō is expansive, with an area of 616 km², it lies within a caldera created by a series of volcanic eruptions between at least 26,500 and 1,800 years ago. The terrain is dominated by underlying volcanic rock and hydraulic erosion processes have carved headlands and created bays.

At the southern end of Lake Taupō, Mounts Tongariro, Ruapehu and Ngauruhoe, form the distant backdrop to the views across the lake.

Within and adjacent to the site, the Whakaroa peninsula and Tahunatarā Point/Waikarariki Point and Kaiapo Point/Waiaruha Point headlands, extending into the Mapara Escarpment, form part of a complex elevated landform including rocky bluffs, outcrops and escarpments on the peninsula and headlands along the lake edge. These features are highly expressive of the underlying volcanic geological processes. They are valued for their natural character, with high scenic value including vegetated rocky outcrops, bluffs, cliffs and escarpments.

Whakaipo Bay is a deep pocket bay bounded by the Whakaroa Peninsula to the west and Tahunatarā Point to the east. The gravel and sand beach is largely undeveloped with the length of the beach forming a recreation reserve. While Kaiapo Bay is a small bay bounded on the west by Waikarariki Point and to the east by Kaiapo and Waiaruha Points.

The Whakaroa Peninsula and the Whakaipo Bay and Kaiapo Bay headlands rise steeply to approximately 650m-700m above lake level and are largely covered in indigenous vegetation, with pine and other exotic vegetation also present (Kaiapo Bay Scenic Reserve and Whakaipo Bush). Several of the rocky bluffs, outcrops and escarpments are visible through the vegetation. Beyond the headlands, the gently undulating to rolling terrain of the Mapara Valley extends to the northeast. The

Mapara Valley is predominantly rural in character, with pastoral grassland dissected by hedgerows, shelterbelts, post and wire fencing and clusters of specimen trees scattered across the landscape.

Within the wider landscape surrounding the zone change area are clusters of rural dwellings of varying density. This includes within the valley systems and along the prominent ridgelines/escarpments which contain the valleys. Existing settlements of Kinloch and Acacia Bay are located northwest, within the Whangamata Stream valley, and the southeast of the site along the lake edge, respectively. The landscape between Acacia Bay and the southern side of the Mapara Escarpment is characterised by a higher density of rural subdivision along roads located off Mapara Road (to the north and south). These include Blue Ridge Drive and Loch Views Road (lots ranging between approximately 3000m² and 8000m²). Rural development with a slightly lower density of development is located along the ridgeline of the southern portion of the Mapara Escarpment, along Highland Drive and Hill View Drive (lots ranging in size between approximately 3000m² to 1ha).

Beyond the Mapara Escarpment Road cutting, (just south of the intersection with Kaiapo Road), the view opens out to the Mapara Valley, which is predominantly rural, with lower development densities (scattered dwellings and open pastoral landscape). Existing development within the southern portion of the Mapara Valley is concentrated along Tukairangi Road, Kaiapo Road and where Mapara Road intersects with Tukairangi Road (Lot sizes range between approximately 15ha and 60ha).

Within the northern portion of the Mapara Valley, existing development is concentrated around Ross Rise (elevated) and Charnley Gardens, Katelyn Place and Grant Road (along the base of the northern end of the Mapara Escarpment). These rural developments are generally of the order of 8000m² - 5ha lots. The central portion of the Mapara Valley is largely devoid of development, comprised of expansive open pastoral grassland/productive cropping, shelterbelt planting, scattered specimen trees and the occasional farm building/shed.

The key features that influence the characteristics of the wider landscape surrounding the site include:

- a. The prominent ridgelines running from the headlands at Te Tuhi Point, Waikarariki Point and Kaiapo Point/Waiaruha Point (approximately 650m above lake level) up to the Whakaroa Road ridgeline, the Mapara-Punataekahi ridgeline and the foot-slopes of the prominent Punataekahi Hill;
- b. The undulating pastoral valley system located between these two ridgelines, which drains into Kaiapo Bay;
- c. The wide and gently undulating Mapara Valley, which drains into Whakaipo Bay;
- d. The steep pastoral and exotic bush-clad Escarpment which drains into the vegetated Mapara Stream gully system;
- e. The embayment's of Kaiapo Bay and Whakaipo Bay;
- f. The wide-open waters of Lake Taupō (to the south);
- g. Mapara Stream and other local streams and ephemeral watercourses;
- h. Pastoral land use with remnant/regenerating vegetation associated with the gully systems;
- i. Mapara Road, Tukairangi Road and other local roads to the north and northeast;
- j. The settlements of Kinloch and Accacia Bay; and
- k. Scattered clusters of rural and rural residential houses and associated curtilage/screen planting.

These features provide the context within which the application site and its immediate surroundings are interpreted and assessed.

The Subject Site

The topography of the site is dominated by a major ridgeline that extends in a north westerly direction from the Waikarariki Point headland, dividing the site between the Kaiapo Bay catchment (in the eastern part of the site) and the Whakaipo Bay catchment (in the western part of the site). The Mapara Escarpment is located on the western side of the ridge, its grass and tree-covered slopes falling steeply to the gentler terrain associated with the Mapara Stream Valley system below.

Forming part of the Mapara Escarpment area, the ridgeline arcs around the northern extent of Kaiapo Bay catchment merging into the prominent ridgeline of Kaiapo/Waiaruha Points (on which the rural subdivision of Highland Drive is located), creating a gently undulating basin valley landscape that drains southwest-ward towards Kaiapo Bay.

Moderate sloping spurs, ridges and gullies encompass the three streams/ephemeral water courses which flow from the prominent ridgeline along the top of the Mapara Escarpment within the site, through the Kaiapo Valley, and discharge into Lake Taupō at the centre of Kaiapo Bay. On steeper slopes, overland water flow has cut down through the soft pumice soils to form a series of shallow eroded gullies and overland flow paths near the top of the ridge. On the lower slopes, these gullies are generally deeper and more heavily eroded but remain largely free of water due to the nature of the underlying porous, free-draining pumice soils.

The lower slopes of the Kaiapo valley have been recontoured/regraded to even out the landform for lucerne crop farming purposes. This has resulted in some of the natural gullies and drainages being filled in.

An existing stand of mature exotic vegetation is located on the eastern escarpment within the site. The gentler terrain of the Kaiapo valley (southern portion of the site) and the landscape between the base of the escarpment and the northern site boundary (northern portion of the site) have been cleared of indigenous vegetation for farming practices (mix of pastoral grassland and lucerne cropping). Exotic shelterbelts near the site entrance and along the north-eastern site boundary. The site consists mainly of a combination of open pastoral grassland and lucerne crop, utilised for dry stock farming. Several mature pines are scattered across the farmland within the site.

The Mapara Stream gully system located adjacent to the northern site boundary is also identified as Mapara Revegetation Area under the Operative Taupō District Plan (OTDP) and contains mostly exotic vegetation. The Kaiapo Bay Scenic Reserve (SNA 186) and Whakaipo Bush (SNA 318), located between the site and Lake Taupō are identified as Significant Natural Area (SNA) under the OTDP. These include the headlands which contain Kaiapo Bay, steep, rocky bluffs/cliffs, outcrops and escarpments along the lake front, covered in indigenous bush and regenerating scrub. Large pine trees and other exotic tree species are also scattered throughout the indigenous vegetation of the Whakaipo Bush and Kaiapo Bay Scenic Reserve.

Existing buildings within the property include a dwelling, ancillary buildings and farm sheds within the north-eastern portion of the site, close to Kaiapo Road (the site entrance), accessed via a driveway to the east of the buildings.

The southern portion of the site is visually contained due to the basin landform formed by the adjacent ridgelines and the extensive vegetation within the Kaiapo Bay Scenic Reserve. While the extensive vegetation within the Mapara Stream gully system, and the Whakaipo Bush alongside the north-western site boundary, visually contain the lower parts of the northern portion of the site (particularly the gentler terrain at the base of the escarpment).

Views into the application site are restricted by intervening terrain and vegetation of the Kaiapo Bay Scenic Reserve to the southwest (associated with the ridgeline which extends towards the headland at Kaiapo Point/Waiaruha Point), and shelter row and specimen tree planting in the surrounding rural properties to the northwest, northeast and east.

The following photographs depict the general characteristics of the site and its surroundings:



Figure 2: From within the application site, adjacent to the Whakaipo Bush SNA. Overlooking Whakaipo Bay, the Whakaroa Peninsula and Lake Taupō.



Figure 3: From within the application site, adjacent to the Whakaipo Bush SNA. Overlooking Whakaipo Bay, the Whakaroa Peninsula and Whakaipo Recreation Reserve.



Figure 4: From within the application site, looking across lucerne crop fields towards Waikarariki Point Headland, Kaiapo Bay and Lake Taupō. With Ngauruhoe, Tongariro and Ruapehu Mountains in the distance.



Figure 5: Bush clad Cliffs/Bluffs/Escarpment on the headland of Waikarariki Point and open waters of Lake Taupo, seen from within Whakaipo Bay.



Figure 6: Bush clad Cliffs/Bluffs/Escarpment on the headland of Waikarariki Point, seen from the shoreline of Kaiapo Bay.



Figure 7: Bush clad Cliffs/Bluffs/Escarpment on the headland of Waikarariki Point, vegetated margins of Kaiapo Bay and pastoral Kaiapo Valley, seen from within Kaiapo Bay.



Figure 8: Elevated view across Mapara Valley towards the site, the Waikarariki Point Headland and Lake Taupō, from Hill View Drive.

Identified Outstanding and Amenity Landscape Attributes and Values

Taupō District Landscape Assessment

The Plan Change Area is located adjacent to or near several identified Outstanding Natural Features and Landscapes (ONFL) within the OTDP, including Lake Taupō ONFL (ONFL 20), Whakaroa Peninsula (ONFL 65) and Northwestern Bays ONFL (ONFL 28). (Lake Taupō and the Whakaroa Peninsula are also identified as an ONFL (ONFL 9 Lake Taupō) in the Waikato Regional Policy Statement, based on work undertaken in the Waikato Regional Landscape Assessment by M. Buckland et al in 2010).

The western extent of Northwestern Bays ONFL extends from the Whakaroa Peninsula ONFL and along the Lake Taupō fore shore, to Otuparae Point to the east which largely capture the visual catchment of the Plan Change area. The Site shares most of its western and southern boundary, and a small portion of its eastern boundary, with Northwestern Bays ONFL. As a result, the Site is separated from the Lake Taupō ONFL 20 by approximately 450m (at its closest point) and from the Whakaroa Peninsula ONFL by 1.9 km. (It is noted that, when closely scrutinised there appears to be an overlap between the ONFL's and ANFL's. This is likely because of mapping inconsistencies rather than an intended value duplication and the ONFL's and ANFL's are considered as adjacent within this report).

With respect to the Northwestern Bays ONFL and the Plan Change Area, it is noted that Significant Natural Area (SNA) 186 Kaiapo Bay Scenic Reserve and SNA 318 Whakaipo Bush, overlay the same area as the ONFL, between the lake edge and the Plan Change Area, but SNA 186 extends further inland to include an existing block of vegetation on Reserve land which lies to the east, between the Plan Change Area and the Highland Drive subdivision.

In addition to the ONFL's, the plan change area is located within two Amenity Natural Features and Landscape Areas (ANFL), Whakaipo Bay ANFL (ANFL 63), and Mapara - Punatekahi Hill ANFL (ANFL 22). With most of the requested plan change area being contained within the southerly portion of the Whakaipo Bay ANFL, with only a small portion located within the northeastern corner of the plan change area, captured by the Marapa - Punatekahi Hill ANFL.

Key Attributes of the Identified ANFL and ONFLs

The following key values and attributes describe each of the ONFLs:

Lake Taupō ONFL 20 - Key Attributes (SHED10.3 of the OTDP)

Last eruption some 1800 years ago, creating a large caldera lake with a series of bays, river tributaries, pumice beaches and sheer cliff edges. Tapuaehāruru Bay forms a prominent enclosed bay; its flat terraces forming the platform for the Taupō township.

The lake forms the focal point for surrounding settlements. The identification of the lake as an outstanding feature also extends to its margins and Motutaiko Island. Highly valued recreation resource, water quality, and sense of place. Very high historical and cultural values.

Lake Taupō (Landscape Unit Assessment Sheet) 1

Physical

- *Highly prominent focal point for the Taupō District.*

¹ Relevant physical, perceptual, and associative values and attributes have been summarized into bullet points (extracted from the relevant Landscape Unit Assessment Sheet from: *The Outstanding and Amenity Landscapes of the Taupō District*. Isthmus Group. October 2009).

- *Its form is the result of the most recent and largest Taupō eruption some 1800 years ago, creating a caldera lake with a series of bays, river tributaries, pumice beaches and striking cliff bluffs.*
- *Country's largest lake in the centre of the North Island, unique due to size and volcanic origins, some 40m in length at its longest point.*
- *The lake also has a series of hot thermal spots within the lake waters.*

Perceptual

- *Highly prominent well-known landmark feature at the centre of the North Island.*
- *Focus of the District (most settlements oriented towards the lake margins).*
- *Typically first feature drawn in mental maps.*
- *Highly memorable due to size and prominent cliffs.*
- *Ocean-like scale and perception creating a vast open space that allows views from Taupō to the prominent and dramatic backdrop of the three mountains.*
- *Western Bays largely inaccessible by car therefore creates a unique boating only and wilderness experience.*

Associative

- *Highly important sense of place for local communities.*
- *Vistas are awe inspiring, dynamic and ever changing from glassy mirror-like waters to rough ocean-like swells.*
- *Lake highly valued for recreational activities such as fishing, boating, water skiing, kayaking, rock climbing, swimming, parasailing, windsurfing, kite surfing as well as beaches for picnicking, camping, and sunbathing.*

Lake Taupō ONFL 9 (Waikato Regional Landscape Assessment)

This expansive lake has an area of 616 km² and is the largest freshwater lake in New Zealand; it is the source of the Waikato River. The lake, which has pumice beaches, lies in a caldera created by a series of enormous volcanic eruptions between at least 26,500 and 1,800 years ago, and is surrounded by volcanoes in the nearby central plateau and to the south. Lake Taupō forms the foreground to the Tongariro National Park, and is highly visible from a wide area thus having a large viewing audience. Features around and in the lake include cones, islands, cliffs, rock carvings and native bush. The lake is the focal point for the settlements at a number of locations around it.

The lake and its setting have a strong sense of place and identity. Tangata whenua have strong links to the lake and many live alongside it. From a recreational point of view the lake is noted for its trout fishery – brown and rainbow trout, for cycling, kayaking, skydiving, waterskiing and boating.

The main factors contributing to its identification as an outstanding landscape are the expansive areas of water, its memorability and vividness, the natural character of the lake edge and its cultural values.

Activities that could threaten these values would be significant additional development around the lake edge, and on the slopes surrounding the lake. Commercial exotic forestry would also threaten this landscape, as would invasive pest species and wildling pines.

Lake Taupō ONFL 9 (Waikato Regional Policy Statement)

Expansive area of water, memorable and vivid, natural character. Forms the foreground to Tongariro National Park viewed from the north.

Significance to tāngata whenua. Recreational values including trout fishing, water skiing and boating.

Northwestern Bays Whakaroa Pt to Otuparae Pt ONFL 28 Key Attributes (SHED10.3 of the OTDP)

Forms a complex formation of headlands and bays from Otuparae Point south to Whakaroa Point including Whakaipo Bay.

Highly valued for its natural character in close proximity to the developed area of Acacia Bay. Includes contemporary Māori rock carvings in Mine Bay. High scenic value including rocky outcrops and waterfalls, including Waikino.

Northwestern Bays Whakaroa Pt to Otuparae Pt ONFL (Landscape Unit Assessment Sheet)

2

Physical

One of the most scenic and undeveloped parts of the Lake Taupō bays and headlands. High level of prominence particularly when viewed from within the lake, and from surrounding bays. Very highly distinctive and unique, with very high degree of naturalness. Largely undeveloped, with sheer cliffs and secluded bays.

Perceptual

Very high importance in mental maps for Taupō communities. Described as a wilderness experience, particularly due to lack of public roads, and accessibility mainly by boat. High vividness and memorability with high level of amenity. Highly coherent landscape.

Associative

High shared sense of place and identity for Taupō communities, providing a green backdrop to the lake area, and retaining a high sense of natural environment. Very high historical and cultural values, particularly as forming old access ways across the peninsulas.

Whakaipo Bay ANFL 63 Key Attributes (SHED10.3 of the OTDP)

Gentle sloping valley area adjacent to the Lake Taupō margin. High picturesque value and open landscape with views to the lake. Predominantly in grazed pastureland, interspersed with large farm trees and clustered regenerating vegetation around waterways. Provides a highly scenic drive along Māpara Road.

Also includes the foothills of Punatekahi Ridge and Whakaipo Peninsula.

Māpara-Punatekahi Hill ANFL 22 Key Attributes (SHED10.3 of the OTDP)

The Punatekahi Hill forms the western backdrop for the Taupō Township and eastern backdrop for Tūkairangi Road. The upper slopes provide the immediate skyline to the Taupō Township and Tūkairangi Road, however the skyline changes considerably depending on the viewing location due to the undulating nature of the upper slope

Highly valued as a backdrop to Taupō township, and highly prominent when viewed from Tūkairangi Road. Includes a mixture of low-density residential characteristics and rural open space qualities on the eastern side above Acacia Bay. Predominantly rural on the western side. Vegetation cover predominantly grazed pasture and plantation forestry on the Tūkairangi Rd side, and grazed pasture, shelterbelt planting and regenerating bush on the Taupō side

Existing Landscape Value

The existing landscape values of Lake Taupō and its northern bays (Kaiapo Bay and Whakaipo Bay), Waikarariki Point and Kaiapo Point headlands and Whakaroa peninsula when considered collectively is *high to very high*. Landscape values associated with the existing low-density residential development between Acacia Bay and Highland Drive, to the east of the site are low to low-

² Physical, perceptual, and associative values and attributes extracted from the Northwestern Bays Whakaroa Pt to Otuparae Pt ONFL Landscape Unit Assessment Sheet from: *The Outstanding and Amenity Landscapes of the Taupō District*. Isthmus Group. October 2009.
2022-041 Kaiapo Road Plan Change VLA R2_260510

moderate and landscape values associated with the rural hinterland to the north and northwest of the site are *low-moderate to moderate*.

When considered collectively, the overall landscape value of the site and its surroundings is *moderate-high*.

The key attributes that contribute to these ratings include:

- a. The spatial relationship between the wide-open waters of Lake Taupō, the bluffs, outcrops and escarpments, the bush cover, and the open pastoral landscape of the application site.
- b. The complex formation of headlands and bays, with high aesthetic and scenic value including vegetated rocky outcrops, escarpments, bluffs, and cliffs.
- c. The generally natural appearance from the lake edge, of the Whakaipo Peninsula, the Headlands of Waikarariki Point and Kaiapo/Waiaruha Point and Whakaipo and Kaiapo Bays.
- d. Modification to vegetation patterns along the lake edge and within the Whangamata, Mapara and Kaiapo valleys, particularly within the embayment's and gentler slopes of the valleys, where the gentler terrain has allowed for farming practices, rural settlement, townships and recreational opportunities (Taupō Township, Kinloch Township, Whakaipo Bay campground, Acacia Bay Settlement, forming part of the wider Lake Taupō character).
- e. Lake Taupō ONFL.
- f. Northwestern Bays (Whakaroa Point to Otuparae Point) ONFL.
- g. Whakaipo Bay ANFL.
- h. Kaiapo Bay Scenic Reserve SNA, and Whakaipo Bay Scenic Reserve SNA.
- i. Sense of wildness/ruggedness and perceived naturalness.
- j. Recreational values (walking tracks, scenic lookouts, boating/fishing/kayaking within the bays).
- k. Maaori and Pakeha values are associated with past and present occupation and use of the land.

While the open pastoral characteristics of the application site, combined with its relatively low levels of development are typical of the wider surrounding rural landscape, these characteristics and attributes differ significantly from the key features and values that contribute to the Northwestern Bays (Whakaroa Point to Otuparae Point) ONFL status of the ONFL and the more natural appearing landscapes around the northern shores of Lake Taupō.

SITE SUITABILITY ANALYSIS

The following section of this report examines the suitability³ of the site for development under the LRZ (from a landscape and visual amenity perspective) by considering the following factors:

Topography

A combination of the 20m contour data, an 8m resolution digital terrain model and site observations have been used to determine the following:

The topography of the requested Plan Change Area is highly varied and includes:

- a. Gentle undulating to rolling hill country, ridges, and plateaus.
- b. Prominent natural landforms, including the Mapara Escarpment, Waikarariki Point Headland, and prominent ridgelines.
- c. Kaiapo valley basin.

³ The suitability assessment is limited to landscape and visual amenity factors only. It does not include any assessment of the site from a geotechnical perspective.

- d. Steep hillsides and escarpment landform.
- e. Gullies/ephemeral water courses.

The nature of the topography within the Plan Change Area (a combination of gentler terrain within the Kaiapo Valley and steeper terrain within the Mapara Escarpment and Kaiapo Point ridgeline) is likely to require a moderate volume of earthworks to be undertaken to access and form building pads. This has the potential to change the characteristics of the landform within the site.

Apart from the Mapara Escarpment, Kaiapo Point Headland ridgeline, gullies, ephemeral streams and associated riparian areas, the topography within the site is not particularly sensitive to change (from a landscape character perspective). This means that, if shaped appropriately to integrate into the surrounding natural landform and revegetated/grassed, any earthworks undertaken are unlikely to change wider landscape character values.

Streams and Ephemeral Waterways

Four overland flow paths/ephemeral water courses (Mapara Riparian Areas) flow down the Mapara Escarpment to the Mapara Stream (to the north of the site), and four overland flow paths/ephemeral water courses flow down the moderate sloping spurs, ridges, and gullies of the Kaiapo valley from the prominent ridgeline along the top of the Mapara Escarpment to Lake Taupō (to the south/southwest).

The upper slopes and top of the ridge are characterised by shallow eroded gullies and overland flow paths, while the lower slopes are characterised by generally deeper and more heavily eroded gullies, which remain largely free of water (due to underlying free-draining pumice soils).

Slope and aspect

From the elevation data available, it has been determined that:

- a. Most slopes within the site vary between flat and approximately 14 degrees, with the ridgeline areas exhibiting much steeper gradients up to 45 degrees.
- b. Slopes within the Mapara Escarpment, the Kaiapo Point ridgeline and the more heavily eroded gully systems within the site are steeper than the gentler terrain of the Kaiapo Valley basin landscape (within the south of the site) and the Mapara Valley (which comprises a small part of the northern portion of the site). These areas require limitations on development.
- c. The gentle slopes of the Kaiapo Valley basin are generally southwest facing, providing views toward the lake. These gradients are compatible with development.

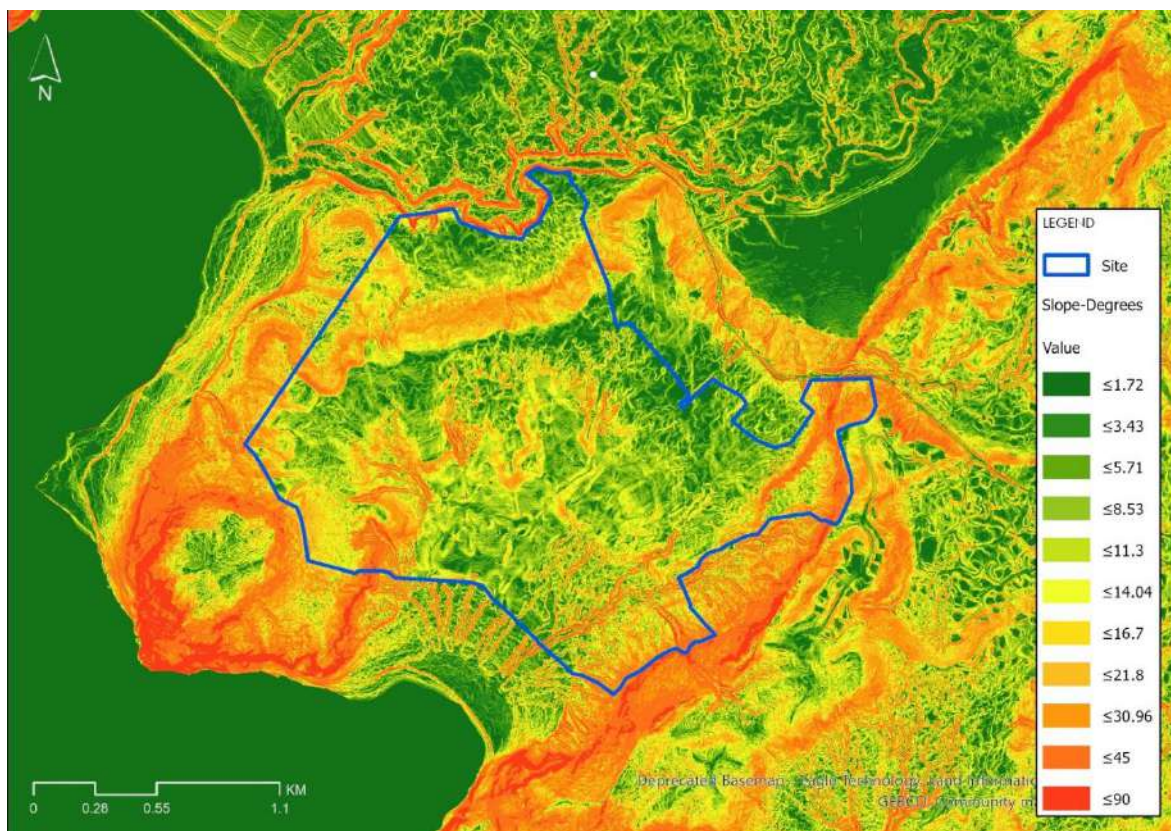


Figure 9: Slope gradients within the site

Vegetation patterns

Vegetation cover observed within the Plan Change Area consists mainly of a combination of open pastoral grassland and lucerne crop, scattered mature pine trees and exotic shelterbelts. A stand of mature exotic vegetation is located within the portion of the Mapara Escarpment Area within the northwestern extent of the Plan Change Area.

Vegetation patterns immediately adjacent to the Plan Change Area consist of the mainly exotic vegetation within the Mapara Revegetation Area (alongside the Mapara Stream, to the north of the site) and the indigenous bush and regenerating scrub (scattered with large pine and other exotic vegetation) which covers the Waikarariki Point and Kaiapo Point headlands. Sheer cliff faces, rocky bluffs, outcrops, and escarpments of these headlands are visible through the vegetation cover.

The Plan Change Area does not contain any significant natural areas, significant native vegetation or have a protection status; and is not identified as a landscape with significant natural character. The indigenous bush and regenerating scrub covering the Waikarariki Point and Kaiapo Point headlands, immediately to the west, south and southeast of the site are DOC protected SNA's.

Landscape Overlays (ONFL, ANFL, SNA)

The Plan Change Area is not located within an identified Outstanding Natural Feature or Landscape identified in SHED10.3 of the OTDP or contain any identified Significant Natural Areas (SNA). It is located within the *Whakaipo Bay Amenity Natural Features and Landscape* (ANFL 63,), with a very small portion of it's northeastern extent located within the *Mapara-Punatēkahi Hill Amenity Natural Features and Landscape* (ANFL22).



Figure 10: Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes Overlays

The Plan Change area is bounded by a small extent of Mapara Revegetation Area (on the northwest), DOC protected natural areas, Outstanding Natural Features and Landscapes (Northwestern Bays Whakaroa Pt to Otuparae Pt ONFL28), and a Significant Natural Area (SNA186), to the west, south and east. The Lake Taupō ONFL 20 is located approximately 450m to the south and 500m west of the site.

Land Use Capability

The NZLRI database identifies the surrounding landscape as LUC 6e-41, Class 6. It is described as strongly rolling to moderately steep hill country below 800 m asl, with Taupō airfall tephra over older tephra and unconsolidated rock types, and pumice, podzol and allophanic soils in moderate to high rainfall areas. The land has potential for moderate sheet, gully and soil slip erosion.

Class 6 is the predominant LUC rating for the surrounding landscape. It is non-arable land, with slight to moderate limitations for pastoral use, but is suitable for pasture, tree crops, forestry and, in some cases, vineyards. Erosion is the main limitation. As such the site is not considered highly productive land under the *National Policy Statement for Highly Productive Land 2022*.

Development Patterns, Density and Surrounding Lot Sizes

Landscape character is affected by perceptions of development density. Analysis of existing subdivisions and building densities in the surrounding visual catchment show greater levels of development immediately to the east and northeast of the site, within the Low-Density Residential zone between Acacia Bay and to the southern side of the Mapara Escarpment, than within the wider rural landscape to the north (Mapara Valley) and further northeast. This existing low-density

residential development straddles Mapara Road between Acacia Bay and Highland Drive, and includes development along Highland Drive, Lochinvar Lane, Chestnut Grove, Maple Grove, Ramsey Drive, Blue Ridge Drive, Gillespie Place, Nga Tui Lane, Willow Lane, Acacia Heights Drive, Loch Views Road, and Dalmore Way.

Of note are the scattered clusters of rural-lifestyle type development along Tukairangi Road, Charnley Way, Ross Rise, Grant Road, Hillview Drive and Edge Hill and parts of Mapara Road, located between Acacia Bay and the more sparsely populated rural land within the Mapara Valley, to the north and northwest.

Lot sizes largely range between approximately 3000m² and 8000m² to the east of the site (between Acacia Bay and the southern side of the Mapara Escarpment (Highland Drive and the 10-lot subdivision along the eastern side of Kaiapo Road)) and 8000m² - 5ha lots within the Mapara Escarpment (Kaiapo Road, Hillview Drive and Edge Hill) and the Mapara Valley rural subdivisions of Tukairangi Road, Ross Rise, Charnley Gardens, Katelyn Place and Grant Road.

Existing development density and clustering is shown in the Development Density and Clustering figure (Figure 11), while existing lot sizes within the surrounding landscape are shown in the Lot Sizes Analysis figure (Figure 12).

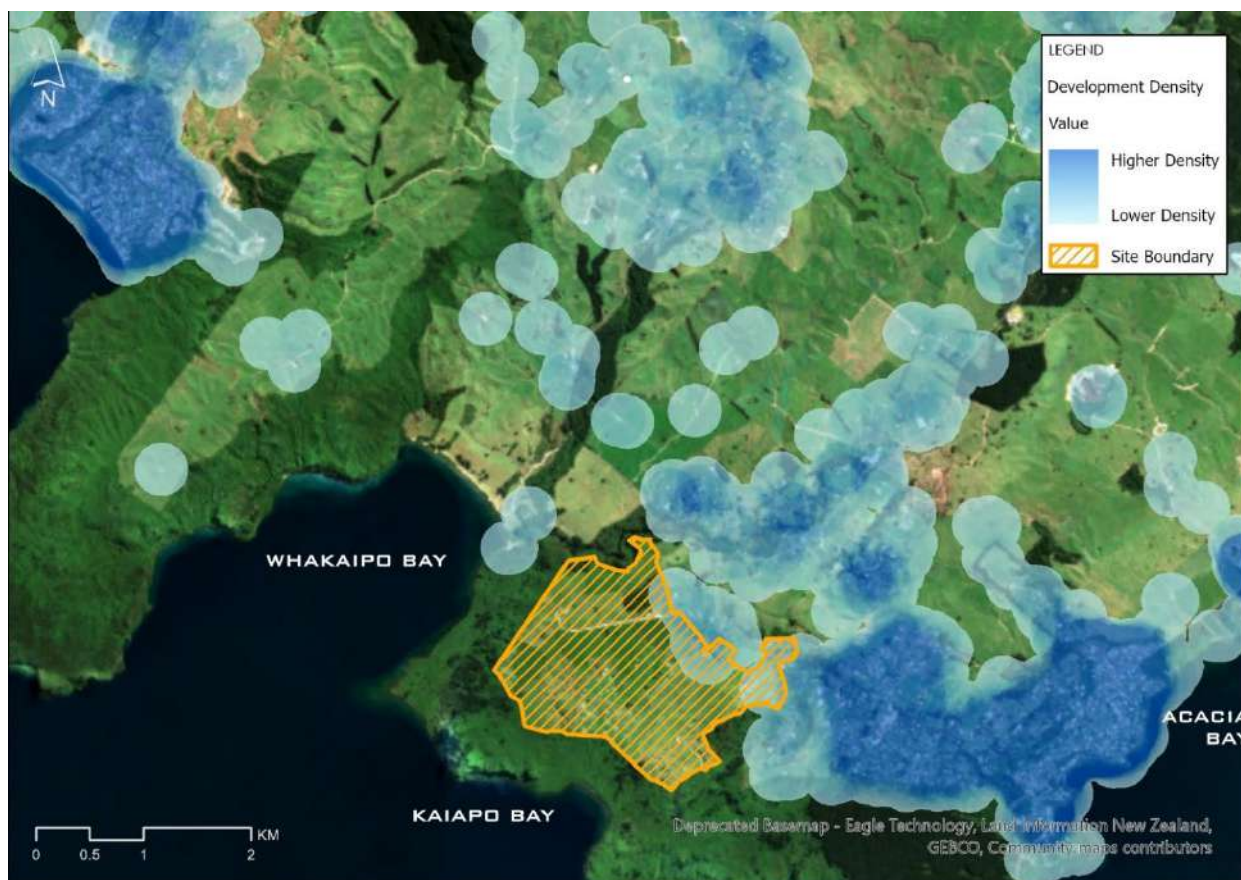


Figure 11: Development Density and Clustering

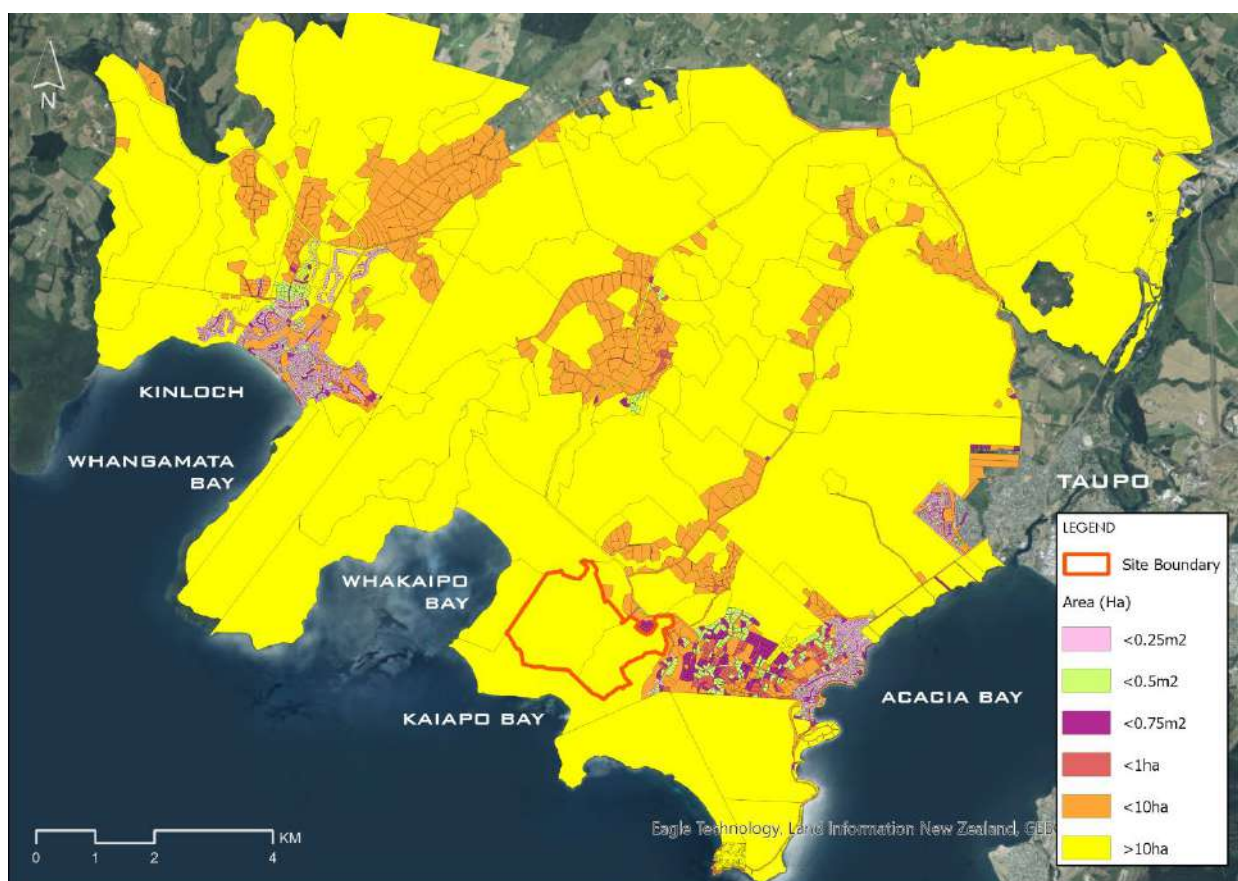


Figure 12: Surrounding Lot Sizes Analysis

Visibility

The more visually prominent parts of the Plan Change Area can be seen in the ZTV analysis map in the Visual Catchment section of this report. In general, the steeper/ elevated parts of the site, including the Waikarariki Point Ridgeline/Mapara Escarpment and Kaiapo Point Ridgeline, are more highly visible and visually prominent from surrounding viewer locations when compared to the gentler, lower-lying terrain found in the Mapara Valley and the basin landform of the Kaiapo Valley.

Site Suitability Summary

In general, the Plan Change Area expresses a moderate degree of suitability for this low-density residential development for the following reasons;

- The site does not contain any outstanding landscapes or features but is bounded by two SNAs.
- No significant indigenous vegetation is contained within the site; however, a block of exotic tree species is located within the site toward the northern boundary. (It is recommended that these trees are retained for landscape integration purposes).
- The site does not contain any high-quality soils.
- The visual catchment of containing site is relatively restricted, meaning that effects of development enabled by the requested plan change will be largely experienced from within the site itself, or from elevated land to the north and east, or more fleetingly, from within Kaiapo Bay itself.
- The site contains large areas of land with viable gradients for residential development, as well as elevated steeper land where limitations should be placed on development.
- The site is located adjacent to existing subdivisions and building densities in the surrounding visual catchment which show greater levels of development to the east and northeast of the site, within the Low-Density Residential zone between Acacia Bay and to the southern side of

the Mapara Escarpment, than within the wider rural landscape to the north (Mapara Valley) and further northeast.

Development Proxy

The LRZ provisions do not define a minimum lot size for the subdivision of land within the zone. Instead, subdivision is managed through matters of control or discretion that require consideration of whether the design and layout provides safe and efficient access, suitable building platforms for future complying buildings, and adequate stormwater management. They also require consideration of natural hazards, land stability, the suitability of future building sites, the provision of appropriate infrastructure, the extent of earthworks and vegetation removal required for roads, access and building platforms, and any actual or potential effects on cultural, historic, landscape or natural values identified in the Plan. These matters provide the framework for assessing whether the subdivision layout is appropriate, rather than relying on a prescribed minimum allotment size.

To assess the potential landscape, natural character and visual amenity effects of the requested rezoning, a representative development proxy has been used. The proxy is not a final subdivision design, and no fixed layout is relied on for the purposes of this assessment. Rather, it provides a practical basis for considering the type, scale and spatial arrangement of development that could reasonably be achieved under the proposed LRZ and small NCZ framework.

In developing the proxy, a range of possible subdivision and development configurations has been considered. These include different arrangements of lot sizes, roads, rights of way, building platforms, open space, planting areas and neighbourhood centre activity. The assessment has then applied a practical, real-world approach to identify a likely form of development that responds to the site's topography, visibility, access requirements, servicing needs, natural drainage patterns and landscape sensitivities.

The proxy assumes that smaller low-density residential lots would be concentrated on the gentler and more developable parts of the site, particularly within the Kaiapo Valley basin, where roads, building platforms and services can be more readily accommodated. Larger lots would be expected in the steeper, more visually sensitive or geotechnically constrained parts of the site, including the Mapara Escarpment, the Kaiapo Point ridge and areas adjoining the rural environment or adjacent natural features.

The proxy also assumes that future subdivision would avoid, where practicable, the most sensitive landforms and landscape features, including prominent ridgelines, steep slopes, gullies, overland flow paths, ephemeral streams and riparian margins. Further, it assumes the retention of existing vegetation where practicable, native restoration planting within gullies and riparian areas, and additional mitigation planting along ridgelines, road corridors and between lots.

This approach is consistent with the matters that would be relevant to a future LRZ subdivision assessment, including safe and efficient access, suitable building platforms, stormwater management, natural hazards, infrastructure, earthworks, vegetation removal, and effects on landscape and natural values.

On this basis, the proxy does not necessarily represent the maximum development yield that could theoretically be pursued under the proposed provisions. It represents a reasonable and suitably conservative assessment scenario, based on how development enabled by the requested zoning could be arranged in a manner that responds to the site's constraints and opportunities. It therefore

provides an appropriate basis for assessing the likely landscape, natural character and visual amenity effects of the requested rezoning.

ASSESSMENT OF EFFECTS ON LANDSCAPE NATURAL CHARACTER AND VISUAL AMENITY

The rating system used is consistent with the recommended 7-point scale contained within Te Tangi a te Manu - Aotearoa New Zealand Landscape Assessment Guidelines.

Document	Effect Rating						
Te Tangi a te Manu - Aotearoa New Zealand Landscape Assessment Guidelines	Very Low	Low	Low - Moderate	Moderate	Moderate -High	High	Very High
Act/Policy	Threshold						
RMA	Less than Minor	Minor	More than Minor		Significant		

Where the level of effect ranges between ratings on this scale, a split rating is provided (e.g., Low-Moderate to Moderate). A Low effect rating that is less than minor is identified as such.

Effects of the Development Enabled by the Requested Plan Change on Landscape Character

Kaiapo Valley

The introduction of dwellings, a school, commercial centre, and associated infrastructure enabled by the requested plan change will affect the existing rural characteristics of the Kaiapo Valley part of the site by introducing low-density residential density of development (with larger lots likely to occur adjacent to the Kaiapo Point ridge to the east and Mapara Escarpment ridge to the west). The degree of the effect would be reduced as the recommended restoration and mitigation planting (refer to the recommendations section of this report) becomes established across the site, the landscape character of the Kaiapo Valley will transition from predominantly low-density development seen amongst establishing vegetation and open pasture, to a more natural landscape with development seen amidst swathes of restoration planting, pockets of mitigation planting and reduced open pasture. This recommended planting will aid in integrating the proposal with the adjacent highly natural landscape features of the Northwestern Bays ONFL and the Kaiapo Scenic Reserve SNA.

This transition is expected to occur over 6-8 years, with the dwellings within the site eventually becoming subservient to the native bush landscape (recommended planting) and curtilage planting likely to occur within each individual lot. Only the larger lots adjacent to the Mapara escarpment ridgeline and Kaiapo Point ridgeline will likely reference the site's previous pastoral land use. These areas are not expected to be prominent from outside of the site from most surrounding viewer locations. The exception to this is where the site is viewed from elevated locations, which will allow the individual low-density residential allotments and pastoral lands use within the larger rural lifestyle lots to become more apparent (this has been discussed in the visual effects section of this report). From these limited surrounding viewer locations, the site will likely appear as a mix of low-density residential development amongst lawn, pockets, and large swathes of planting and larger pastoral blocks.

Waikarariki Point Ridgeline /Mapara Escarpment

The introduction of dwellings and associated infrastructure enabled by the plan change will also affect the existing rural characteristics of a portion of the Mapara Valley by introducing low-density residential development within the eastern extent of the Mapara Valley. Development within the

Mapara Escarpment is likely to consist of larger lot developments, due to the topographic restraints and slope stability risk within this part of the site. Development within the Mapara Valley (adjacent to the northern site boundary) will likely be lots consistent with low-density residential character, owing to the gentler and more stable terrain. The larger lots within the Mapara Escarpment will allow for the retention of open pasture within this part of the site, commensurate with the rural environment within the Mapara Valley (to the north of the site). The recommended mitigation planting will aid in integrating development located within elevated locations within and alongside the upper slopes of the Mapara Escarpment, preventing sky-lining. The recommended restoration planting within the Mapara Riparian Area within the Mapara Valley will aid in integrating the low-density residential development with the adjacent natural landscape features of the Mapara Revegetation Area and Mapara Stream and Whakaipo Bush SNA.

A rural, open pastoral landscape character within the Mapara Escarpment part of the site is expected to remain prominent from outside of the site. While the low-density residential development likely to occur within the Mapara Valley part of the site will alter the existing pastoral character more significantly, this area of the site is not expected to be prominent from outside of the site.

With the recommendations in place (refer to the recommendations section of this report), development enabled by the zoning will:

- a. Maintain the existing topographical features and patterns within the site (including gully systems, the Mapara Escarpment, Kaiapo Point ridgeline, knolls, and ridges).
- b. Enhance the natural characteristics of the northwestern bays ONFL, Lake Taupō ONFL, Northwestern Bays ONFL, and the adjacent Significant Natural Areas (Whakaipo Bush SNA and Kaiapo Bay Scenic Reserve SNA).
- c. Integrate with the existing rural amenity values and characteristics of the wider surrounding Mapara Valley rural landscape.

Existing Pastoral Characteristics of the Site

The site will remain predominantly rural within the Mapara Escarpment part of the site and will retain the sites existing open pastoral character when viewed from most locations outside the Plan Change Area.

The basin shaped landform and remote/inaccessible location of the Kaiapo Valley means that this part of the site is not expected to be prominent from outside of the Plan Change Area. The character within the Kaiapo Valley will change from being predominantly rural, visually characterised by its current farming land use patterns and pastoral/lucerne crop development, to a landscape predominantly characterised by pockets and large swathes of planting, interspersed with dwellings.

Recommended mitigation planting along the ridgelines will ensure that development located within the upper slopes of the Mapara Escarpment ridge and upper slopes of the Kaiapo Point ridge will be able to integrate into these sensitive landforms.

The Kaiapo Valley portion of the Plan Change Area will transform from its rural state to an indigenous vegetation covered landscape, with dwellings nestled amongst it. The increase in indigenous vegetation will contribute to a positive change in character, resulting in a more consistent and harmonious appearance between the Kaiapo Valley and the adjacent Northwestern Bays ONFL and Kaiapo Scenic Reserve SNA.

The introduction of swathes of restoration vegetation within the gully systems and overland flow paths will enhance the visual amenity values of the wider landscape and provide ecological links to the adjacent SNA bush habitat, contributing to the overall ecological value of the area. The

recommended restoration and mitigation planting within the Kaiapo Valley will create continuity and cohesion throughout the area and will help to offset adverse effects associated with the introduction of the low-density residential development within this part of the site.

The effects on visual amenity are discussed later in this report.

Existing Topography and Features

Following the recommendations contained in this report, earthworks associated with any development will be minimised by utilising existing access tracks and within the site for the main access roads. New roads and tracks will be located sympathetic to the underlying terrain to minimise cut and fill. Earthworks associated with the creation of the proposed building platforms for residential dwellings, school buildings and commercial buildings will be shaped and grassed/planted to integrate into the surrounding natural contours and landcover. The building platforms will be located to avoid the steeper slopes within the site.

This approach will ensure that the effects of earthworks on the existing topographical features, such as the Mapara Escarpment, knolls, ridgelines, gullies, and rills, within the site are minimised.

Overall, the earthworks associated with LRZ development within the site will not cause significant disturbance to the existing physical (topographical) features.

Effects on the Nighttime Environment (Dark Sky)

While the development enabled by the requested plan change will alter the nighttime (dark sky) characteristics of the site, through the introduction of low lumen lighting associated with the commercial buildings and dwellings enabled by the rezoning, this will be seen within the context of the wider surrounding low-density residential, rural lifestyle and rural landscape within which scattered light sources can already be experienced. This includes light emanating from rural residential development within the otherwise dark Mapara Valley, and the slightly more intense light emanating from the low-density residential development immediately to the east of the site (between Acacia Bay and Highland Drive). When viewed from out on the lake, lighting within the site is likely to be subservient to the brighter lights associated with Kinloch and Taupō. The exception to this will be from proximity locations within Kaiapo Bay.

Lighting within the Plan Change Area is recommended to be managed to maintain a dark sky environment by shielding all lights, directing lighting away from the Lake and adjacent public reserves (Whakaipo Bay Recreation Reserve) and restricting lighting to a “warm” colour temperature under 3000 Kelvin⁴. It is recommended that no road or street lighting be used along the length of access roads except where required for signage or safety and where appropriate low-lumen downlights be used. These recommended mitigation measures will aid in integrating the development enabled by the plan change with its surroundings and by reducing the visual prominence of any light source visible, reducing the adverse effect on the nighttime environment.

Development Density and Integration

A zoning change from rural to Low-density residential development within the plan change area is considered appropriate as the area is located immediately adjacent to the existing low-density residential development located east of the site, between Highland Drive and Acacia Bay, and the

⁴ The measure of the colour of a light source relative to a black body is expressed in degrees Kelvin (K). Warm white light has a colour temperature between 2700-3500K. Lights rated between 5000K and 6000K are viewed as white, while lights above 6000K tend to have a blue cast.

rural lifestyle and rural development located within the Mapara Valley, to the north and northeast of the site.

Due to topographic and slope stability constraints within the site, the requested zoning will likely enable a development intensity that consolidates smaller lots within gentler terrain with greater slope stability (within the Kaiapo Valley part of the site), while locating larger lots toward the periphery of the site, within the steeper terrain of the Mapara Escarpment, the Kaiapo Point Headland Ridge and adjacent to the rural environment. In this way, the plan change low-density residential development will likely be at the centre of the site, with the larger lots be adjacent to the neighbouring ONFL and SNAs, and the rural zone, satisfying several urban design principles as well as being sympathetic to the surrounding landscape.

Rezoning will enable a development intensity that is consistent with its location at the existing interface between the low-density residential settlement and a rural lifestyle and rural environment. As discussed in the site suitability analysis section of this report, existing low-density development is located immediately to the east of the site (Highland Drive to Acacia Bay) and within the Kaiapo Road 10-lot subdivision immediately to the north, and several nodes of rural subdivision development are present to the north (Charnley Way, Katelyn Place, Ross Rise, Grant Road) and northeast (Tukairangi Road, Hill View Drive and Edge Hill) within the wider surrounding rural landscape. While the larger lots anticipated within the Kaiapo Point ridgeline and Mapara Escarpment (which make up much of the northern part of the site) would be commensurate with the rural lifestyle and rural development, immediately to the north and northeast, within the Mapara Valley.

The development within the plan change area will still be interpreted within the context of the wider surrounding low-density residential, rural lifestyle and rural landscape.

The plan change will not introduce sporadic urban development but rather extends an existing urban/rural transition further west within the landscape. The new location of this rural - low density transition is appropriate as it consolidates low-density residential development to the east of the Mapara Escarpment landform and retains the rural lifestyle character of the Mapara Escarpment and Mapara Valley.

With the recommendations in place, it is considered that the scale and density of the development that will result from rezoning the site to low-density residential will be consistent with the patterns, density, and distribution of development within immediate and wider surrounding landscape and will respond to the sites sensitive location within an Amenity Landscape, adjacent to the northwestern bays ONFL (with a very small part of the ONFL contained within the site boundary) and the Whakaipo Bush and Kaiapo Scenic Reserve SNAs, and the Lake Taupō ONFL.

[Outstanding Natural Features and Landscapes \(ONFLs\) and Amenity Natural Features and Landscapes \(ANFL\)](#)

Rezoning will not adversely affect the key values and attributes of the Lake Taupō ONFL20, or Northwestern Bays (Whakaroa Pt to Otuparae Pt) ONFL28. The proposal will have some adverse effects on the Whakaipo Bay Amenity Natural Features and Landscapes ANFL63 (partially contained within the site).

[Key Values and Attributes of the ONFLs](#)

These valued landscapes have specific physical attributes that contribute to their appeal. These include the lake edge with bush-covered peninsulas, headlands, escarpments, bluffs, sheer cliffs,

rocky outcrops, and waterfalls. The perception of these landscapes is shaped by the high physical prominence and scenic qualities of the lake edge, as well as the coherency of the native vegetation surrounding it. Moreover, they hold associative attributes such as a shared sense of place, cultural and community values, and historical significance.

Any development within the LRZ will be a sufficient distance away from Lake Taupō (ONFL 20), and the headlands, bays and bush which form ONFL 28 and is of a scale that landscape and natural character values associated with these features will not be adversely affected to any great extent. When experienced within the context of modified landscape features, such as other existing subdivisions, modifications to natural vegetation patterns/cleared pastoral grassland areas, adverse effects associated with any future subdivision will be moderated.

The retention of existing planting within the site, in combination with any recommended mitigation planting across the site, will allow the development to be screened, backdropped, grounded and softened, allowing it to successfully integrate with its surroundings. Planting within the gully systems, along streams and ephemeral water courses, along the base of the escarpment and along the northern, western, and southwestern site boundaries, , will have a small positive effect on the Kaiapo Bay Scenic Reserve (SNA and ONFL), the Whakaipo Bush (SNA and ONFL), the Mapara Revegetation area, gully systems and riparian areas within the site. Recommended planting also provides ecological corridors through the location of planting which links existing patches of vegetation. Implementation of the recommended planting will have a small positive effect through enhancing the natural character of the existing surrounding SNA/ONFL vegetation.

Development that may be enabled as a result of the proposed plan change is anticipated to introduce new light sources into the environment which will have a slight effect on perceptions of remoteness and dark night sky. However, as such light sources will be seen in conjunction with existing light sources in the surrounding environment, (the low-density residential development immediately to the east of the site and the wider surrounding rural development between Kinloch and Taupō) they will have only a slight effect on perceptions of remoteness and the dark night sky.

While future development will alter the appearance of the site, the development recommendations contained in this report will assist the integration of a proposal (extensive proposed planting, neutral and/or darker toned building materials and colours and lots/building pads located to avoid steep slopes and visually prominent locations within the site where possible), this change will not affect the wider scenic qualities and sense of remoteness/wildness of the area and will not affect wider natural character in a significant way.

The ONFL's distance from the subject site means that sensory experience of the development within the plan change area will be primarily visual. Such development will not adversely affect the sense of naturalness and ruggedness associated with the large-scale rocky bluffs, escarpments and indigenous vegetation around the Whakaroa Peninsula and the headlands of Whakaipo and Kaiapo Bays. Nor will it adversely affect the wide-open character of Lake Taupō, which is of sufficient scale to absorb the degree of change that may occur.

The factors contributing to the identification of Lake Taupō as an ONFL (Waikato Regional Landscape Assessment 2010) are:

... the expansive areas of water, its memorability and vividness, the natural character of the lake edge and its cultural values.

Activities that could threaten these values would be significant additional development around the lake edge, and on the slopes surrounding the lake. Commercial exotic forestry would also threaten this landscape, as would invasive pest species and wildling pines.

The Lake Taupō ONFL is identified as ONFL 20 under the OTDP, which describes the Outstanding Landscape values as extending to the Lake margins. In many instances, the lake margins of Lake Taupō (including the vegetated lake edges, peninsulas, headlands, and bluffs/escarpments) have also been identified as separate ONFLs, ANFLs and SNA's (many as DoC reserves - and Amenity Natural Features and Landscapes (ANFL's)).

A very small part of the site (southern and western boundary line) contains the northwestern Bays ONFL28, located immediately to the south and west of the site. This ONFL has been described as:

Forms a complex formation of headlands and bays from Otuparae Point south to Whakaroa Point including Whakaipo Bay.

Highly valued for its natural character in close proximity to the developed area of Acacia Bay. Includes contemporary Māori rock carvings in Mine Bay. High scenic value including rocky outcrops and waterfalls, including Waikino.

Physical:

One of the most scenic and undeveloped parts of the Lake Taupō bays and headlands. High level of prominence particularly when viewed from within the lake, and from surrounding bays. Very highly distinctive and unique, with very high degree of naturalness. Largely undeveloped, with sheer cliffs and secluded bays.

Perceptual

Very high importance in mental maps for Taupō communities. Described as a wilderness experience, particularly due to lake of public roads, and accessibility mainly by boat. High vividness and memorability with high level of amenity. Highly coherent landscape.

Meaning and Associations

High shared sense of place and identity for Taupō communities, providing a green backdrop to the lake area, and retaining a high sense of natural environment. Very high historical and cultural values, particularly as forming old access ways across the peninsulas.

The reserve and bush between the site and Lake Taupō provide a buffer that ensures the lake margins will remain free from development. The recommended indigenous planting within the main gullies within the Kaiapo Valley within the site will have a small positive effect on the existing areas of indigenous vegetation along the lake margins immediately to the south and west of the site. This will contribute to the maintenance and enhancement of existing landscape values associated with both the Lake Taupō and Northwestern Bays Whakaroa Pt to Otuparae Pt ONFL (concerning the natural character of the lake edge/margins).

The overall effect of the development enabled by the plan change on the existing landscape and natural character values will be **low**. This rating considers the recommendations outlined in the this report, which includes the extensive areas of planting, and, where possible, recommends the avoidance of roading and house/commercial building/school sites within areas sensitive to change (the Mapara Escarpment Area, Kaiapo Point headland ridge, steep slopes, the Mapara Riparian Areas, ephemeral watercourses, gullies, and existing vegetation).

Key Values and Attributes of the ANFL

The Site is located within ANFL 63 (Whakaipo Bay), described as:

Gentle sloping valley area adjacent to the Lake Taupō margin. High picturesque value and open landscape with views to the lake. Predominantly in grazed pastureland, interspersed with large farm trees and clustered regenerating vegetation around waterways. Provides a highly scenic drive along Māpara Road.

Also includes the foothills of Punatekahi Ridge and Whakaipo Peninsula.

Physical

Prominent feature, particularly in close view to main roads. Highly distinctive for its gently undulating topography, bordered by the prominent headlands either side. Particularly notable for its close association with Lake Taupō in the background. Highly unique and natural.

Perceptual

High importance in mental maps as forming a picturesque bay setting. Highly vivid and memorable due to its coherent landscape cover, being predominantly rural in character within the lake setting. High level of amenity value.

Meanings and Associations

High sense of place for local communities. Little information known on specific historical and Tangata Whenua values within this landscape feature. Highly iconic of the scenic Taupō bays,

Plan Change enabled development within the part of the site located in the Whakaipo Bay ANFL will change its character from predominantly grazed pasture with rural planting to a low-density residential landscape set among existing exotic vegetation, proposed indigenous gully planting, and retained pasture on the steeper slopes of the Mapara Escarpment and Kaiapo Point headland ridge.

The retention of existing vegetation adjoining the Mapara Revegetation Area, together with recommended indigenous planting within the main Kaiapo Valley gully systems, will enhance the landscape and natural character values of Mapara Stream and the ephemeral streams that drain toward ONFL28 and the SNAs to the south and west of the site.

While the change in site character will affect part of the ANFL, it will not alter the characteristics of the wider ANFL. The ANFL is partly valued for the highly scenic experience from Mapara Road. The main change from rural to low-density residential character will largely occur within the gentler terrain of the Kaiapo Basin, which is outside the Mapara Road visual catchment due to intervening topography.

Some increased development density, more akin to rural lifestyle development, may be visible from Mapara Road. However, views of the site from Mapara Road will remain predominantly rural in character, with grazed pasture continuing to be the dominant visible land cover. This is discussed further in the visual effects section of this report.

The low-density residential development enabled by the plan change will generally be screened from surrounding public roads by intervening topography, including Kaiapo Road and Highland Drive. It will, however, be visible from parts of Kaiapo Bay and from some private viewing locations accessed from Kaiapo Road and Highland Drive. This is also discussed further in the visual effects section of this report.

Summary of Effects on Landscape Character

Development enabled by the proposed Plan Change will result in a Low level of cumulative change and a Low cumulative adverse effect on the existing landscape character. This rating considers the recommended mitigation achieved through the avoidance of house sites within areas sensitive to change (The Mapara Escarpment Area, steep slopes, the Mapara Riparian Areas, overland flow paths/ephemeral watercourses, gullies and existing vegetation), natural character and visual amenity vales), and the extensive areas of recommended planting.

The overall effect of the plan change development on the existing surrounding landscape character values will be Low. These effect levels are less than minor effects in terms of the RMA, meaning that, while an observable change will occur within the landscape, that change is not sufficient to change the overall rural character of the site or the surrounding natural landscape.

ASSESSMENT OF VISUAL EFFECTS

The Te Tangi a te Manu - Aotearoa New Zealand Landscape Assessment Guidelines⁵ states:

*Visual matters are integral to landscape rather than a separate category or factor. Physical, associative, and perceptual dimensions are each experienced visually (as well as through other senses).*⁶

For this reason, effects on visual amenity are components of the effects on landscape character and are assessed as follows:

Visual Effects Method

All ratings take into account the mitigation measures recommended in this report, including locating building sites away from visually prominent areas, avoiding steep slopes where practicable to reduce visible earthworks, providing planting, and controlling building colours and materials to assist with landscape integration.

View locations have been grouped for assessment based on their location and viewing characteristics. Different locations may involve different viewer types, viewing sensitivities and viewing durations.

While parts of the development enabled by the proposal may be visible from surrounding locations, the level of effect will vary depending on viewing context, distance, topography, and the screening provided by existing and proposed vegetation.

Visual Catchment

A zone of theoretical visibility (ZTV) analysis was carried out to identify the visual catchment within which development enabled by the plan change would be potentially visible. A proxy development scenario was utilised in the ZTV analysis to demonstrate the type of development likely to occur within the site (which takes into consideration the topographic restraints and landscape sensitivities of the site).

⁵ The Te Tangi a te Manu - Aotearoa New Zealand Landscape Assessment Guidelines were adopted by the NZILA in May 2021, replacing the NZILA Best Practice Note: Landscape Assessment and Sustainable Management 10.1 (NZILA BPN 10.1).

⁶ Para 4.30. Te Tangi a te Manu

Two ZTV maps (refer following maps) were produced, one showing the ZTV at ground level, the other showing the ZTV within which a 7.5m high dwelling within each of the lots is potentially visible.

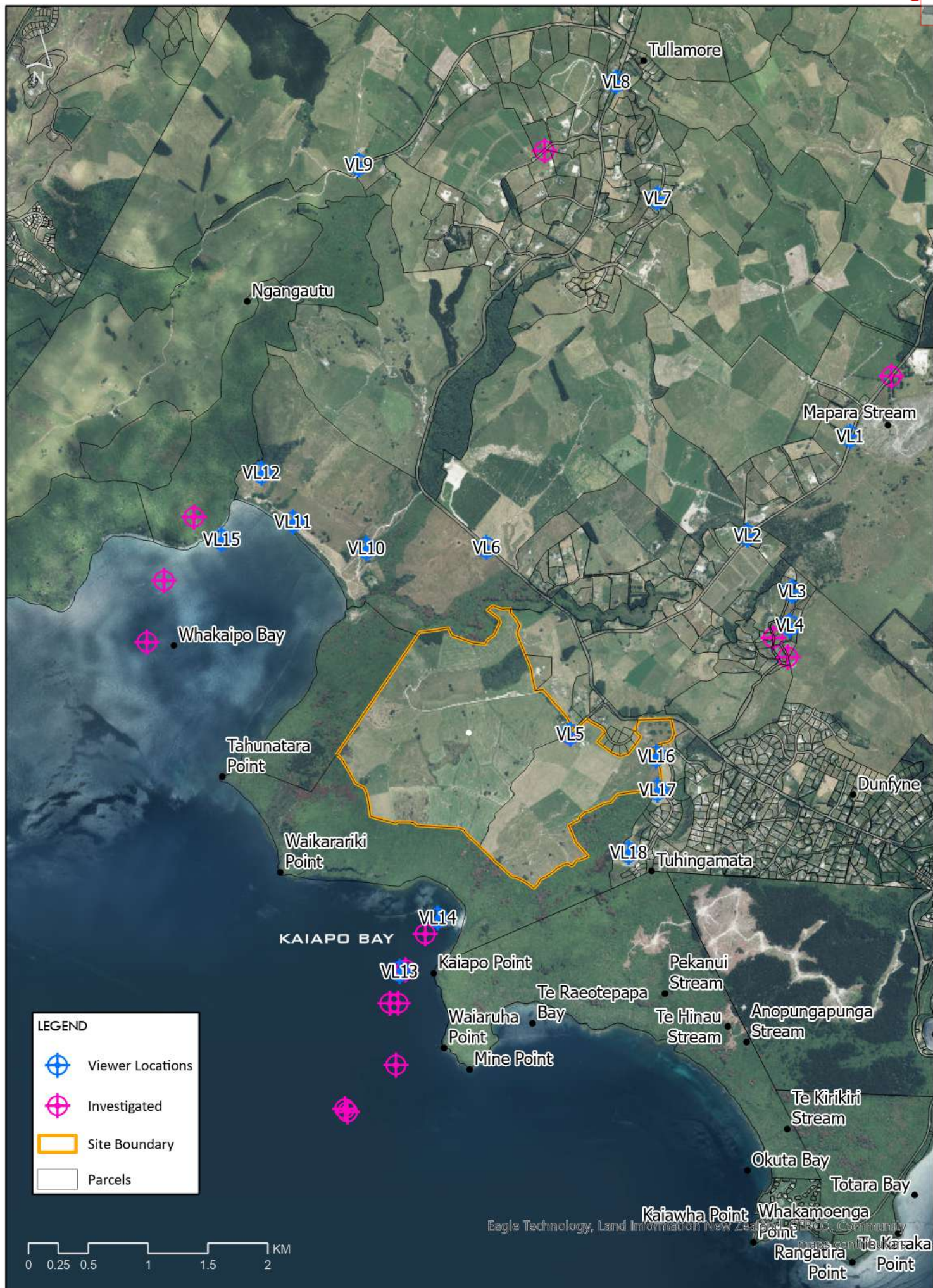
The ZTV analysis used a digital elevation model (DEM) derived from a combination of available elevation data from the national database and site-specific survey data attained in 2020. These ZTV maps do not take into consideration existing vegetation within the site or surrounding landscape. They, therefore, provide a 'worst-case scenario' of potential visibility.

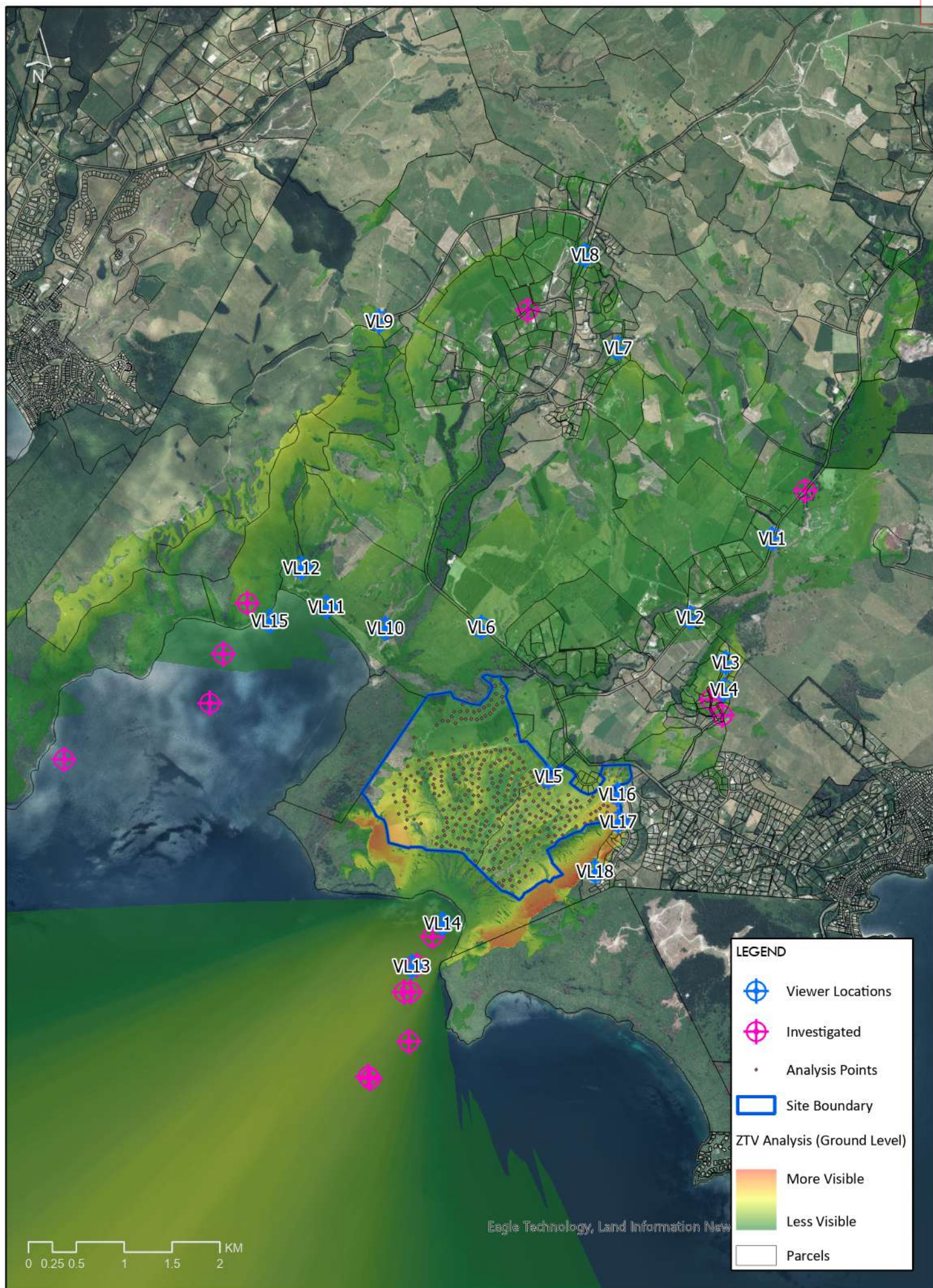
Site visits were carried out in February 2023 and January 2024, to verify the findings of the ZTV analysis and to assess the effects of the development enabled by the requested plan change from view locations representative of the range and types of views available from within the surrounding landscape. These locations were selected based on the availability of existing views from public or private property, viewing frequency, viewer types, viewer distance and the viewing time and framework available at the time of study and are identified as view locations in the following ZTV maps (Pages 35 -36).

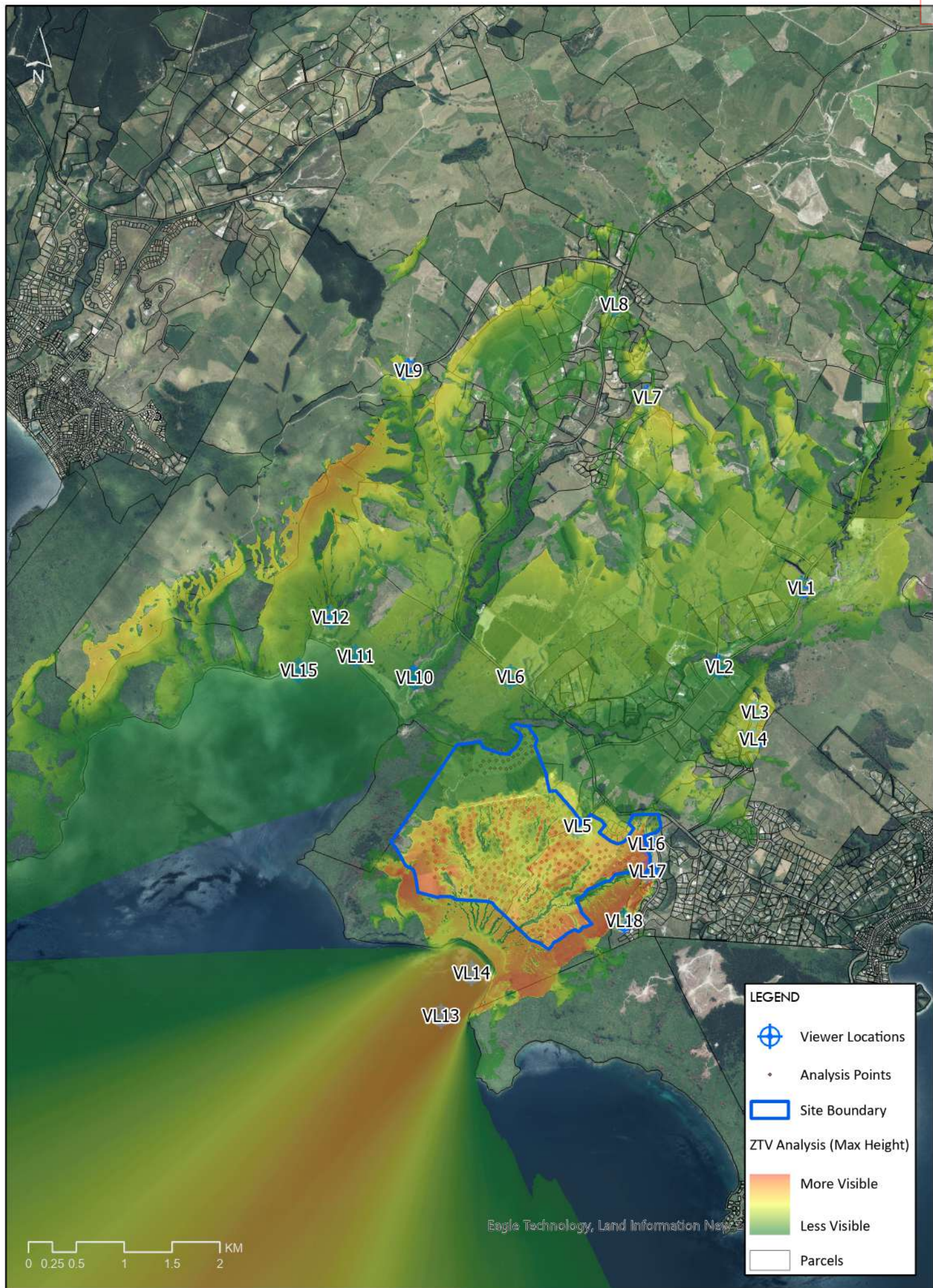
Key findings from the ZTV analysis and site investigation are:

- a. Development enabled by the plan change may be visible from publicly accessible land to the north, northeast, northwest and southwest. Views from the west, east, northeast and southeast are generally screened by intervening topography and vegetation.
- b. Development may also be visible from parts of Lake Taupō to the south and southwest, including Kaiapo Bay, and to the northwest, including Whakaipo Bay. Views from directly west of the site within Lake Taupō are screened by the Waikarariki Point headland.
- c. From locations further out within lake Taupō, development will become difficult to discern due to the distance away and visual complexity of the view and the context of the development within the wider surrounding landscape.
- d. Publicly accessible locations from the site is potentially visible include Kaiapo Road, Mapara Road, Tukairangi Road, Hill View Drive, Edge Hill, Ross Rise and Whakaroa Road as well as from Lake Taupō (Kaiapo and Whakaipo Bays) and the Whakaipo Bay Recreation Reserve.
- e. Private (gated subdivisions) from which the site is potentially visible include the consented (yet to be built) 10 lot subdivision immediately to the north of the site (accessed off Kaiapo Road) and the Highland Drive subdivision (partially constructed).
- f. Field verification found that existing vegetation (planting within gully systems, alongside the Mapara Stream, roadside planting, curtilage planting, shelter rows, hedges, and specimen trees) as well as existing dwellings, sheds and barns will further restrict views into the subject site from surrounding public (and private) locations.
- g. The nearest publicly accessible view location is located at the site boundary at the end of Kaiapo Road, from where views of the development are limited to the top main ridgeline, with development within the Kaiapo Valley screened by intervening topography.
- h. The nearest private dwellings (accessed off Kaiapo Road and Highland Drive) are located approximately 10m - 50m from the site boundary (located on the main ridgeline of the Mapara Escarpment, to the north of the site and the main ridgeline of the Kaiapo Point Headland ridgeline, to the east of the site).
- i. Site inspection identified the clearest views of the site would be from a limited number of elevated locations approximately 1.8km to the northeast, from Hill View Drive and Edge Hill,

and from within Kaiapo Bay to the south and southwest, from approximately 800m - 2000m, away.







Visual Absorption Capability

One of the main factors that will influence a development's visual effect is the visual absorption capability of the surrounding landscape. This is the ability of the landscape to integrate a development or feature into its existing visual character without significant change.

View locations have been rated in terms of visual absorption capability (VAC). Factors considered in determining the sites VAC rating include:

- j. The extent to which the development enabled by the requested plan change visually blends into its surroundings / visually contrasts its surroundings (in terms of colour, form, shadow, style, scale, massing etc).
- k. The role of the surrounding landscape in screening or emphasising the development enabled by the requested plan change .
- l. Visual and physical links with other similar elements or activities in the landscape;
- m. The level of modification to the surrounding landscape (short and long term);
- n. The distance at which the development is experienced (near or far) and how this affects its visual prominence.
- o. The effect of ephemeral factors (seasonal factors, weather conditions, etc) on the above.

Notable views of the site are generally restricted to approximately 2km of the site. Views of the subject site from locations more than this distance diminish to the point at which they become negligible or are less frequent due to intervening vegetation or topography. The site's ability to absorb the development enabled by the requested plan change ranges from Poor-Neutral to Very Good. The definitions for the ratings and the visual absorption ratings for all view locations are attached in appendix three of this report.

The Very Good ratings occur from locations that are generally some distance from the site, where the subdivision is partially screened and/or back dropped by vegetation/topography and seen within the context of other dwellings within the surrounding low-density residential, rural lifestyle and rural landscape.

The Poor-Neutral ratings occur from locations where direct views are available, with little screening provided by intervening topography, vegetation, or existing buildings and little existing low-density residential or rural subdivision development context.

Potentially Affected Viewers

Viewers who may experience changes in landscape character resulting from the requested rezoning include:

- a. Residents of Kaiapo Road, Highland Drive, Mapara Road, Tukairangi Road, Hill View Drive, Edge Hill, Ross Rise and Whakaroa Road;
- b. Motorists using Kaiapo Road, Highland Drive, Mapara Road, Tukairangi Road, Hill View Drive, Edge Hill, Ross Rise and Whakaroa Road;
- c. People recreating on Lake Taupō (boaties, swimmers), within Kaiapo Bay and Whakaipo Bay (to the south and southwest, and northwest, respectively); and
- d. People utilising the Whakaipo Bay Recreation Reserve, campground, and walking/cycling tracks (to the northwest).

Investigated View Locations

Other potential view locations were investigated but have not been included in this assessment for the following reasons:

- a. While visible, the effect of the proposed subdivision on landscape character, natural character and/or visual amenity would be well below the minor threshold of the RMA; and/or
- b. The potential view location was like another view location.

Views from along the walking/cycling track within the Whakaipo Bay Recreation Reserve were investigated, however, it was found that distance and, due to dense vegetation along the track, limited glimpsed fleeting views available and the visual complexity of the vista would make development enabled by the plan change very difficult to discern from locations along this track.

Views from the west within Whakaipo Bay were investigated, but it was found that existing intervening topography and vegetation (of Waikarariki Point Headland) would screen most of the proposal from view and the visual complexity of vistas in and around this location would make the plan change development very difficult to discern.

Views from along Grant Road, Katelyn Place and Charnley Way were also investigated; however, it was found that existing intervening vegetation and topography (Mapara Escarpment) would screen most of the proposal from view and the visual complexity of vistas in and around this location would make the plan change very difficult to discern.

The investigated view locations are identified on the ZTV Maps.

Potential Visual Effects

The development enabled by the zone change will likely result in a small change to the existing visual characteristics of the site and immediate surroundings when seen from Tukairangi Road (VL 1 and VL 2), Mapara Road (VL 6 and VL 8) and low-lying parts of the Whakaipo Bay Recreation Reserve (VL 10 and VL 11) and from within Whakaipo Bay (VL 15). A more pronounced change would be anticipated when seen from elevated parts of the Mapara Valley (Kaiapo Road (VL 5), Highland Drive (VL 16 – VL 18), Edge Hill (VL 4), Hill View Drive (VL 3), Ross Rise (VL 7), Whakaroa Road (VL 9), and elevated parts of Whakaipo Bay Recreation Reserve (VL 12) and from some locations on the lake within Kaiapo Bay (VL 13 - VL 14).

The visual catchment of the plan change area is heavily influenced by the topography of the site and surrounding area, which in turn has informed the recommended development density within the application area. Kaiapo Valley, which terminates in the Kaiapo Bay, is formed by the Mapara escarpment along its western border, which extends in a northeasterly direction from the headland of Wairariki Point to wrap around the northern extent of Kaiapo Valley before extending in a north easterly direction further inland away from the application site. A second escarpment, which culminates at Kaiapo Waiaruha Point, forms the eastern edge of the Kaiapo Valley. Sections of the escarpments and headlands, which contain the steeper slopes, are captured within the application area. The northwestern boundary of the application area also extends beyond the Mapara escarpment to capture a small portion of the level Mapara Valley floor.

Between these two escarpments lies the Kaiapo Valley. The valley floor is generally gently sloping to the south. Flatter gradients are found around the upper areas adjacent to the escarpments forming a broad bench to the northeast, while increased gradients occur further south culminating in a second more level bench area adjacent to the lake edge. The application area does not encompass the entire valley floor, stopping well short of the level bench adjacent to the lake edge, but captures a portion of the upper bench and much of the large area of the increased gradient slope.

Within the application site, as part of the Plan Change recommendations, low density development will occur on the gentler slopes of the Kaiapo Valley floor and a small portion of the Mapara Valley floor. Larger lot developments are recommended on the steeper terrain associated with the escarpments and headlands.

Consequently, when views into the Kaiapo Valley are obtained, the change in landscape character because of a compliant development is likely to align more closely with the low-density development immediately to the east of the site, rather than the surrounding rural landscape to the north and northwest. When broader views of the surrounding area are obtained the landform of the escarpments and headlands are prominent, the change in landscape character because of visible compliant development is more likely to align with the surrounding rural landscape to the north and northwest.

The retention of extensive existing planting (on the eastern extent of the Mapara Escarpment and along the northern and western site boundaries) as well as swathes of indigenous reserve and mitigation planting, as identified in the recommendations, will help to backdrop, screen, and break up the bulk and visual prominence of development. The combination of existing and recommended planting will also aid in integrating it with the surrounding natural landscape features (northwestern Bays ONFL, Kaiapo Scenic Reserve SNA and Whakaipo Bush SNA), the rural environment (to the north and northwest) and the low-density residential environment to the east of the site.

While only publicly accessible view locations have been identified and inspected, several potentially affected view locations on private property were noted. The sensitivity to change for the permanent residents is likely to be greater than that of visitors and transient viewers. Where experienced, adverse effects on visual amenity values are therefore anticipated to be greater for permanent residents in the following locations: Tukairangi Road (VL 1 and VL 2), Hill View Drive VL 3, Edge Hill VL4, Kaiapo Road VL 5, Ross Rise VL 7, Whakaipo Road VL 9 and Highland Drive VL 16 – VL18). While transient viewers travelling along Mapara Road (VL 6 and VL 8) and visitors of the Whakaipo Bay Recreation Reserve and Whakaipo Bay and Kaiapo Bay are likely to be less sensitive to change.

Potential Visual Effects – Mapara Valley

From most locations within the Mapara Valley, including VL1–VL4 and VL6–VL12, parts of the plan change area are visible. However, distance, topography, and existing and future mitigation vegetation will obscure much of the development from view.

From low lying locations, (Tukairangi Rd VL 1 and VL2, Mapara Rd VL6, Whakaroa Rd VL9 and Whakaipo Bay VL10 - VL12) looking from the north and west toward the application site, most of the site is obscured by intervening topography and vegetation, with only the upper slopes of the Mapara Escarpment visible. More westerly locations are generally nearer the application site and lower lying, capturing the broad sweep of the Mapara Escarpment which screens views into the Kaiapo Valley. The vegetation of the Mapara Revegetation Area and Whakaipo Bush SNA screening the low lying portion of the application site within the Mapara Valley.

The northerly viewpoints are elevated, but remain below the Waikarariki Point headland. From these locations, the upper surface of the Mapara Escarpment may be visible, allowing more extensive views of development on this landform.

Where visible, the development enabled by the plan change is likely to form a greater part of the view. However, this development is expected to comprise larger-lot areas with a rural lifestyle character, which can be more readily integrated with the landscape character of the Mapara Valley.

From more elevated localised high points within the Mapara Valley (Hill View Drive - VL 3, Edge Hill - VL 4 and Ross Rise VL7), the upper slopes of the Kaiapo Basin and the upper surface of Mapara Escarpment will be seen with scattered dwellings (predominantly larger lots with a small portion low-density residential development) and infrastructure forming part of these vistas. The low-density residential dwellings within the Mapara Valley (between the base of the Mapara Escarpment and the northern site boundary) will likely remain screened from view by intervening topography and/ or the mature planting within the Mapara Revegetation Area.

From these locations within the Mapara Valley, viewers will experience a shift within the site from the current rural character, towards more larger lots (similar to rural lifestyle lots). They will not experience the low-density residential development likely to occur within the Kaiapo Valley or within the lower southeastern portion of the Mapara Valley due to screening afforded by topography and vegetation. The change will only be visible within a small portion of the view and is not considered to have substantial effect on the wider surrounding character.

Adverse effects on landscape character and visual amenity values associated with a compliant subdivision from these locations are considered to be very low, except for VL3, VL4 and VL7 where they are considered low. These adverse effects will likely reduce to low positive effect with the establishment of the restoration and mitigation planting, which will become a dominant character of the site from these locations, and enhance the natural character, landscape character and visual amenity values of the site and the adjacent SNA and ONFL.

Highland Drive

VL16 - VL18 represent View Locations along Highland Drive, the existing subdivision that is located on the ridgeline that borders the eastern edge of the application site. While the application site is potentially visible from some private residential properties along Highland Drive, a combination of existing topography and vegetation (within and adjacent to SNA186 along the Kaiapo Point Headland ridge) will screen most views of the site from most of the dwellings along this road.

Dwellings along the eastern side of the road are located at a lower elevation than the road level and views across the site are crested by the intervening ridgeline terrain. While on the western side of the road, from most of the dwellings, views across the site are screened by a combination of intervening terrain and existing woodlot vegetation located between these dwellings and the SNA which separates the site from the allotments at the mid to southern end of Highland Drive.

There is some potential, however, for several dwellings on the elevated ridgeline to overlook the application site from the dwellings. Where this potential is realised, most of the low-density residential development within the Kaiapo Valley and the larger lot development anticipated on the main ridgeline of the Mapara Escarpment is likely to be visible. From these locations the character change within the site is likely to be more obvious than from other surrounding view locations due to proximity and overlook.

Development will be seen within the context of the Whakaipo Bush and Kaiapo Bay Scenic Reserve SNAs, and Northwestern Bays and Lake Taupō ONFLs, adversely effecting visual amenity values derived from the natural character of these landscapes and features. The recommended restoration planting within the Kaiapo Valley will aid in integrating the site with natural patterns and ecological corridors of the adjacent SNAs and ONFL bush reserves, enhancing landscape, natural character, and visual amenity values. The recommended mitigation planting, neutral colour schemes and restricted building heights within visually prominent locations, will aid in integrating development with its surrounds.

Initially, the introduction of the low-density residential development within the Kaiapo Valley and larger lots along the steeper terrain will alter the open pastoral landscape character of the site to a low-density residential landscape within areas of establishing indigenous mitigation and restoration planting. As the recommended planting becomes more established, the character of the site will become progressively more natural, integrating the development enabled by the requested plan change with the adjacent SNA bush reserves, and enhancing natural character values of the site (and adjacent Northwestern Bays ONFL and Lake Taupō) as a whole.

Adverse effects on landscape character and visual amenity values associated with a compliant subdivision from these locations are considered to generally be initially very low, except where overlook affords views into the site which would range from low- moderate to moderate. These adverse effects will likely reduce to a low positive effect with the establishment of the recommended restoration and mitigation planting, which would become a dominant character of the site from these locations, and enhance the natural character, landscape character and visual amenity values of the site and the adjacent SNA and ONFL.

Potential Visual Effects – Kaiapo Valley and Embayment

The Kaiapo Valley and embayment provides two areas of potential visibility, from VL5 which represent views from existing residential development located between the application site and Mapara Rd, and VL13 and VL14, which represent views obtained from on the lake within the bay.

Generally, for the dwellings represented by VL5, the main living areas face towards the north (away from the subject site). Topography associated with the Mapara Escarpment and Kaiapo Point ridgeline and vegetation along the road boundary are anticipated to partially screen views of the site from these dwellings.

In addition, the basin topography of the Kaiapo Valley screens the lower slopes from view from these locations, while the existing planting along the eastern extent of the escarpment will screen views of development within the northern part of the site. As a result, only a small portion of development within the plan change area would be visible from these view locations. Due to the relative elevation, it is anticipated that where visible, dwellings within the foreground will partially screen dwellings beyond, reducing the visual extent, scale and density of development experienced from these locations.

Consequently, low-density residential development enabled by the plan change is likely to be seen within the basin of Kaiapo Valley, and potentially capturing some larger lots on the Mapara Escarpment (western) and the Eastern Highland Drive ridgeline.

Initially it is anticipated that development will alter the rural pastoral landscape to a low-density residential landscape set within areas of establishing indigenous mitigation and restoration planting. Once the recommended mitigation planting located along the northern site boundary becomes

established, most of the development enabled by the plan change will likely be screened from view. In the long term, the development area will likely be characterised by indigenous vegetation, with low-density residential development seen amid the vegetation.

VL13 and VL14 are representative of transitory views for people utilising Lake Taupō and Kaiapo Bay (recreational watercraft including the water ski lanes).

Existing visual amenity is derived from views of the lake and reserve areas around the shoreline (Lake Taupō ONFL, the Waikarariki Point and Kaiapo/Waiaruha Point headlands ONFL and the Kaiapo Bay Scenic Reserve (SNA 186), with the rural landscape of the application site in the background providing the context against which the more valued features are seen.

While existing development located at the top of the Kaiapo Valley (including the existing dwelling within the site) and dwellings within the Highland Drive subdivision to the east of the site can be seen from further out in the bay/Lake Taupō, these become crested by the ridgeline and SNA vegetation along the Kaiapo Point ridgeline, as viewers move closer to the head of the bay. As a result, from locations on the lake within the mid (VL 13) to inner (VL 14) Kaiapo Bay, little to no existing development can be seen, and the site and its surrounds impart a more natural character and associated higher existing visual amenity values.

From these locations development enabled by the plan change is likely to be seen within the basin of Kaiapo Valley. Development will be partially screened by and seen above and beyond the SNA vegetation along the foreshore of the lake in the foreground from these locations. Due to the basin landform of the Kaiapo Valley, the change in character within the site is limited to a relatively small visual catchment (some parts of Kaiapo Bay, but not wider Lake Taupō) and potential viewers from this location are limited and fleeting.

As with the other view locations which capture the Kaiapo Valley basin, initially a significant change in character will likely be observed from these viewer locations, where the site will go from predominantly rural pastoral/lucerne to a mix of low-density residential amongst establishing large swathes of restoration planting and pockets of mitigation planting. This will be less noticeable from locations further out in the bay and from Lake Taupō due to distance, and as viewers move closer to the shore, the development will become crested by the SNA vegetation immediately to the south of the site (VL 14) and obscured from view. From on the beach, the application site is completely screened from view by the vegetation within the SNA reserve.

When visible, as any recommended restoration and mitigation planting becomes established, the character of the site will transition to a predominantly bush-clad character, enhancing existing natural character and landscape and associated visual amenity values of the site and the adjacent Northwestern Bays ONFL and SNA.

While development within the catchment will introduce new light sources into an otherwise dark night-time environment, it is not expected that many people will experience this from within the bay, with any overlighting expected to occur close inshore, where the site is screened from view. It has been recommended that lights within the site are shielded, directing lighting away from the Lake and restricting lighting to a “warm” colour temperature under 3000 Kelvin⁷ to reduce adverse effects associated with new light sources.

⁷ The measure of the colour of a light source relative to a black body is expressed in degrees Kelvin (K). Warm white light has a colour temperature between 2700-3500K. Lights rated between 5000K and 6000K are viewed as white, while lights above 6000K tend to have a blue cast.

The transient nature of these viewers from on Lake locations also means that, while visible, plan change enabled future development is unlikely to remain the focus of any views for a prolonged period, with viewers more likely to be focused on the water-based activities they are engaging in.

Once the restoration and mitigation planting become established, it is likely that development will appear subservient to the more dramatic lake edge landscape and views across the open waters of Lake Taupō. The visual amenity associated with the existing natural characteristics of the enclosed Kaiapo Bay environment, emphasised by the near-vertical rocky vegetated cliffs of the headlands containing the bay, which tower 650m above lake level will be largely unaffected by the future development seen in the background of the view.

Initially, some dwellings enabled by the plan change may be seen along the main ridgeline within the site (against the skyline), increasing their visual prominence from these views. Mitigation planting around the dwellings within these lots will help to reduce adverse effects associated with sky-lining and integrate the development with the adjacent bush-clad SNA landscape. The recommended restoration planting will further aid in integrating the site with the adjacent more highly natural SNA and ONFL landscapes and will ensure that the dwellings within the proposal appear recessive.

The use of visually recessive materials and colours on the exterior of all buildings within the development enabled by the requested plan change will further aid the development in integrating with its surroundings.

Adverse effects on landscape character and visual amenity values on these locations, associated with LRZ development, will initially be **low** to **low-moderate** from VL5 and VL14, and **moderate** from VL13. These adverse effects will likely reduce to **low** positive effect with the establishment of the restoration and mitigation planting, which will dominate the character of the site from these locations and enhance the natural character, landscape character and visual amenity values of the site and the adjacent SNA and ONFL.

Summary of Visual Effects

The effect of the compliant subdivision enabled by the plan change on visual amenity values associated with existing landscape character values include:

- c. A small increase in the observable levels of development within the wider rural and low-density residential landscape.
- d. Change in land management practices that result in a loss of rural character.
- e. Increased levels of natural character experienced within the site.

Initially (while the recommended restoration and mitigation planting is establishing), the temporary adverse effects will be slightly higher (likely range between very low and moderate effect (minor)), until such time as the planting becomes established, at which point the effects are likely to shift to a positive low effect.

ASSESSMENT OF EFFECTS ON NATURAL CHARACTER

Section 6(a) of the RMA requires, amongst other things, the preservation of the natural character of wetlands, lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development. While the application site is not located within Lake Taupō or its margins, because the subject site is located within part of the lake edge and a backdrop to Lake

Taupō (and contributes to the natural character values of the lake), potential effects associated with the development enabled by the requested plan change on the natural character values of Lake Taupō have been considered.

While there are no wetlands or permanent streams within the application site, there are stream tributaries (and associated wetland areas) which feed into Lake Taupō via the Northwestern Bays ONFL, SNA and DOC protected Kaipo Bay Scenic Reserve and Whakaipo Bush, immediately to the south and west of the site. Potential effects associated with the plan change on the natural character values of the tributaries to Lake Taupō within the adjacent ONFL/SNA reserves have therefore also been assessed.

Natural Character Values

The natural character of the lake edge has been identified as integral to the identification of Lake Taupō as an Outstanding Natural Feature and Landscape (ONFL 9 under the Waikato Regional Landscape Assessment⁸), with threats to the existing natural character values identified as “significant additional development around the lake edge”:

The main factors contributing to its identification as an outstanding landscape are... the natural character of the lake edge...

Activities that could threaten these values would be significant additional development around the lake edge, and on the slopes surrounding the lake.

Natural character is defined as the distinct combination of an area’s natural characteristics and qualities, including the degree of naturalness.

The Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines state:

Current best practice is to integrate natural science and experiential aspects. The context and purpose of the assessment influences whether the focus is on naturalness (degree of natural character) informed by attention to natural characteristics and qualities or on the specific characteristics and qualities themselves.⁹

Natural character is described in terms of its biotic, abiotic, and experiential characteristics and is rated from very low to very high using the Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines 7-point scale.

The following description is a precis of the natural character values associated with the site and how these are interpreted in the context of the wider study area;

The existing natural characteristics of the site and surrounding environment are influenced by the following factors and are described in terms of:

- *Physical natural elements and processes including abiotic aspects (e.g., landform and water, hydrological processes, geomorphology, climate) and biota aspects (flora and fauna, ecology).*

⁸ *Waikato Regional Landscape Assessment.* Mary C. Buckland, O’Connor Planning Consultants Limited, Chow: Hill and GHD. February 2010

⁹ Para 9.57 *Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines*

- *How they are perceived and experienced including how natural the area appears (how apparent or dominant the human structures or activities are), and how the area's natural aspects are experienced and appreciated....¹⁰*

Existing Natural Character Values

The key attributes and characteristics of the surrounding rural and natural environment that contribute to the existing natural character values of Lake Taupō and its tributaries include:

Physical Factors: Natural Elements and Processes (Abiotic and Biotic)

- The gullies, ridgelines, and deposition plains along the edge of Lake Taupō, including the Mapara and Kaiapo Valleys, formed by the erosion of the original volcanic landform by the Mapara Stream, and other local streams/ ephemeral water courses.
- The headlands, peninsulas and bays and associated escarpments, rocky outcrops, and bluffs which form the edge of Lake Taupō.
- Indigenous bush cover along the steep terrain of the headlands and peninsulas along the lake edge displays high levels of abiotic and biotic naturalness.
- Prominent peninsula and headlands rising steeply to 650-700m above lake level, with rocky outcrops, bluffs and escarpments form the lake edge and backdrop to the lake.
- Lake Taupō and the lake edge (including the Whakaroa Peninsula, Waikarariki Point and Kaiapo Point headlands (the Northwestern Bays)) are identified as Outstanding Landscape Areas (ONFLs) and include DOC conservation reserves and SNAs (Kaiapo and Whakaipo Bay Scenic Reserve bush SNA), under the Operative Taupō District Plan (OTDP).
- Lake Taupō and the lake edge have been historically modified by indigenous vegetation clearance and conversion to open pastoral land and cropping, the townships of Kinloch, Acacia Bay and Taupō, rural settlements, commercial pine forest and other exotic vegetation landcover.
- The site has been historically modified by indigenous vegetation clearance and conversion to open pastoral land and lucerne cropping with stands of mature exotic vegetation and extensive farming related earthworks/terrain modifications, farm tracks, and farm utility buildings.
- Whakaipo Bay Recreation Reserve includes a gravel road and campground, with exotic planting, which has modified the shoreline and lake margins to the northwest of the site.
- Clusters of rural subdivisions (dwellings, road accessways and associated curtilage planting), are located within the wider surrounding lake hinterland (rural landscape).
- Exotic vegetation has predominantly replaced indigenous vegetation along stream margins/within the stream gully systems of the Mapara Valley (including along the Mapara Stream riparian margins and Mapara Revegetation area) and the Kaiapo Valley (within the site). Where the streams pass through the ONFL/SNA and lake margins, immediately adjacent to the site (to the west and south), riparian margins comprise of a mix of indigenous and exotic species.

Experiential Factors: How the Natural Elements and Processes are Perceived and Experienced

- The open expanse of Lake Taupō are highly memorable and the complex formation of headlands and bays along the northwestern lake edge, including vegetated rocky outcrops, escarpments, bluffs, and cliffs along Waikarariki and Kaiapo Point Headlands and Whakaroa Peninsula, hold high scenic value, a sense of wildness/ruggedness, and perceived naturalness.
- Currents within the bays, waves and swells are influenced by surrounding topographical features and dynamics of the streams and rivers which feed into the lake at the bays.
- The memorable scenic qualities of Lake Taupō are enhanced by the sounds of the lake and

¹⁰ Para 9.21. *Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines*
2022-041 Kaiapo Road Plan Change VLA R2_260510

- transient factors such as the presence of wildlife including fish and aquatic bird species.
- d. Sensory experiences associated with the presence of the lake (sounds of the water, smell, water temperature etc) add to the contextual experience.
 - e. The prominent and impressive peninsula and headlands rise steeply to 650-700m above lake level where strongly expressed volcanic and hydraulic processes are evident in the dramatic and dynamic interface between the peninsula/headlands and Lake Taupō.
 - f. The formative processes and patterns associated with Lake Taupō and its margins are evident, except where the shoreline and margins of the Lake have been altered at Kinloch, Whakaipo Bay Recreation Reserve, Whakamoenga Point, Acacia Bay, and Taupō, and adjoining farmland use (pastoral and exotic vegetation), and exotic planting has replaced some indigenous aquatic and lake margin plant species.
 - g. The dynamic nature of the lake imparts a strong sense of naturalness, despite the presence of Taupō and Kinloch Townships and other low-density residential settlements in between (Acacia Bay to Highland Drive), as well as pastoral/farming land uses within the rural environment.
 - h. The presence of Kinloch Township and Acacia Bay to Highland Drive low-density residential development reduces the sense of remoteness and aesthetic coherence associated with this area. The Mapara rural settlement further reduces the sense of remoteness within this area.
 - i. At the Kaiapo Bay and Whakaipo Bay scale, the landscape is generally natural in appearance, with some modification to vegetation patterns (exotic species) along the lake edge, particularly within the Kaiapo Basin, Mapara Escarpment (pasture, lucerne crop and exotic trees) and Whakaipo embayment (only a narrow strip of exotic vegetation is present along the lake margin) where the gentler terrain has allowed for farming and recreational opportunities and sparse buildings/structures (within Whakaipo Bay Recreational Reserve campground).
 - j. At the northern bays scale (further out within Lake Taupō), the landscape is less natural in appearance, influenced by the development of Kinloch Township, including the marina and esplanade reserve which have altered the shoreline of the lake along this embayment, Acacia Bay low-density development and Taupō Township development.
 - k. Ecological patterns and processes associated with the Waikarariki point and Kaiapo Point headlands and the Whakaroa Peninsula (Scenic Reserves and Doc protected natural areas) and other parts of the Lake Taupō northern lake edge and margins are still highly evident (regenerating) and are identified SNAs.
 - l. Recreational values (walking tracks, scenic lookouts, boating/fishing/kayaking within the bays).
 - m. Limited light exposure at the Whakaroa Peninsula, the Headlands of Waikarariki Point and Te Kauwae Point and Whakaipo Bay scale, due to the small number of buildings/structures.
 - n. Existing light exposure at the Lake Taupō scale, due to the presence of Taupō and Kinloch Townships and other low-density residential and rural settlements in between.
 - o. Sense of wildness/ruggedness and perceived naturalness.

Cumulative Existing Natural Character Value

The study area for natural character effects comprises the landscape bounded by the extent of the Mapara and Kaiapo Valleys (to the containing Mapara Escarpment and Kaiapo ridgeline to the north, east and west), and to the south by 2km offshore within Lake Taupō. Activities that occur within this catchment have the potential to affect the existing natural character values of Lake Taupō.

The existing natural character values of the study area range from ***low-moderate*** to ***very high***, with the greater natural character value (***high*** to ***very high*** value) occurring within Lake Taupō, Kaiapo and Whakaipo Bays, within proximity to the ONFL landscapes (ONFL 20: Lake Taupō, ONFL 65: Whakaroa

Peninsula, and ONFL 28: North-western Bays Whakaroa Pt to Otuparae Pt), and lower values occurring in the more modified areas, including the rural pastoral farmland landscape of the Mapara and Kaiapo valleys and the campground of Whakaipo Recreation Reserve (***low-moderate***), and rural planting patterns within the valleys (shelterbelts, riparian planting and exotic specimen trees) (***moderate value***).

When considered collectively, the above attributes combine to give this part of the rural and natural environment (the study area) ***moderate-high*** existing natural character values.

Effects On Natural Character

With regard to physical effects, development enabled by the plan change will not result in any adverse effects on the existing abiotic or biotic attributes of Lake Taupō or its tributaries since the site is physically separated from Lake Taupō (approximately 450m from the edge of Lake Taupō at its nearest point)).

The application site does not contain any permanent streams or wetlands that are subject to natural character assessment under Section 6a of the RMA. The site does however contain four Mapara Riparian Areas¹¹ and many overland flow paths, which feed into the various ephemeral and permanent streams located within the adjacent SNAs (Whakaipo Bush Reserve and Kaiapo Bay Scenic Reserve). For this reason, the potential effects of the proposal on the overland flow paths and the Mapara Riparian Areas have been considered.

There are no significant areas of native vegetation within the site and the development enabled by the plan change will not require the removal of any native vegetation within the site.

Roading required to provide access to the northern part of the site can traverse the Mapara Escarpment without further altering the existing gully landform within the Mapara Riparian Area (this can be seen in the development scenario contained in appendix four). This is because an existing access track has already modified the Mapara Escarpment and Mapara Riparian area and the future access road will likely follow this track (most suitable terrain).

It has been recommended that main access roads, driveways and building platforms enabled by the plan change be located to avoid the existing overland flow paths and streams within the site where possible (avoiding steep slopes or gullies which may cause erosion and ensuring that the landform patterns remain predominantly intact). In addition, retention of existing planting (within the Mapara Escarpment and adjacent to the Mapara revegetation area) as well as recommendations for extensive Indigenous restoration and mitigation planting (refer to recommendations section of this report), will protect the overland flow paths within the site and (as a result), the various ephemeral and permanent streams located within the adjacent SNA (Whakaipo Bush Reserve and Kaiapo Bay Scenic Reserve).

Restoration planting (refer to development scenario map in appendix four) has been recommended to include large swathes within the sensitive gully systems within the site, the Mapara Riparian Areas

¹¹ An inspection of the extent of the *Mapara Riparian Areas* within the application site, suggests that several of these riparian areas are located within highly modified farm drains, culverts, and the access track within the northern part of the site, and that these gully/overland flow path landforms may have been incorrectly mapped. Also, while these areas are overland flow paths, there is no evidence that they contain an ephemeral or permanent waterway or any wetlands.

and overland flow paths, while pockets of mitigation planting have been recommended within road corridors and between allotments, further protecting and enhancing the natural values of these more sensitive areas. This will enhance the ecological values within the site by providing ecological connections with the adjacent SNA reserves.

The recommended mitigation and restoration planting will further aid in managing slope stability and erosion control (sediment runoff), as the planting will be established at the time of subdivision consent (following plan change consent). It has been recommended that an erosion control plan also be implemented during the construction of future development enabled by the plan change, ensuring that Lake Taupō and its tributaries will be protected from potential sediment runoff. With these recommendations in place, the formative processes and patterns of Lake Taupō and its tributaries will remain intact, and the recommended mitigation and restoration planting will have a small positive effect on the physical natural character values of the tributaries and associated wetland areas within the SNAs and ONFL adjacent to the site.

Regarding the perceptual/experiential effects of the development enabled by the plan change on natural character values, while the application site is not located within the margins of Lake Taupō (due to separation distance), it forms part of the backdrop to the lake and therefore potentially influences the natural character values of the lake. As such the potential effects on the natural character values of Lake Taupō will be experiential only, with the level of effects being determined by the perceptions and expectations of those experiencing the site as part of the backdrop to the lake. Due to vegetation cover, there will be no observable change to the stream tributaries located within the SNA/ DOC reserves immediately adjacent to the site (Whakaipo Bush and Kaiapo Bay Scenic Reserve), and therefore, potential adverse perceptual/experiential effects on Lake Taupō only have been considered.

Lake Taupō and the lake edge is currently experienced at a wide range of distances, by diverse groups within the context of several transient factors. It is experienced from the following location types:

- a. From on Lake Taupō (recreational water vessels), within Kaiapo Bay and Whakaipo Bay (to the south, southwest, west, and northwest), at approximately 450m – 2km away from the site.
- b. From Whakaipo Bay Recreation Reserve, campground, and walking/cycling tracks (to the southeast).
- c. From the Great Lake Trail between Whakaipo Bay Recreation Reserve and Whakarua Point, and the Tahunatara Point Walking Track along the base of the Waikarariki Point Headland, between Whakaipo Recreation Reserve and Tahunatara Point.
- d. From the Kaiapo Valley and Kaiapo Point Ridgeline (motorists and residents), at approximately 1.5km – 2km away.
- e. From the Mapara Valley (motorists and residents) to the north and northwest, at approximately 700m - 5km away.

The plan change will likely result in a change in the perceptions of the existing natural character associated with the lake edge within the study area, with the type of development likely to occur consisting of a mix of low-density residential scale development, larger lot development (likely to occur where steeper terrain of the gully systems, Mapara Escarpment and Kaiapo Point ridge restrict development), large swathes of restoration planting and pockets of mitigation planting within the site. Restoration and mitigation planting has been recommended to aid in integrating the site with the adjacent natural landscape features and will result in an enhancement of natural character

values within the gullies and steeper slopes, as well as an enhancement of ecological connections with the adjacent ONFL/ SNAs. This will help to offset adverse effects resulting from the development enabled by the proposed rezoning within the site, with natural character values influenced by the following factors:

- a. The site is located within the part of the lake edge which has already been historically modified (open pastoral farmland, lucerne cropping, extensive farming related earthworks/terrain modifications, farm tracks, farm utility buildings) and already has reduced natural character values.
- b. The site is physically separated from Lake Taupō by 450m at its nearest point. This separation distance, along with the elevation difference and existing modifications to the site, mean that the development enabled by the plan change will not be perceived as being directly associated with the margins of the lake.
- c. Where the site is viewed from within proximity (Kaiapo Bay) perceived/experiential adverse effects on natural character values (experienced initially, while the recommended planting establishes) are likely to be higher than from the wider scale of the northwestern Bays (where context of Kinloch, Acacia Bay and Taupō Township are visible). However, as discussed in the visual effects section of this report, due to the basin landform of the Kaiapo Valley, the change in character within the site and the effects on natural character values of the lake edge backdrop to Lake Taupō are contained to a relatively small visual catchment (some parts of Kaiapo Bay, but not the wider Lake Taupō) and potential views obtained from these locations are limited and fleeting.
- d. Recommended areas of restoration and mitigation planting will enhance the site's natural character, extending native bush from the adjacent SNA reserves into the gullies, riparian areas and overland flow paths within the site and parts of the Mapara Escarpment and Kaiapo Point ridgelines (with the low-density residential and rural-lifestyle development integrating into the large swathes and pockets of native bush). This will alter the site's perceived character from open pastoral/cropping rural to low-density residential/rural lifestyle development seen amongst large swathes and pockets of indigenous bush and smaller areas of open pasture. Once established, the restoration and mitigation planting will enhance the natural character values of the site and adjacent SNA reserves (and backdrop to Lake Taupō). This aligns with the natural characteristics of the adjacent Northwestern Bays ONFL and the SNA reserves.
- e. Earthworks as a consequence of plan change enabled development are to be carefully designed and managed (refer to recommendations section of this report) to limit disturbance to the underlying topography, with the roads and accessway located to integrate into the landscape as much as possible. This means that extensive areas of cut, and fill and retaining walls are avoided where possible. Further, the shaping and grassing or planting of all cut and fill batters associated with building platforms enabled by the plan change, ensures that the development will integrate with the adjacent natural landform.
- f. The low-density residential development will introduce new light sources into the site (which forms the backdrop to Lake Taupō), resulting in some adverse night-time lighting effects. However, it has been recommended that lighting within the site will be mitigated by placing controls over the use of exterior lights including a requirement to shield all lights, directing lighting away from the Lake, and restricting lighting to a “warm” colour temperature of under 3000 Kelvin¹². In addition, there will be no road or street lighting used along the length of

¹² The measure of the colour of a light source relative to a black body is expressed in degrees Kelvin (K). Warm white light has a colour temperature between 2700-3500K. Lights rated between 5000K and 6000K are viewed as white, while lights above 6000K tend to have a blue cast.

the access road and low lux downlights will be used where signage and/or safety lighting is required. The recommended planting will also provide some screening.

Overall Natural Character Effect Rating

With the establishment of the mitigation and restoration planting, development associated with the plan change is likely to have a **very low** adverse effect on perceptual/experiential natural character values associated with Lake Taupō at the wider (Lake Taupō) scale, with **low - moderate adverse** perceptual/experiential effects likely from some proximity locations within Kaiapo Bay (refer to the visual effects section of this report).

Development enabled by the plan change will not adversely affect the streams and wetlands within the SNA/ONFL reserves immediately adjacent to the site due to separation distance and recommended erosion control (sediment runoff) and indigenous planting within the sensitive gullies, riparian areas, and overland flow paths within the site, which will have **low positive** effects on the natural character values of the site and adjacent SNAs/ONFL. This is because the proposed mitigation and restoration planting will enhance the physical (abiotic and biotic) and perceptual and experiential natural character values within the site, extending the natural character values associated with the adjacent SNA reserves and enhancing the overall natural landscape values associated with the ONFL.

RELEVANT STATUTORY AND NON-STATUTORY PROVISIONS

To understand how the **requested** plan change may affect landscape character and visual amenity within the site and its surrounding landscape, it is necessary to consider the key statutory and non-statutory provisions that influence the nature and extent of landscape change anticipated in this location.

The relevant statutory framework includes:

- a. the Resource Management Act 1991 and subsequent amendments;
- b. the Waikato Regional Policy Statement; and
- c. the Operative Taupō District Plan.

These documents establish the relevant expectations for landscape character, natural character and visual amenity through their objectives, policies and rules. In particular, the Operative Taupō District Plan is relevant because it identifies the outcomes anticipated under the existing zoning and the proposed zoning and provides the wider framework for managing the consequential effects of subdivision, built form, earthworks, infrastructure, lighting, planting and land use change.

The Taupō District Growth Management Strategy 2050, 2018, has also been considered as a relevant non-statutory document.

The following section provides an overview of the key provisions most relevant to landscape, natural character and visual amenity matters. It considers how the proposed rezoning may change the landscape outcomes currently anticipated for the site, and how the wider planning framework would manage the effects of development enabled by the proposed zoning.

Resource Management Act 1991

The subdivision must meet the requirements of the Resource Management Act (RMA), and it is therefore important that the assessment of visual, landscape and amenity effects address the requirements of Part 2, of the Act. The key sections relevant to this application are S6(a), S6(b), and S7(c & f).

Concerning s6(a), as detailed in the natural character section of this report, with the mitigation and restoration strategy in place, development enabled by the proposed rezoning is likely to have a **very low adverse effect** on the perceptual/experiential existing natural character values of the site and its surroundings (Northwestern Bays ONFL and Lake Taupō) at the wider Northwestern Bays scale. Development enabled by the requested plan change will not adversely affect the physical factors (biotic and abiotic) of Lake Taupō or the streams and wetlands within the SNA/ONFL reserves immediately adjacent to the site due to separation distance and recommended erosion control (sediment runoff) and indigenous planting within the sensitive gullies, riparian areas, and overland flow paths within the site. The recommended mitigation and restoration planting will enhance the physical (abiotic and biotic), perceptual and experiential natural character values within the adjacent Northwestern Bays ONFL and the Kaiapo Scenic Reserve and Whakaipo Bush SNAs.

With regard to s6(b), as discussed in the landscape character section of this report the adjacent North-western Bays and Lake Taupō have been identified as an Outstanding Natural Features and Landscapes(ONFLs). With the recommended mitigation and restoration planting in place, the

development enabled by the requested plan change will enhance the existing biophysical, perceptual, and associative values that contribute to the ONFL status of these landscapes.

Regarding Section 7(c & f), until the wider recommended landscape restoration and mitigation plantings become established, the adverse effects of the development enabled by the plan change on the existing visual amenity values will likely range from very low to low - moderate (as detailed in the visual effects section of this report). These ratings consider the additional mitigation measures recommended (location of building sites to avoid visually prominent locations, avoidance of steep slopes to reduce visible earthworks and restrictions surrounding building colours and materiality), which aid in integrating the proposed subdivision with the surrounding landscape. Once the mitigation and restoration planting become established, effects on visual amenity values are likely to result in low positive effect.

Waikato Regional Policy Statement

The Waikato Regional Policy Statement provides the higher-order regional framework for managing natural and physical resources, including riparian areas and wetlands, indigenous biodiversity, outstanding natural features and landscapes, natural character, amenity and the built environment. The provisions most relevant to this landscape and visual assessment are LF-O3, ECO-O1, ECO-P1, ECO-P2, NFL-O1, NFL-P1, NATC-O1, NATC-P1, IM-O9 and IM-P5.

LF-O3, Riparian areas and wetlands

LF-O3 seeks the management of riparian areas and wetlands to maintain and enhance public access and amenity values, and to maintain or enhance water quality, indigenous biodiversity, cultural values, riparian habitat quality and extent, and wetland quality and extent.

The proposed rezoning would not require development within the principal riparian, gully or overland flow path areas identified for protection and restoration. The development proxy and recommendations provide for native restoration planting within sensitive gully systems, overland flow paths, ephemeral streams and riparian areas. This would assist in maintaining and enhancing riparian habitat, natural character and amenity values within the site.

Compared with the existing General Rural Zone, the proposed Low Density Residential Zone would enable a greater density of development and associated earthworks, roads and infrastructure. However, the development enabled by the requested plan change framework provides an opportunity to retire sensitive riparian and gully areas from productive rural use, strengthen native vegetation patterns and improve the landscape and ecological function of those areas. On this basis, the proposed rezoning can be managed in a way that is consistent with LF-O3.

ECO-O1, ECO-P1 and ECO-P2, Indigenous biodiversity

ECO-O1 seeks a healthy and functional state for the full range of ecosystem types, their extent and the indigenous biodiversity they support. ECO-P1 promotes positive indigenous biodiversity outcomes, including restoration of habitats, connectivity between habitats, and buffering or linking areas of significant indigenous vegetation and significant habitats of indigenous fauna. ECO-P2 requires significant indigenous vegetation and significant habitats of indigenous fauna to be protected by ensuring the characteristics that contribute to their significance are not adversely affected to the extent that their significance is reduced.

The application site is not located within a Significant Natural Area. The Whakaipo Bush SNA and Kaiapo Bay Scenic Reserve SNA are located adjacent to the site. Development enabled by the

proposed rezoning would not extend into those SNAs and would not require the removal of SNA vegetation.

The recommended restoration and mitigation planting would strengthen indigenous vegetation patterns within the site and provide improved ecological and landscape connections to the adjacent SNAs. In particular, planting within gullies, overland flow paths, ephemeral streams and riparian areas would buffer and link existing natural areas and assist with the enhancement of indigenous biodiversity values.

In this respect, while the proposed LRZ and small NCZ area would enable a greater level of built development than the existing GRUZ, the associated planting and open space framework provides a mechanism to maintain and enhance indigenous biodiversity outcomes in a manner consistent with ECO-O1, ECO-P1 and ECO-P2.

NFL-O1 and NFL-P1, Outstanding natural features and landscapes

NFL-O1 seeks the identification and protection of outstanding natural feature and landscape values from inappropriate subdivision, use and development. NFL-P1 requires identified values and characteristics of outstanding natural features and landscapes of regional or district significance to be protected from adverse effects, including cumulative effects, arising from inappropriate subdivision, use and development.

The application site is not located within an Outstanding Natural Feature or Landscape identified in the Waikato Regional Policy Statement or Operative Taupō District Plan. However, it is located close to the Lake Taupō / Northwestern Bays outstanding landscape context, and the effects of the proposed rezoning on the values and attributes of those landscapes are relevant.

The development enabled by the proposed rezoning would be visible from some surrounding locations and would change the character of the site from rural to low-density residential. However, the development proxy demonstrates that built development can be located and managed to avoid the most visually sensitive landforms where practicable, including the main ridgelines, steep slopes and the Mapara Escarpment. Larger lots are also anticipated within more sensitive or visually prominent areas, with smaller LRZ-scale lots concentrated in less constrained parts of the site.

The recommended restoration and mitigation planting would soften, screen and backdrop future built form, strengthen existing vegetation patterns and improve the relationship between the site and adjacent natural landscape features. On this basis, the proposed rezoning would not adversely affect the key values and attributes of the nearby ONFLs, and the extensive restoration planting would have a positive effect on the wider natural landscape setting.

IM-O9 and IM-P5, Amenity

IM-O9 seeks to maintain or enhance the qualities and characteristics of areas and features valued for their contribution to amenity. The WRPS definition of amenity values refers to the natural or physical qualities and characteristics that contribute to people's appreciation of an area's pleasantness, aesthetic coherence, and cultural and recreational attributes.

The proposed rezoning would change the amenity experienced within and around the site. In particular, it would enable a greater number of dwellings, roads, accessways, domestic curtilage areas, fencing, lighting and associated activity than would be anticipated under the existing GRUZ. A small NCZ area would also enable a more concentrated node of commercial, community and supporting built form.

Those changes would reduce the existing rural openness of parts of the site and introduce a more settled low-density residential character. However, the development proxy and recommendations demonstrate that these effects can be managed through the distribution of lot sizes, the siting of building platforms, the avoidance of visually sensitive slopes and ridgelines where practicable, and the use of restoration and mitigation planting.

The recommended planting framework would also contribute positively to amenity values by strengthening gullies, riparian areas, overland flow paths and ridgeline vegetation, and by integrating development with the surrounding landscape. Accordingly, while the amenity of the site would change, the resulting amenity can be maintained at an acceptable level and, in some respects, enhanced through the recommended landscape framework.

NATC-O1 and NATC-P1, Natural character

NATC-O1 seeks to protect the natural character of the coastal environment, wetlands, lakes, rivers and their margins from the adverse effects of inappropriate subdivision, use and development.

NATC-P1 requires activities within the coastal environment, wetlands, lakes, rivers and their margins to be appropriate in relation to the level of natural character present.

The application site is not a pristine area and is not identified as having high or outstanding natural character. It is a farmed and modified rural landscape. However, parts of the site contribute to the perceived natural character of the wider setting, particularly where gullies, overland flow paths, ephemeral streams, vegetation patterns and escarpment landforms are experienced in association with Lake Taupō, Kaiapo Bay, Whakaipo Bay and the adjoining SNA and ONFL context.

The proposed rezoning would introduce built development into this setting. However, the most sensitive natural character elements within the site, including gullies, overland flow paths, ephemeral streams and riparian areas, are intended to be retained and enhanced through native planting. Development is also recommended to be located away from steep slopes, ridgelines and visually prominent areas where practicable.

While development enabled by the rezoning may be visible from some locations, it would not become a dominant element in the wider natural character context, provided the recommended siting, planting and earthworks measures are adopted. The recommended restoration planting would also enhance natural character values by increasing indigenous vegetation cover and strengthening the landscape and ecological relationship between the site and adjacent natural areas.

Operative Taupō District Plan

The subject site is located within the General Rural Zone (GRUZ) under the Operative Taupō District Plan (OTDP). The submitters seek to rezone the site to Low Density Residential Zone (LRZ), with a small area of Neighbourhood Centre Zone (NCZ). Accordingly, the provisions relevant to the assessment of effects on the landscape and natural character are included in the following sections of the OTDP:

- a. Section 10.2, Natural Character;
- b. Section 10.3, Natural Features and Landscapes;
- c. Section 11, Subdivision;
- d. Section 13.3, Low Density Residential Zone;
- e. Section 13.4, General Rural Zone; and
- f. Section 13.7 Neighbourhood Centre Zone.

The relevant provisions are contained in Appendix Seven.

PC42 removed the former Mapara Valley Structure Plan, Mapara Valley Environments and associated provisions from the OTDP, and those matters are now more appropriately addressed through the current GRUZ, subdivision, natural character, natural features and landscapes, and zone provisions.

Existing General Rural Zone

The existing GRUZ framework anticipates a rural landscape with a predominance of open space, productive rural land use, vegetated areas, dispersed buildings and a relatively low level of infrastructure. In landscape and visual amenity terms, the GRUZ provisions seek to maintain rural character by managing the scale, density and location of subdivision and development, and by retaining the open space and dispersed building pattern that distinguishes the rural environment from urban and residential environments.

The current rural planning framework is relevant as the existing baseline against which the proposed rezoning is assessed. The key landscape and visual values associated with the existing zoning include:

- a. the openness of the rural landscape;
- b. the predominance of pastoral, vegetated and natural land cover;
- c. the relatively low density of buildings;
- d. the dispersed pattern of rural development;
- e. the rural scale and character of roads, accessways and infrastructure;
- f. the visibility and legibility of ridgelines, gullies, escarpments and other landform features; and
- g. the relationship of the site to adjacent natural and landscape features, including the Northwestern Bays Outstanding Landscape Area, Whakaipo Bush SNA, Kaiapo Bay Scenic Reserve SNA, Kaiapo Bay and Whakaipo Bay.

From a landscape character perspective, the GRUZ provisions recognise that rural areas contain a range of activities and are not pristine or undeveloped landscapes. However, they seek to manage activities so that rural character, rural amenity, productive land use and landscape values are not eroded by inappropriate or poorly located development.

Proposed Low Density Residential Zone framework

If the rezoning is approved, the LRZ provisions would replace the GRUZ framework as the principal zone framework for most of the site. This would enable a change in the anticipated character of the site, from a predominantly rural land use pattern to a more settled low-density residential environment.

From a landscape and visual amenity perspective, the key change is not simply the introduction of residential activity, but the significant increase in the density and extent of subdivision, dwellings, roads, accessways, domestic curtilage, fencing, lighting, infrastructure and amenity planting that would be enabled. These activities would be more intensive and more residential in character than is anticipated under the current GRUZ provisions.

However, the LRZ framework is still a low-density residential framework. It does not anticipate the same level of built intensity as the General Residential Zone or Medium Density Residential Zone. The relevant LRZ standards provide for maximum combined coverage of 10% of the gross site area, 10 m front and other boundary setbacks, 0 m setbacks for common wall boundaries, and a maximum building height of 8 m where the Height Restricted Area does not apply. Height in relation to boundary is controlled by a 2.5 m height at the boundary with a 45-degree recession plane, except for common wall boundaries.

In landscape terms, those standards would allow the site to accommodate residential development while retaining a relatively open settlement pattern. The 10 m setbacks and low combined coverage would assist in maintaining separation between buildings and provide space for open areas, planting and landscape integration. That is particularly important in this location because of the site's elevated landform, proximity to adjacent natural areas, and visibility from parts of the surrounding landscape.

Comparison between the GRUZ and LRZ frameworks

The GRUZ and LRZ provisions manage different anticipated environments. The GRUZ provisions seek to maintain rural character, rural amenity and a dispersed pattern of development. The LRZ provisions anticipate residential use and subdivision, but at a relatively low density and with larger setbacks and lower coverage than more intensive residential zones.

The proposed rezoning would therefore change the planning expectation for the site. Under the GRUZ provisions, residential development is ancillary to the rural environment and is generally expected to remain limited and dispersed. Under the LRZ provisions, residential activity becomes the primary anticipated land use. The resulting landscape change would include:

- a. a greater number of lots and dwellings;
- b. a more regular pattern of roads, accessways and infrastructure;
- c. increased domestic curtilage and garden development;
- d. more fencing, lighting, signage and vehicle movement;
- e. a stronger perception of settlement; and
- f. reduced rural openness within those parts of the site developed for residential purposes.

While this would be a material change from the existing rural zoning, the proposed LRZ framework is appropriate in landscape and visual amenity terms provided the future subdivision and development is structured to respond to the site's landform, visibility and landscape sensitivity. The development proxy demonstrates how this can occur by locating more intensive residential development on gentler and less visually sensitive land, retaining larger lots in steeper or more sensitive areas, avoiding prominent ridgelines and escarpment slopes where practicable, and using restoration and mitigation planting to integrate built form.

Neighbourhood Centre Zone

A small area of Neighbourhood Centre Zone is also proposed. The NCZ provisions anticipate a more concentrated form of activity than the LRZ. The purpose of the zone is to provide for small clusters of convenience-based commercial activities and food and beverage outlets that serve the day-to-day needs of the surrounding neighbourhood. The provisions also state that large-scale commercial and long-stay activities are not anticipated in the zone.

The NCZ would therefore introduce a more visibly urban and active node within the wider low-density residential framework. Relevant landscape and visual effects could arise from commercial or community buildings, parking, hardstand, servicing, signage, lighting and greater levels of pedestrian and vehicle activity. However, the scale of the NCZ is limited, and the provisions include controls to manage its interface with residential and open space areas, including bulk and location controls and screening requirements for adjoining residential or open space boundaries.

The NCZ component is acceptable in landscape and visual terms where it remains small in scale, is located away from the most visually sensitive parts of the site and is integrated with the surrounding residential and open space structure. Its role would be to support the day-to-day needs of the future neighbourhood rather than to create a separate commercial centre of wider visual or functional prominence.

Section 11, Subdivision

The subdivision provisions are important because they will determine the pattern, density and layout of future development. While rezoning would establish the land use framework, subdivision would determine how that framework is translated into lots, roads, reserves, building platforms, infrastructure corridors and open space.

In landscape and visual amenity terms, Section 11 is relevant because subdivision design can either reinforce or weaken the site's underlying landscape structure. In this case, the key subdivision matters include:

- a. whether lot boundaries respond to landform, gullies, ridgelines, riparian margins and vegetation patterns;
- b. whether roads and accessways avoid unnecessary disturbance to steep slopes and visually prominent landforms;
- c. whether building platforms are located away from skylines, ridgelines and the most sensitive escarpment slopes where practicable;
- d. whether larger lots are used in steeper, more visible or more constrained parts of the site;
- e. whether open space and reserve areas protect and enhance gullies, overland flow paths, riparian areas and ecological links; and
- f. whether future development can be appropriately serviced without generating adverse landform, visual or natural character effects.

The development proxy used in the assessment of the appropriateness of the provisions responds to those matters by showing a subdivision pattern that is not simply driven by maximum yield. It uses larger lots in the more sensitive parts of the site, concentrates smaller low-density residential lots in less constrained areas, and retains an open space and planting framework through the gullies, overland flow paths and riparian areas. That approach is consistent with the role of the subdivision provisions in managing the layout and effects of development.

Section 10.2, Natural Character

Section 10.2 is relevant because the site is close to Lake Taupō, Kaiapo Bay, Whakaipo Bay, riparian areas, ephemeral streams, gullies and adjacent natural areas. Although the site is currently farmed and modified, its landform and vegetation patterns contribute to the perceived natural character of the wider setting, particularly where it is experienced in association with the lake, bush-covered margins, gullies and escarpment landforms.

The proposed rezoning would not directly urbanise the lake margin or adjacent SNA areas. The principal natural character issue is whether development within the site would adversely affect the perceived naturalness of adjacent gullies, riparian margins, overland flow paths and the wider lake-margin setting.

Development enabled by the plan change can respond by:

- a. avoiding development within sensitive gullies, overland flow paths, ephemeral streams and riparian areas where practicable;
- b. retaining existing vegetation where practicable;
- c. establishing native restoration planting within gullies, riparian areas and overland flow paths;
- d. strengthening ecological and landscape connections between the site and adjacent natural areas; and
- e. locating built development so that the landform and vegetation framework remains legible.

On this basis, the proposed rezoning can be managed so that natural character values are maintained and, in parts of the site, enhanced through restoration planting and retirement of sensitive land from development.

Section 10.3, Natural Features and Landscapes

Section 10.3 is central to the landscape and visual assessment because the site is within a Landscape Amenity Overlay and is located close to An Outstanding Natural Features and Landscape and Significant Natural Areas. The site is not within an Outstanding Landscape Area or Significant Natural Area, but it forms part of the wider landscape context within which those features are experienced.

The relevant landscape issue is whether the development enabled by the rezoning would maintain the attributes and amenity values of the Landscape Amenity Overlay and avoid unacceptable adverse effects on the landscape attributes of nearby Outstanding Landscape Areas.

The potential effects are principally perceptual and visual. They relate to the visibility of future dwellings, roads and neighbourhood centre activity, the potential for buildings to appear on skylines or prominent slopes, the potential fragmentation of open rural character, and the relationship between built development and adjacent natural features.

Development enabled by the plan change can respond by:

- a. avoiding building platforms on the main ridgelines, the Mapara Escarpment, steep slopes and visually prominent locations where practicable;
- b. using larger lots in the more sensitive parts of the site to retain greater openness and reduce built density;
- c. concentrating smaller LRZ-scale lots within the gentler and more contained parts of the Kaiapo Valley;
- d. retaining and strengthening vegetation patterns;
- e. restoring gullies, overland flow paths and riparian margins with native planting;
- f. using ridgeline, road corridor and inter-lot planting to soften and break up built form;
- g. requiring recessive colours and low-reflectance materials for buildings in visually sensitive locations; and
- h. shaping, grassing and/or planting batters to reduce scarring and integrate cut and fill into the surrounding landform.

In this respect, the proposed rezoning would not avoid all change to landscape character. Rather, it would enable a different landscape outcome, a planted low-density residential environment set within an enhanced open space and revegetation framework. The key issue is whether that changed outcome remains compatible with the surrounding landscape context. In my opinion, it can do so, provided the recommendations in this report are adopted and carried through into future subdivision and land use controls.

Relationship with adjacent ONFL and SNA areas

The site's relationship with the Northwestern Bays Outstanding Landscape Area, Whakaipo Bush SNA, Kaiapo Bay Scenic Reserve SNA, Kaiapo Bay and Whakaipo Bay is important. These adjacent areas contribute strongly to the natural and visual amenity of the wider landscape setting. The proposed rezoning would introduce increased levels of development close to, but not within the adjacent ONFL or SNA areas.

The recommended restoration and mitigation planting would help strengthen the landscape and ecological relationship between the site and those adjacent areas. It would also provide a vegetated framework that backdrops, filters and softens views of future buildings and roads. Over time, this planting would reduce the contrast between built development and the surrounding natural landscape features and would assist the development to read as a low-density residential neighbourhood integrated with the local landform and vegetation structure.

Appropriateness of the Requested Plan Change (Landscape, Natural Character and Visual Amenity)

The proposed rezoning would enable a change in the character and amenity of the site from a rural pastoral landscape, as anticipated under the existing GRUZ provisions, to a large-lot, low-density residential environment. It would provide for a greater density and extent of residential subdivision, dwellings, roads, infrastructure, domestic curtilage, lighting and associated activity. The small area of NCZ would also enable a more concentrated node of commercial, community and supporting built form.

The proposed LRZ and NCZ framework, together with the subdivision, natural character, natural features and landscapes, and district-wide provisions, provides an appropriate planning framework for managing the landscape and visual effects of that change. The LRZ provisions would retain a relatively open residential pattern, the NCZ provisions would confine neighbourhood-supporting activity to a small and managed node, and the subdivision and overlay provisions would enable detailed assessment of layout, landform response, access, servicing, planting and visual integration.

The development proxy utilised in this assessment demonstrates that the site can be developed in a manner that responds to its landscape constraints and opportunities. It shows that future development can avoid the most sensitive landforms where practicable, retain larger lots in more visually sensitive areas, concentrate residential development on more suitable land, provide a coherent road and reserve network, and establish a substantial restoration and mitigation planting framework.

On this basis, and subject to the recommendations in this report, the effects of rezoning the site from GRUZ to LRZ, with a small area of NCZ, are considered acceptable from a landscape and visual amenity perspective. The future development enabled by the proposed zoning can be appropriately managed through the objectives, policies and rules of the Operative Taupō District Plan, including Sections 10.2, 10.3, 11, 13.3 and 13.4.

RECOMMENDATIONS

To meet the requirements of the requested planning provisions, it is recommended that future subdivision and development adopt a landscape-led design strategy to manage potential effects on landscape character, natural character and visual amenity. The strategy should respond to the site's landform, vegetation patterns, visual sensitivity and relationship with adjacent natural areas.

A landscape mitigation strategy should be prepared at subdivision stage. It should demonstrate how planting, open space, lot layout, building platforms, roads and earthworks will work together to integrate development with the surrounding landscape. It should also show how built form will be visually broken up, how extensive or continuous views of housing will be avoided, and how development will be integrated with planted reserves and the wider landscape context, including bush, lake, headlands and distant mountains.

Subdivision layout and lot pattern

- a. The subdivision layout should provide for a range of lot sizes that respond to the site's topography, landscape sensitivity and visibility.
- b. Smaller low-density residential lots should be located on gentler terrain, including the Kaiapo

Valley basin, where development can be more readily absorbed.

- c. Larger lots should be located in more sensitive or constrained parts of the site, including the Mapara Escarpment, the elevated terrain of the Waikarariki Point and Kaiapo Point headlands, the gully systems, and areas adjoining the rural environment.
- d. Lot boundaries should align with natural topographic changes where practicable, to reduce the need for major recontouring and to reinforce the underlying landscape structure.
- e. Development within the Mapara Escarpment should be minimised, particularly on steep slopes and in locations that are visually prominent from the Mapara Valley.

Roading and access

Road layouts should respond to the underlying landform and avoid steep slopes, upper slopes, the Mapara Escarpment and gully systems where practicable. Roads and rights of way should be aligned to minimise earthworks, reduce visual prominence and avoid unnecessary disturbance to visually sensitive landforms.

- f. Where access is required across more sensitive terrain, existing tracks and disturbed areas should be used where practicable.

Earthworks and building platforms

- g. Building platforms, roads and associated earthworks should be designed to integrate with the surrounding topography.
- h. Building platforms should avoid steep slopes, prominent ridgelines, gullies, riparian margins and visually prominent locations where practicable.
- i. Cut and fill batters should be shaped to integrate with the surrounding natural landform. Steep batters and retaining walls greater than 1 m in height should be avoided where practicable.
- j. Earthwork areas should be grassed and/or planted as soon as practicable to reduce visible scarring and assist with landscape integration.
- k. An erosion and sediment control plan should be implemented during construction to protect Lake Taupō, its tributaries, ephemeral streams, gullies and overland flow paths from sediment runoff.

Existing vegetation, restoration planting and mitigation planting

- l. Existing specimen trees and established vegetation should be retained where practicable, particularly where they contribute to landscape character, visual screening, habitat value or the integration of future built form.
- m. Contiguous indigenous restoration planting should be established within gully systems, reserve areas, overland flow paths and riparian margins.
- n. Restoration planting should strengthen existing vegetation patterns, improve ecological connections, and assist with the integration of the development with adjacent natural areas.
- o. Mitigation planting should be provided throughout the site to reduce the visual prominence of future development, particularly when viewed from Highland Drive, Kaiapo Road, Kaiapo Bay and other sensitive public and private viewing locations.

- p. Additional planting should be provided along ridgelines, road corridors and between allotments to break up built form, soften views of roads and buildings, and reduce the perception of continuous residential development.

Built form, height, colours and materials

- q. Building heights within visually prominent parts of the site, including the upper slopes and main ridge of the Mapara Escarpment, should be restricted to 7 m to reduce the prominence of future development.
- r. Exterior building colours should be limited to neutral, recessive and/or darker-toned cladding and roofing materials.
- s. Roofing and cladding materials should have low reflectance values to assist buildings to recede into the surrounding landscape, particularly where viewed against existing and proposed vegetation or pastoral landcover.
- t. Fencing within the Mapara Escarpment should be rural in character, such as post and wire or post and rail. Solid, visually prominent or urban-style fencing should be avoided in visually sensitive locations, particularly where it would be seen from the Mapara Valley or adjoining rural areas.

Lighting

- u. External lighting should be shielded and directed away from Lake Taupō, adjoining public reserves, gully systems and neighbouring rural or residential properties.
- v. Lighting should use warm colour temperatures, not exceeding 3000 Kelvin, to reduce glare, light spill and night-time visual prominence.
- w. Road or street lighting should be avoided along the access road where practicable. Where lighting is required for signage, safety or wayfinding, low-lumen downlights should be used.

Pedestrian and cycle connections

- x. Pedestrian and cycle connections should be provided within the development. Where practicable, these should connect with adjoining roads and reserves, including Kaiapo Bay and Whakaipo Bay, to provide recreational access and integrate the development with the wider open space network.

FINDINGS AND CONCLUSION

The requested rezoning would enable a clear change in the anticipated character and amenity of the site, from a rural pastoral landscape to a large-lot, low-density residential environment, with a small neighbourhood centre component. That change would be most apparent within the site itself, and from a limited number of surrounding elevated or proximate viewing locations.

The site is not a pristine or unmodified landscape. It is currently used for pastoral grazing and lucerne cropping, contains existing rural buildings and curtilage planting, and forms part of a wider landscape that already includes rural, rural-residential and low-density residential development. However, the site also occupies a sensitive landscape setting, being located on elevated land near Lake Taupō, Kaiapo Bay, Whakaipo Bay, the Mapara Escarpment, adjoining Significant Natural Areas, and nearby Outstanding Natural Features and Landscapes.

The wider landscape has moderate-high landscape value, principally because of the relationship between Lake Taupō, the northern bays, bush-covered headlands, escarpments, gullies, pastoral land and established rural settlement patterns. The more sensitive parts of the site include the Mapara Escarpment, the Kaiapo Point ridge, prominent ridgelines, steep slopes, gullies, overland flow paths, riparian margins and areas visible from elevated locations and Kaiapo Bay.

The development proxy demonstrates that the site can accommodate the proposed zoning in a manner that responds to these constraints. It shows how future development can be directed towards the gentler and less visually sensitive parts of the site, while larger lots, open space, retained vegetation and restoration planting can be used within the more sensitive parts of the Mapara Escarpment, Kaiapo Point ridge and gully systems.

In landscape character terms, the most substantial change would occur within the Kaiapo Valley basin, where the existing pastoral character would transition to a low-density residential environment set within a stronger planting framework. This would reduce the existing rural pastoral character of that part of the site but would also provide an opportunity to establish a more coherent planted landscape, with dwellings seen amongst areas of native restoration planting, mitigation planting and retained open space.

The Mapara Escarpment is expected to retain a stronger rural and pastoral character, due to its steeper landform, greater visual sensitivity and suitability for larger lots. Limiting development on the escarpment, avoiding prominent building platforms where practicable, restricting building height in visually sensitive locations, and requiring appropriate planting, colours, materials and rural-style fencing will be important to maintaining the legibility of this landform and reducing the risk of visually prominent or skyline development.

The requested rezoning is not expected to adversely affect the key attributes and values of the Lake Taupō or Northwestern Bays Outstanding Natural Features and Landscapes, provided development is managed in accordance with the recommendations in this report. The site is physically separated from the lake edge by intervening landform and vegetation, and the most valued ONFL attributes, including the lake, bush-covered margins, headlands, cliffs, escarpments, secluded bays, high natural character and sense of wildness, would remain legible and dominant within the wider landscape.

The requested restoration and mitigation planting is central to the acceptability of the rezoning from a landscape and natural character perspective. Planting within gullies, overland flow paths, riparian areas, reserve areas, ridgelines, road corridors and between lots would help integrate the development with the surrounding landscape, reduce the visual prominence of buildings and roads, strengthen ecological links, and enhance the perceived natural character of the site and its relationship with adjoining SNA and ONFL areas.

The visual catchment of the site is relatively limited by landform and vegetation. From most public locations within the surrounding landscape, views of the site are either screened, filtered, distant, or limited to the more elevated parts of the Mapara Escarpment and ridgeline landforms. The clearest views are likely to be from a limited number of elevated private or semi-private locations, including parts of Hill View Drive, Edge Hill, Ross Rise, Highland Drive and Kaiapo Road, and from parts of Kaiapo Bay.

Short-term visual effects are expected to be greatest before mitigation and restoration planting has established. During this period, the change from rural land to a more developed low-density

residential environment will be apparent from some locations. Over time, as planting establishes, the visual prominence of buildings, roads and earthworks will reduce, and the planted framework is expected to become a defining characteristic of the site.

The neighbourhood centre component would introduce a more concentrated form of built development and activity than the surrounding low-density residential area. Its effects would be localised, but potentially more visually apparent because of greater building coverage, hardstand, parking, signage, lighting, servicing and activity. For this reason, the neighbourhood centre should remain small in scale, be carefully located, and be integrated with planting, built form controls and lighting controls.

The proposed rezoning will alter the existing rural character of the site. However, that change would not be experienced as isolated or sporadic urban development. Rather, it would form an extension of the existing low-density residential and rural-residential settlement pattern to the east and northeast, while retaining a larger-lot and more open transition towards the Mapara Escarpment and the rural landscape to the north.

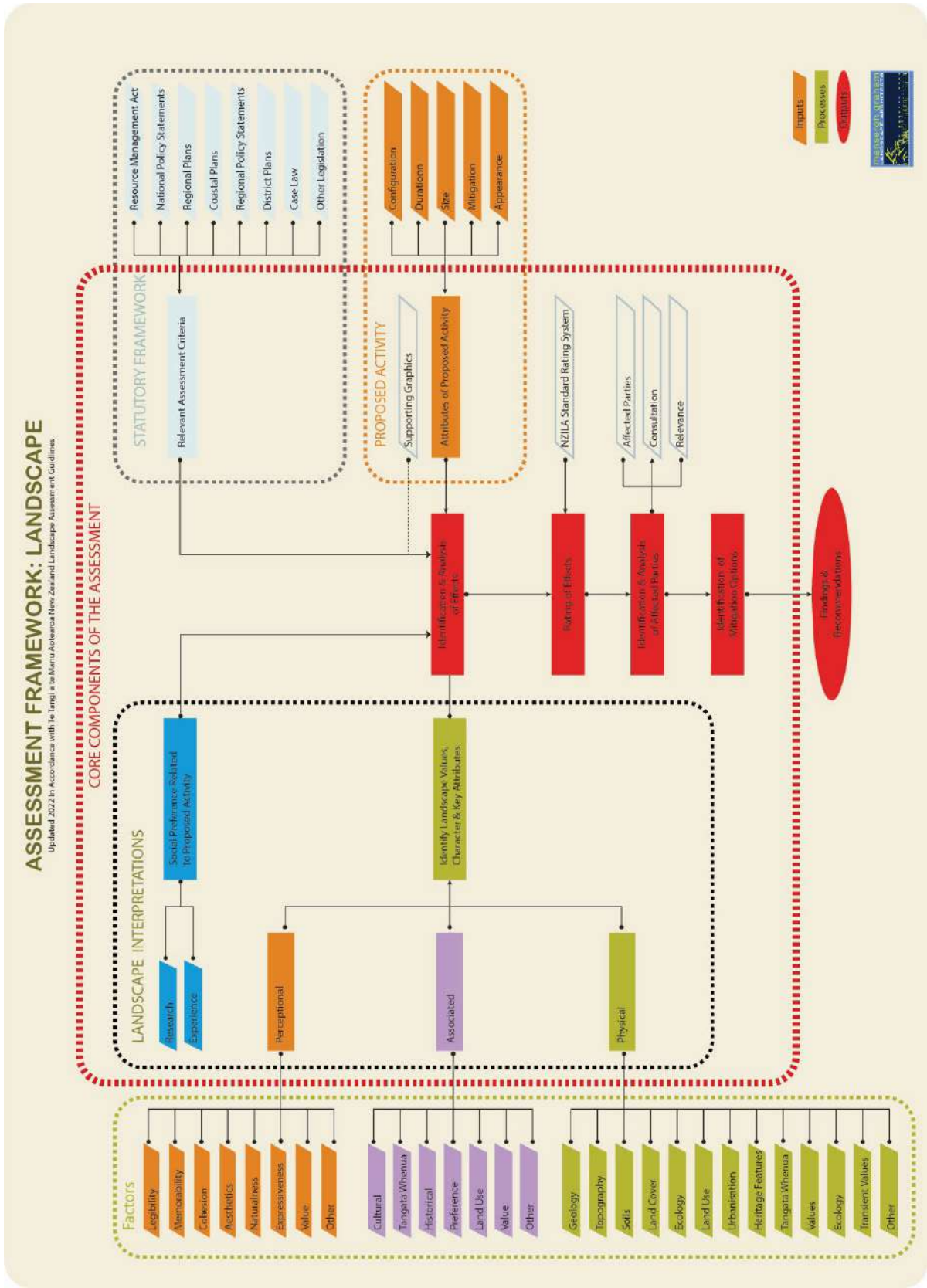
The consequential effects of the rezoning can be appropriately managed through the Operative Taupō District Plan framework, including the provisions relating to natural character, natural features and landscapes, subdivision, earthworks, lighting, the Low Density Residential Zone and the General Rural Zone context. Future subdivision and land use processes will provide the mechanism for confirming detailed layout, building platform location, road alignment, earthworks design, vegetation retention, restoration planting, lighting and built form controls.

Overall, the requested rezoning is considered acceptable from a landscape, natural character and visual amenity perspective, subject to the recommendations in this report being carried through into the plan change framework and future subdivision design. While the rezoning would enable a notable change within the site, that change can be integrated with the surrounding landscape through a combination of sensitive lot distribution, avoidance of visually sensitive landforms where practicable, retention and enhancement of vegetation, restoration of gullies and riparian areas, and controls on building prominence, lighting, fencing and earthworks.

With those measures in place, the effects on landscape character and visual amenity are expected to be **low** overall. Natural character effects are expected to range between **very low adverse** to **very low positive**, with positive effects arising from any restoration planting and strengthened ecological and visual connections with adjoining natural areas.

In conclusion, development enabled by the proposed LRZ zoning over the subject site can be accommodated without unacceptable adverse effects on the landscape, natural character or visual amenity values of the site and its wider receiving environment.

APPENDIX ONE: METHODOLOGICAL FLOW CHART



APPENDIX TWO: LANDSCAPE AND VISUAL AMENITY EFFECT - RATING SYSTEM

The following standardised rating system has been developed by Mansergh Graham Landscape Architects Ltd and is consistent with the recommended rating system identified in the Te Tangi a te Manu - Aotearoa New Zealand Landscape Assessment Guidelines.

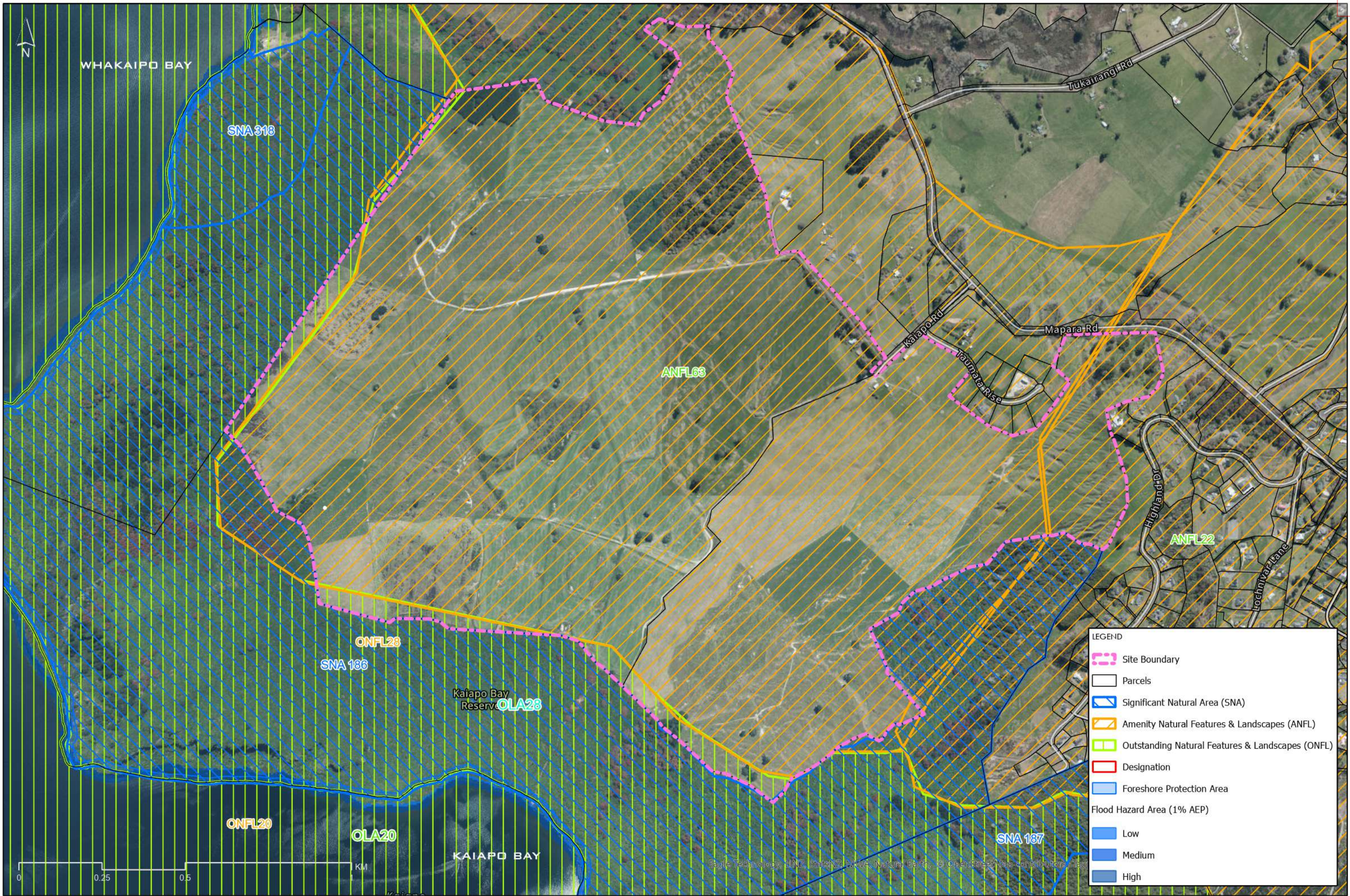
LANDSCAPE AND VISUAL AMENITY EFFECT - RATING SYSTEM		
Effects Rating		Use and Definition
Very High	Significant (RMA/NZCPS)	<u>Use</u> The development/activity would: a. Have a very high level of effect on the character or key attributes of the receiving environment and/or the vista within which it is seen; and/or b. Have a very high level of effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> Very: adverb 1 in a high degree. 2 with superlative or own without qualification: the very best quality. High: adjective 1 extending above the normal level. 2 great in amount, value, size, or intensity. 3 great in rank or status. 4 morally or culturally superior.
		<u>Use</u> The development/activity would: a. Have a high level of effect on the character or key attributes of the receiving environment and/or the vista within which it is seen; and/or b. Have a high level of effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> High: adjective 1 extending above the normal level. 2 great in amount, value, size, or intensity. 3 great in rank or status. 4 morally or culturally superior.
Moderate-High	More than Minor (RMA)	<u>Use</u> The development/activity would: a. Have a moderate-high level of effect on the character or key attributes of the receiving environment and/or the vista within which it is seen; and/or b. Have a moderate-high level of effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> Moderate: adjective 1 average in amount, intensity, or degree. High: adjective 1 extending above the normal level. 2 great in amount, value, size, or intensity. 3 great in rank or status. 4 morally or culturally superior.
Moderate		<u>Use</u> The development/activity would: a. Have a moderate level of effect on the character or key attributes of the receiving environment and/or the vista within which it is seen; and/or b. Have a moderate level of effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> Moderate: adjective 1 average in amount, intensity, or degree.
Low-Moderate	Minor (RMA)	<u>Use</u> The development/activity would: a. Have a low-moderate level of effect on the character or key attributes of the receiving environment and/or the vista within which it is seen; and/or b. Have a low-moderate level of effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> Low: adjective 1 below average in amount, extent, or intensity. 2 lacking importance, prestige, or quality; inferior. Moderate: adjective 1 average in amount, intensity, or degree.
Low		<u>Use</u> The development/activity would: a. Have a low level of effect on the character or key attributes of the receiving environment and/or the vista within which it is seen; and/or b. Have a low level of effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> Low: adjective 1 below average in amount, extent, or intensity. 2 lacking importance, prestige, or quality; inferior.
Very Low	Less Than Minor (RMA)	<u>Use</u> The development/activity would: a. Have a very low effect on the character or key attributes of the receiving environment and/or the vista within which it is seen; and/or b. Have a very low effect on the perceived amenity derived from it. <u>Oxford English Dictionary Definition</u> Very: adverb 1 in a high degree. 2 with superlative or own without qualification: the very best quality. Low: adjective 1 below average in amount, extent, or intensity. 2 lacking importance, prestige, or quality; inferior.
		Detectable Effect Threshold
No Effect		The development/activity would have no detectable effect on the receiving environment.
		Note: Ratings may be positive (e.g. high level of enhancement), neutral (e.g. neither positive or negative) or negative (e.g. high adverse effect).

APPENDIX THREE: VISUAL ABSORPTION CAPABILITY RATINGS

The following standardised rating system has been developed by Mansergh Graham Landscape Architects Ltd and is consistent with the recommendations of Te Tangi a te Manu - Aotearoa New Zealand Landscape Assessment Guidelines.

Visual Absorption Capability Definition Ratings	
VAC Rating	Use
Very Good	The development enabled by the requested plan change /activity would be completely screened, almost completely screened, or completely absorbed by existing landscape features. Any views of the development would be either unidentifiable or at a great distance, and/or; The development/activity would not affect the existing character of the surrounding landscape or view in which it is seen, and/or; The development/activity would introduce a visual element into the landscape or view which may be viewed very frequently or continuously in that or similar landscape types.
Good	The development enabled by the requested plan change /activity would be mostly screened or visually absorbed by existing landscape features, but still be identifiable. The development/activity may act as a tertiary focal attraction within the landscape or view in which it is seen, and/or; The development/activity would not affect the existing character of the surrounding landscape or view in which it is seen, and/or; The development/activity may introduce a visual element into the landscape or view which may be viewed frequently in that or similar landscape types.
Neutral	The development enabled by the requested plan change /activity would neither be screened nor become a visual intrusion or focal attraction within the landscape or view in which it is seen. The development enabled by the requested plan change /activity may act as a minor focal attraction from some locations, and/or; The development/activity would alter the existing character of the surrounding landscape or view in which it is seen, and/or; The development/activity would introduce a visual element into the landscape or view which may be viewed occasionally in that or similar landscape types.
Poor	The development enabled by the requested plan change /activity would be clearly visible but would not act as a primary focal attraction, and/or; It would be expected that the development enabled by the requested plan change /activity would alter the existing character of the surrounding landscape or view in which it is seen, and/or; The development/activity may introduce a new visual element into the landscape or view. The development/activity may be viewed infrequently in that or similar landscape types.
Very Poor	The development enabled by the requested plan change /activity will be highly visible and may act as a primary focal attraction or feature. It would also be expected that the development enabled by the requested plan change /activity will significantly alter the existing character of the surrounding landscape or view in which it is seen, and/or; The development/activity will introduce a new visual element into the landscape or view, which will be significantly different in appearance, or scale from the landscape elements surrounding it, and/or; The development/activity would be found very rarely in that or similar landscape types.

APPENDIX FOUR: PLAN CHANGE AREA AND DISTRICT PLAN OVERLAYS



APPENDIX FIVE: VIEW LOCATION PHOTOGRAPHS



Figure 13: VL 1 – Tukairangi Road, looking southwest towards the application site. Most of the site is obscured by intervening topography and vegetation, with only the upper slopes of the Mapara Escarpment visible. Where visible, the development will likely appear similar to rural lifestyle in character (more readily integrating with landscape character of the Mapara Valley) due to topographic restraints of the Mapara Escarpment. Similar potential effects are anticipated from VL 2 (Tukairangi Road).



Figure 14: VL 4 – Edge Hill looking southwest towards the application site. The upper slopes of the Kaiapo Basin landscape are visible, along with the Mapara Escarpment and part of the northern extent of the site (where not obscured by the part of the Mapara Escarpment immediately east of the site). Potential change observed due to low-density residential likely to be partially visible within the Kaiapo Basin. Similar potential effects from VL 3 (Hill View Drive).



Figure 15: VL 5 – Kaiapo Road, looking southwest across the application site. Lower Kaiapo Valley Basin obscured by the upper slopes of the basin. Main ridge of the Mapara Escarpment to Waikarariki Point headland visible. Low-density residential development, school, and commercial centre potentially visible on the upper slopes of the Kaiapo Basin. Large lot development likely visible in the distance along the Mapara Escarpment. Existing context of low-density residential development on the southeastern side of Kaiapo Road and along Highland Drive.



Figure 16: VL 6 – Mapara Road, looking south towards the site. The Mapara Escarpment and part of the northern extent of the site is visible. Development enabled by the proposal seen within this part of the site will likely appear as larger lots rather than low-density residential due to the constraints of the steep terrain of the escarpment. While this will introduce a change within this part of the site, it will not appear dissimilar to rural lifestyle development observed within the surrounding Mapara Valley, aiding in integrating the plan change from this location. Similar potential effects form VL 8, with more of the site obscured by intervening topography and vegetation.



Figure 17: VL 7 - Ross Rise. The gentler terrain of the Kaiapo Basin (where majority of low-density residential development is likely to occur) will be screened from view by the Mapara Escarpment. Only the Mapara Escarpment and the northern part of the site visible. Some of the low-density residential development will likely be partially visible (seen beyond the mature vegetation within the Mapara Revegetation Area) within the northern part of the site, between base of Mapara Escarpment and the Mapara Revegetation area. This will likely be appear as rural lifestyle development, rather than low-density residential development due to distance away and extensive screening afforded by the Mapara Revegetation area vegetation.



Figure 18: VL 9 – Whakaroa Road, looking south towards the site. Distant views afforded to the southwestern extent of the site, including the Mapara Escarpment and Waikarariki Point Headland. Introduction of predominantly large lot dwellings (enabled by plan change development) into currently open pastoral rural landscape, restricted in density by the steeper slopes of the escarpment. Low-density development likely screened from view by Mapara Escarpment within the site.



Figure 19: VL 12 - Whakaipo Bay Recreation Reserve. Only a small part of the Mapara Escarpment within the site will be visible. Majority of the site is screened from view from this location. Extensive vegetation within the Mapara Revegetation Area and Whakaipo Bush SNA, the distance and the visual complexity of these views will make the large lots enabled by the plan change difficult to discern from this location. Similar potential effects from VL 10 and VL 11. While nearer to the application site, views from these locations are more highly screened by intervening vegetation than from VL 12 (VL 12 represents the worst-case scenario from Whakaipo Bay Recreation Reserve).



Figure 20: VL 13 – Mid Kaiapo Bay, looking north towards the site. The location further back in the bay means more of Kaiapo Valley visible, with less screening afforded by the SNA vegetation. Development enabled by the proposed rezoning will intrude into natural characteristics of the vista, reducing existing visual amenity values. Establishment of the restoration and mitigation planting will integrate development with the surrounding natural landscape features, enhancing natural character, landscape character and visual amenity values. This VL has been assessed in more detail in the Potential effects – Kaiapo Bay section of this report, below.



Figure 21: VL 14 Inner Kaiapo Bay Looking north towards the site. Only upper slopes of Kaiapo Bay visible, with the lower slopes screened by the SNA vegetation located along the foreshore. High existing natural character values experienced due to Lake, headlands, and SNA vegetation. Low-density residential development likely to be enabled by the proposal will intrude on natural vista, reducing existing visual amenity values. Establishment of restoration and mitigation planting will enhance natural character and visual amenity values.



Figure 22: VL 15 Whakaipo Bay looking east towards the site and Tahunatara Point. Due to the relative elevation much of the Mapara escarpment obscured by the lower slopes screened by the SNA vegetation located along the foreshore. Dispersed larger lot dwellings potentially visible along the escarpment. Low level of change anticipated due to small extent of visible development.

APPENDIX SIX: RELEVANT PLANNING PROVISIONS – OTDP

APPENDIX SIX: RELEVANT PLANNING PROVISIONS - OTDP

Section 10.2 NATC – Natural Character

POLICIES	
NATC-P1	Protect the District's lakes and river margins from buildings that are visually obtrusive and/or result in a decline of the amenity of the margin area.
NATC-Principal Reasons	
NATC -PR1	Given the District contains several large lakes and is intersected by rivers, a significant portion of rural properties are adjacent to lakes and waterways. Lakes and river margins are particularly susceptible to amenity and foreshore degradation. Policy NATC-P1 intends particular care be given to all buildings and structures located near the foreshore and has strong links to Part 2 and 3 matters set out in the Resource Management Act 1991.

Section 10.3 NFL – Natural Features and Landscapes

OBJECTIVES	
NFL-O1	Protect Outstanding Natural Features and Landscapes from inappropriate use and development which may adversely affect the Landscape Attributes.
NFL-O2	Maintain the Landscape Attributes of Amenity Natural Features and Landscapes.
NFL-O3	Recognise and encourage the enhancement of Amenity Values within Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes in the Taupō District.
NFL-O4	Acknowledge and encourage mechanisms that appropriately manage Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes in the Taupō District.
POLICIES	
NFL-P1	Ensure use and development is located and designed in a way that protects the Landscape Attributes of Outstanding Natural Features and Landscapes.
NFL-P2	Protect Outstanding Natural Features and Landscapes from more than minor adverse visual effects of earthworks, including more than minor visible scarring or more than minor adverse change to the natural landform or natural feature.
NFL-P3	Avoid the erection of built structures that will have more than minor adverse visual effects on the Landscape Attributes of Outstanding Natural Features and Landscapes or will result in cumulative adverse effects from increased built density.
NFL-P4	Where SNA - Significant Natural Areas are within Outstanding Natural Features and Landscapes, avoid, remedy, or mitigate more than minor adverse visual effects of Indigenous Vegetation Clearance on the Landscape Attributes of the Outstanding Natural Feature and Landscape.
NFL-P5	Remedy or mitigate potential adverse effects of use or development on the attributes of Outstanding Natural Features and Landscapes, giving consideration to: - The suitability of the site for the proposed use or development. - Recognise specific site requirements for some uses or development. - The scale, location, design and nature of the use or development, and whether it will be sympathetic with the Landscape Attributes of the Outstanding Natural Features and Landscapes. - The ability to remedy or mitigate significant adverse effects. - The extent of any disturbance or modification to the Outstanding Natural Features and Landscapes as a result of use or development, including potential impacts of earthworks and the ability of earth worked areas to be rehabilitated. - The visual impact of Indigenous Vegetation Clearance within SNA - Significant Natural Areas on the Landscape Attributes, and the ability to revegetate cleared areas with appropriate indigenous species. - The effectiveness and appropriateness of proposed mitigation to address adverse landscape and visual effects of use or development, including appropriateness of mitigating vegetation to screen or soften built structures, and ongoing maintenance of mitigation planting.
NFL-P6	Ensure new use and development is located and designed in a way that maintains the Landscape Attributes of Amenity Natural Features and Landscapes, while considering the existing landscape character and the underlying Zone.
NFL-P7	Where SNA - Significant Natural Areas are within Amenity Natural Features and Landscapes, avoid, remedy, or mitigate more than minor adverse visual effects of Indigenous Vegetation Clearance on the Landscape Attributes of the Amenity Natural Feature and Landscape.

NFL-P8	Manage the scale and intensity of use and development in Amenity Natural Features and Landscapes to avoid, remedy, or mitigate more than minor adverse effects on the Landscape Attributes, considering: - The suitability of the site for the activity proposed. - The scale, location, design, and nature of the use or development in relation to the provisions of the underlying Zone, and whether it will be sympathetic with the Landscape Attributes of the Amenity Natural Feature and Landscape. - The extent to which the Landscape Attributes will be affected. - The ability to remedy or mitigate more than minor adverse effects. - The visual impact of Indigenous Vegetation Clearance within SNA - Significant Natural Areas on the Landscape Attributes, and the ability to revegetate cleared areas with appropriate indigenous species. - The effectiveness and appropriateness of any mitigation to address adverse landscape and visual effects of use or development, including appropriateness of mitigating vegetation to screen or soften built structures, and ongoing maintenance of mitigation planting. - Recognise specific site requirements for use or development.
NFL-P9	Recognise and encourage use or development that enhances Amenity Values within Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes in the Taupō District, by utilising, but not being limited to, the following principles: - Where possible, existing vegetation is retained and protected, and vegetation patterns that reflect the natural landform are maintained. - Fencing styles are designed to complement the existing character of Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes. - Built structures are located and designed in a way to integrate with the Landscape Attributes. - Building materials utilise recessive colours and have low reflectance levels. - Existing vegetation patterns are utilised to integrate buildings within Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes. - Roading layout is designed and located to minimise visual prominence, where possible by following topography, and minimising the number of vehicle accesses onto roads. - Earthworks are located to minimise disturbance of the natural form and character of Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes, by avoiding visually prominent locations. - Where practical, earthworks or areas surrounding earthworks are vegetated to soften any abrupt changes in landform or reduce visible 'scarring' of the landform. - New tree planting and vegetation patterns reflect the existing landscape character and natural patterns of the landscape. - Where possible, ecological corridors and ecosystems are restored. - Planting is used to help integrate buildings with Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes.
NFL-P10	Encourage the utilisation of design guidelines that maintain and enhance Amenity Values within Outstanding Natural Features and Amenity Landscapes and Natural Features and Landscapes in the Taupō District.

RULES	
NFL-R1 - PER activities	Subject to
1. Any activity that:	- complies with all of the standards for the Zone in which it is located, and - complies with all of the General District Wide Matters, and - is not identified as a CON, RDIS, DIS, or NC activity in the Zone in which it is located, and - is not identified as a CON, RDIS, DIS, or NC activity in the General District Wide Matters.
NFL-R2 - RDIS activities	Subject to
1. Provided the activity is not identified as a DIS or NC activity within Outstanding Natural Features and Landscapes by another rule in the Plan, the erection of structures.	- Between 5m and 10m in height; or ... - Which are between 250m² and 1000m² in ground floor area, and have an aggregate coverage less than 2.5% of the allotment. Matters of Discretion – NFL-R3.
NFL-R3 - RDIS activities Matters of Discretion	
1. The location of the structure in relation to the Landscape Attributes as described in SCHED10.3 - NFL, considering:	- ridgelines and prominent landforms, - the need to locate the structure within an Outstanding Natural Feature and Landscapes, and - whether there are alternatives,

- d. whether the location within an Outstanding Natural Feature and Landscape is shown to be justified, and
 - e. how the location and design mitigates any adverse effects on the Landscape Attributes of the Outstanding Natural Feature and Landscape.
2. The scale of the structure on the Outstanding Landscape Natural Feature and Landscape, and the ability to reduce the visual dominance of increased bulk.
 3. The use of materials and colours to respond to the natural hues of the Landscape Area, and minimisation of reflectivity levels, including the utilisation of colours from the A and B Groups of the British Standard BS 5252 colour chart with reflectivity level less than 35%.
 4. Measures to reduce window reflectivity by use of overhanging eaves, or low-reflectivity glass.
 5. Any proposed mitigation planting to assist in integrating structures with the site, and the effectiveness of such mitigation on protecting the Landscape Attributes of the Outstanding Landscape Area.
 6. The minimisation of earthworks associated with the erection of structures that may adversely affect the Landscape Attributes and character of the Outstanding Natural Feature and Landscape.
 7. Consideration of cumulative visual effects of structures on the Outstanding Natural Feature and Landscape.
 8. Consideration of the potential for erosion and land instability (including on-going erosion and land instability) resulting from the proposed earthworks, which may result in an adverse effect on Landscape Attributes.

NFL-R4 Other Plan Matters

All activities shall comply with the relevant matters where applicable as identified below:

...

5. Chapter 10 Natural Environment

6. Chapter 11 Subdivision

NFL - Principal Reasons

- NFL-PR1** Outstanding Natural Features and Landscapes have been identified in the District Plan as those being important at a District Wide scale and are shown on the Planning Maps as an overlay to the underlying Zone. It is important that the attributes of Outstanding Natural Features and Landscapes are protected from inappropriate use and development. It is also noted that activities within these areas can be appropriate where their effects are managed to protect the landscape's important attributes. The Council recognises that some landowners will desire, or need, to obtain an economic return from their land whilst protecting its landscape attributes. In such cases the Council will assess, through the resource consent process, the effects of activities within Outstanding Natural Features and Landscapes on their merits. There may be cases where it is preferable to develop small areas intensively, whilst protecting the important Landscape Attributes of Outstanding Natural Features and Landscapes as opposed to developing a larger part of the Outstanding Natural Feature and Landscape to a relatively low intensity.
- SCHED10.3 - NFL lists the key attributes that contribute to the significance of the Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes.
- NFL-PR2** The objective and policies focus on inappropriate activities that have more than minor adverse effects which may potentially diminish the Landscape Attributes. Guidance is provided in the policy to assess the effects of such activities, with measures to avoid, remedy, or mitigate more than minor adverse effects. In addition, Objective NFL-03 provides for enhancement where possible, of the Amenity Values associated with Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes. The objectives and associated policies will assist decision-makers in the resource consent process, to ensure that development within these Areas is compatible with the character of the existing landscape.
- NFL-PR3** Additional rules for Outstanding Natural Features and Landscapes are introduced into the District Plan. Many of the Outstanding Natural Features and Landscapes are already protected through other enactments, and it is evident that guardianship afforded by landowners in the past has enabled many of these landscapes and features to remain intact today. Therefore, rules relating to Outstanding Natural Features and Landscapes are aimed at the management of new activities that have the potential to degrade the qualities and attributes that make such landscapes outstanding. An assessment of landscape effects should consider the effects on, but not be limited to, the Landscape Attributes as defined in SCHED10.3 - NFL, in addition to any other requirements associated with the underlying Zone and District Wide provisions. The effectiveness of measures to avoid, mitigate or remedy any potential more than minor adverse effects within Outstanding Natural Features and Landscapes will differ on a case-by-case basis, as it is dependent on, but not limited to such factors as the amount of vegetation cover and visual prominence of the landscape feature within the larger landscape context. The proposed scale, intensity, design and location of use, or development, disruption and the extent to which the existing landscape patterns and character may be affected, will be assessed to determine the effect of the proposal on the Outstanding Natural Feature or Landscape. This will identify the landscape's ability to absorb the proposed change, and therefore identify any adverse visual or landscape effects. The location requirements of use and development will be considered where such activities rely on a particular locality for their operational requirements. Measures which may be effective in avoiding or mitigating potential adverse effects include, but are not limited to, rehabilitation of earth worked areas, the positioning of a building amongst existing vegetation or below the skyline, controlling the colour of a structure to blend with the landscape character, and controlling the intensity of an activity.

NFL-PR4	<i>Amenity Natural Features and Landscapes have been identified in the District Plan as those being important at a District-wide scale and are shown on the Planning Maps as an overlay of the underlying Zone. Use and development activities within Amenity Natural Features and Landscapes can be appropriate where the effects are managed to maintain the landscape's important attributes. The Council recognises that some landowners will desire, or need, to obtain an economic return from their land whilst protecting its Landscape Attributes. In such cases the Council will, if necessary, assess through the resource consent process the effects of activities within Amenity Natural Features and Landscapes on their merits. There may be cases where it is desirable and appropriate to develop small areas intensively, whilst protecting the important Landscape Attributes of Amenity Natural Features and Landscapes. An assessment of landscape effects should consider the effects on, but not be limited to, the Landscape Attributes as defined in SCHED10.3 - NFL, in addition to any other requirements associated with the underlying Zone.</i>
NFL-PR5	<i>The focus of Amenity Natural Features and Landscapes is about maintaining the existing Amenity Values that such landscape areas have, and where possible enhancing them through NFL-O3. Amenity Natural Features and Landscapes are typically working landscapes and are often highly modified. The provisions of the underlying Zone provide guidance to the types of activities anticipated within Amenity Natural Features and Landscapes. There are no additional rules for Amenity Natural Features and Landscapes, other than what currently exists for the underlying Zone. Use and development within Amenity Natural Features and Landscapes that trigger DIS - discretionary or NC - non-complying activity status will require an assessment of effects on the Landscape Attributes. The location requirements of use and development will be considered where such activities rely on a particular locality for their operational requirements.</i>
NFL-PR5	<i>The objective and policies encouraging the maintenance and enhancement of Amenity Values in Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes will largely occur through voluntary methods or will be implemented through the resource consent and Structure Planning process. It may be necessary for subdivision, use and development, which is subject to resource consent, to achieve a Net Environmental Gain. One of the ways in which this gain can be achieved is through the enhancement of Amenity and Natural Environmental Values. The use of the policy in this objective along with design guidelines for sensitive landscape design will assist in providing guidance as to how Amenity Values may be enhanced within Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes.</i>
NFL-PR7	<i>A number of the District's Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes already have a level of protection and appropriate management afforded to them through management plans prepared under various enactments. Such management plans should be taken into account when considering the effects of activities subject to resource consent, where they provide for appropriate management of landscape values.</i>
NFL - Anticipated Environmental Results	
...	
NFL-AER2	<i>Protection of Outstanding Natural Features and Landscapes from the adverse effects of inappropriate use and development.</i>
NFL-AER3	<i>Maintenance of the values attributed to Amenity Natural Features and Landscapes. Enhancement of the Amenity Values of Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes within the Taupō District.</i>

Section 11 SUB – Subdivision

OBJECTIVES	
SUB-O8 Outstanding Natural Features and Landscape Areas	<i>Protect Outstanding Natural Features and Landscape Areas from inappropriate subdivision which may adversely affect the Landscape Attributes.</i>
SUB-O9 Outstanding Natural Features and Landscape Areas	<i>Recognise and encourage the enhancement of Amenity Values within Outstanding Natural Features and Landscapes, and Natural Features and Landscapes in the Taupo District.</i>
POLICIES	
SUB-P1 RESZ	<i>Avoid, remedy or mitigate adverse effects of subdivision, in the residential zones on cultural, historic, landscape and natural values, as identified through the provisions of this Plan.</i> <i>...</i>
SUB-P6 Outstanding Natural Features and Landscapes	<i>Within Outstanding Natural Features and Landscapes, ensure subdivision:</i> <i>Is located and designed in a way that protects the Landscape Attributes of Outstanding Natural Features and Landscapes.</i>

	b. Avoids fragmentation of open space character leading to any cumulative adverse effects on Outstanding Natural Features and Landscapes. c. Remedy or mitigates potential adverse effects of subdivision on the attributes of Outstanding Natural Features and Landscapes giving consideration to: i. The suitability of the site for the proposed subdivision, ii. The scale, location, design and nature of the subdivision, and whether it will be sympathetic with the Landscape Attributes of the Outstanding Landscape Area. iii. The extent of any disturbance or modification to the Outstanding Natural Features and Landscapes as a result of subdivision, including potential impacts of earthworks and the ability of earth worked areas to be rehabilitated. iv. The effectiveness and appropriateness of proposed mitigation to address adverse landscape and visual effects of subdivision, including appropriateness of mitigating vegetation to screen or soften built structures, and ongoing maintenance of mitigation planting.
SUB-P7 Amenity Natural Features and Landscapes	Within Amenity Natural Features and Landscapes, ensure subdivision: a. Is located and designed in a way that maintains the Landscape Attributes of Amenity Natural Features and Landscapes, while considering the existing landscape character and the underlying District Plan Zone. b. Scale and intensity is managed to avoid, remedy, or mitigate more than minor adverse effects on the Landscape Attributes of Amenity Natural Features and Landscapes, considering: i. The suitability of the site for the activity proposed. ii. The scale, location, design, and nature of the subdivision in relation to the provisions of the underlying Zone, and whether it will be sympathetic with the Landscape Attributes of the Amenity Natural Feature and Landscape. iii. The extent to which the Landscape Attributes will be affected. iv. The ability to remedy or mitigate more than minor adverse effects. v. The visual impact of Indigenous Vegetation Clearance within SNA - Significant Natural Areas on the Landscape Attributes, and the ability to revegetate cleared areas with appropriate indigenous species. vi. The effectiveness and appropriateness of any mitigation to address adverse landscape and visual effects of subdivision, including appropriateness of mitigating vegetation to screen or soften built structures, and ongoing maintenance of mitigation planting.
SUB-P8 Outstanding and Amenity Natural Features and Landscapes	Recognise and encourage subdivision that enhances Amenity Values within Outstanding Natural Features and Landscapes and Amenity Natural Features and Landscapes in the Taupō District, by utilising, but not being limited to, the following principles: a. Subdivision design that utilises the existing landform and landscape features and aligns new allotment boundaries to natural patterns. b. Where possible, existing vegetation is retained and protected, and vegetation patterns that reflect the natural landform are maintained. c. Fencing styles are designed to complement the existing character of the Outstanding Natural Feature and Landscape and Amenity Natural Feature and Landscape.
RULES	
SUB-R1 CON activities GRZ, MRZ, LRZ, NCZ	Subject to
1. Any subdivision in the GRZ, MRZ, LRZ or NCZ which: a. Demonstrates compliance with all of the standards for the future land use, or b. For which a land use consent has already been granted c. Is not identified as RDIS, DIS or NC activity	Matters of Control Those matters of control in SUB-R2 and SUB-R14
SUB-R2 Matters of control/discretion GRZ, MRZ, LRZ, NCZ	
...	
e. Any actual or potential effects on areas or features of cultural, historic, landscape or natural value as identified in the plan.	
SUB-R13 DIS activities GRZ, MRZ, LRZ, NCZ	Subject to
2. Any subdivision of land where more than nine (9) allotments share a single common access in the GRZ, MRZ, LRZ or NCZ	
SUB-R14 Matters of Control/Discretion for Residential Zones	

a. <i>Impact of the activity on the amenity and character of the Residential Zones, surrounding allotments and other Zones.</i> ... f. <i>The clearance or planting of vegetation, including its location, species and maintenance.</i> ... i. <i>Any actual or potential effects on areas or features of cultural, historical, landscape or ecological value as identified in the plan.</i> j. <i>In respect to the New Residential Environment the appropriateness of the design, layout and density of the subdivision, having particular regard to any:</i> ... v. <i>landscape issues (particularly as they relate to any Amenity Landscape Area), natural values and any infrastructural servicing issues.</i> ...	
SUB-R15 DIS activities RLZ	Subject to
1. <i>Subdivision resulting in lots that are larger than 2 ha but smaller than 4 ha adjoining the GRUZ</i>	
2. <i>Subdivision resulting in lots that are larger than 2 ha but smaller than 10 ha on land containing Land Use Capability Class 3 Soils</i>	Matters of Discretion a. SUB-R17.a. to i and ...
SUB-R16 DIS activities GRUZ and RLZ	Subject to
1. <i>Any subdivision which is not identified as a CON, RDIS or NC</i>	Matters of Discretion a. SUB-R17.a. to k
2. <i>Any subdivision of land where more than twelve (12) allotments share a single common access</i>	
SUB-R17 Matters of Discretion for GRUZ and RLZ	
... e. <i>Any actual or potential effects on areas or features of cultural, historic, landscape or natural value as identified in the plan.</i> ... h. <i>Any immediate adverse or potentially adverse effects, including cumulative effects, on the amenity and landscape values of the GRUZ or RLZ, and the methods by which such effects can be remedied or mitigated.</i> j. <i>The development of other Bonus Lots in the similar area which may lead to urbanisation or more than minor adverse effects on the functioning of the GRUZ or RLZ.</i> k. <i>Those matters raised in SUB-P8.</i>	
SUB-R21 NC activities RLZ	Subject to
1. <i>Subdivision resulting in lots that are 2 ha or less adjoining the GRUZ</i>	Matters of Discretion a. SUB-R17.a. to i, and b. <i>Any potential reverse sensitivity effects on surrounding land-based primary productive activities.</i> c. <i>Any potential effects on the functioning of adjacent properties and the location of existing dwellings and sensitive activities.</i> <i>In addition to the above, for the purposes of assessment under SUB-R21.1 the matters over which the Council reserves control for the purpose of assessment are:</i> a. <i>Any potential reverse sensitivity effects on surrounding land-based primary productive activities.</i> b. <i>Any potential effects on the functioning of adjacent properties and the location of existing dwellings and sensitive activities.</i>
2. <i>Subdivision resulting in lots that are smaller than 2 ha that do not adjoin the GRUZ</i>	
3. <i>Subdivision resulting in lots that are 2 hectares or less on land containing Land Use Capability Class 3 Soils</i>	
SUB-R22 NC activities GRUZ and RLZ	Subject to
2. <i>Any subdivision of land in the GRUZ or RLZ that is located within an Outstanding Landscape Area where the resulting lots are less than 10 hectares</i>	
SUB-R34 Other Plan Matters	
<i>All activities shall comply with the relevant matters where applicable as identified below:</i> ...	

5. Chapter 10 Natural Environment	
6. Chapter 11 Subdivision	
SUB - Principal Reasons	
SUB-PR2	To ensure the amenity and character of the Residential Zones are maintained and enhanced, minimum standards have been identified. Threats to the character and amenity of the Residential Zones include structures and activities of an inappropriate or 'non-residential' scale, location or density. Provision for sufficient daylight and privacy, outlooks not dominated by bulky buildings, the maintenance of a residential streetscape and open space, as well as provisions addressing vehicle safety including access, movements and manoeuvrability, are required to maintain the character of the areas and ensure the amenity values of the Residential Zones are not adversely affected.
...	
SUB-PR5	Outstanding Landscape Areas have been identified in the District Plan as those being important at a District Wide scale, and are shown on the Planning Maps as an overlay to the underlying Zone. It is important that the attributes of Outstanding Landscape Areas are protected from inappropriate subdivision, use and development.
The proposed scale, intensity, design and location of a subdivision, use, or development, disruption and the extent to which the existing landscape patterns and character may be affected, will be assessed to determine the effect of the proposal on the Landscape Area. This will identify the landscape's ability to absorb the proposed change, and therefore identify any adverse visual or landscape effects.	
SUB-PR6	Amenity Landscape Areas have been identified in the District Plan as those being important at a District-wide scale, and are shown on the Planning Maps as an overlay of the underlying Zone. Subdivision, use, and development activities within Amenity Landscape Areas can be appropriate where the effects are managed to maintain the landscape's important attributes.
Subdivision, use, and development within Amenity Landscape Areas that trigger discretionary or non-complying activity status will require an assessment of effects on the Landscape Attributes. The location requirements of use and development will be considered where such activities rely on a particular locality for their operational requirements.	

Section 12.3 EW – Earthworks

OBJECTIVES	
EW-O1	Protect Outstanding Natural Features and Landscapes from inappropriate use and development which may adversely affect the Landscape Attributes.
EW-O2	Maintain the Landscape Attributes of Natural Features and Landscapes.
POLICIES	
EW-P1	Protect Outstanding Landscape Areas from more than minor adverse visual effects of earthworks, including more than minor visible scarring or more than minor adverse change to the natural landform or natural feature. a. Earthworks are located to minimise disturbance of the natural form and character of the Landscape Area, by avoiding visually prominent locations. b. Where practical, earthworks or areas surrounding earthworks are vegetated to soften any abrupt changes in landform, or reduce visible 'scarring' of the landform. c. The extent of any disturbance or modification to the Outstanding Landscape Area as a result of subdivision, use or development, including potential impacts of earthworks and the ability of earthworked areas to be rehabilitated.

RULES	
EW-R1 - PER activities	Subject to the following Standards
1. Earthworks within the LRZ, GRZ, NCZ	a. Disturbance of the allotment at any one time while redeveloping – 50% maximum; OR if in DEV1-Kinloch LRZ - 10% maximum b. 1.5m vertical ground alteration outside the minimum building setback in a new face or cut and / or fill c. 0.5m vertical ground alteration within the minimum building setback requirement d. ... e. Compliance with standards from Other Plan Matters
4. Earthworks within the GRUZ	a. ... b. Outstanding Landscape Areas -Refer to rule EW-R2.5

EW-R2 - RDIS activities	
1. Any earthworks within NCZ, GRZ, MRZ, LRZ or RLZ (Kinloch) that does not comply with any one part of the standards for PER activities.	Matters of Discretion a. The extent to which the earthworks will change the ground level of the site, including the relationship of the site to adjacent reserves, and foreshore protection areas, and adjacent sites. b. The degree to which the finished ground levels reflect the contour of adjoining the sites, and any potential impacts on stability of neighbouring properties and existing stormwater flow patterns. c. The degree to which the earthworks will enable building facades to be extended below natural ground level and result in buildings that are more visually dominant off-site and inconsistent with the character of the Zone. d. ... e. ... f. ... g. The extent of any vegetation removal and the time period for which soil will be exposed. h. Proposed methods and timing for the avoidance, remedying or mitigation of potential adverse effects and the degree to which they would be successful including: planned rehabilitation, re-contouring and re-vegetation or the retention of existing vegetation i. ...
5. Earthworks within an Outstanding Landscape that creates a new cut face or fill that is in excess of 1.5 metres in height, or cumulative vertical ground alteration in excess of 3.0 metres over a 12 month period, provided that any exposed cut or fill face located in vegetation of a height 1.5 metres or less is revegetated not later than the next growing season. Revegetation should consist of the same or similar species (other than pest species) present on the site prior to earthworks).	Matters of Discretion a. The extent to which the Earthworks will change the ground level b. The effect on the Landscape Attributes. c. The degree to which the finished ground levels reflect the contour of the surrounding landform. d. The degree to which Earthworks will enable building facades to be extended below natural ground level. e. The period that soil will be exposed. f. Proposed methods and timing for the remedying or mitigation of potential adverse effects and the degree to which such methods would be successful, including rehabilitation, recontouring and re-vegetation or the retention of existing vegetation. g. Consideration of cumulative visual effects of Earthworks on the Outstanding Natural Features and Landscapes. h. The location of the Earthworks in relation to the Landscape Attributes as described in SCHED10.3 - NFL, considering; i. ridgelines and prominent landforms, ii. the location requirement of the activity iii. whether there are alternatives.
EW-R3 DIS activities	Subject to
1. Any activity within the GRUZ, RLZ, TCZ, GIZ and HIZ that is not a PER, CON or RDIS activity.	Matters of Discretion
2. Any activity within the NCZ, MRZ, GRZ, LRZ, MUZ, or RLZ (Kinloch) which does not comply with two or three standards for PER activities including (where a standard contains more than one control) two or three parts thereof, or is not a PER, CON or RDIS activity.	
EW-R6 Other Plan Matters	
All activities shall comply with the relevant matters where applicable as identified below:	
...	

5. Chapter 10 Natural Environment
6. Chapter 11 Subdivision
EW - Anticipated Environmental Results
EW-AER1 Maintenance of the values attributed to Natural Features and Landscapes.

Section 12.5 LIGHT – Light

OBJECTIVES	
LIGHT-O1	The maintenance and enhancement of the character and amenity of the Residential Zones.
LIGHT-O2	That the MUZ, GIZ and HIZ provide for a range of activities and within which adverse environmental effects are avoided or mitigated, and the amenity and integrity of adjoining Residential Zones is maintained.
POLICIES	
LIGHT-P1	Maintain the GRUZ character as defined by the effects generated from rural activities including light spill.

Section 13.3 LRZ – Low Density Residential Zone

OBJECTIVES	
LRZ-O1	The maintenance and enhancement of the character and amenity of the LRZ.
POLICIES	
LRZ-P1	Maintain and enhance the character and amenity of the LRZ by controlling the bulk, location and nature of activities, to ensure activities are consistent with a residential scale of development, including an appropriate density and level of environmental effects.
LRZ-P3	Any relevant Development Area Plans, strategies or guidelines should be taken into account in the design of any development within the residential environment.
LRZ-P4	Encourage a wide range of appropriate activities and development within the LRZ while ensuring any adverse effects are avoided, remedied or mitigated.
LRZ-P5	Maintain Specific Requirement Areas through protecting the established character of these areas in locations where the resulting amenity is valued.
LRZ-P6	Recognise the important role of reserves and their existing infrastructure and services (including those provided by commercial operators) in providing recreational opportunities for the community.

RULES	
LRZ-R1 - PER activities	Subject to
1. Any activity that complies with the standards	a. LRZ-R5.1 to LRZ-R5.8 b. Compliance with standards from Other Plan Matters
3. One accessory building per allotment	a. The maximum gross floor area of the accessory building shall not exceed 6m ² b. The maximum height of the accessory building shall not exceed 2m c. Compliance with MRZ-R6.8
7. Fences and walls - or any combination of these, whether separate or joined together - 2m in height or less above ground level. 8. Retaining walls of 2m in depth or less below ground level.	a. Compliance with LRZ-R5.8 outside of the yard setback.
LRZ-R2 - RDIS activities	Subject to
1. Any activity which does not comply with any one part of the standards in LRZ-R5.1 - LRZ-R5.8, including (where a standard contains more than one control) one part thereof.	Matters of Discretion a. Restricted to only the matters of non-compliance specified in that standard.
LRZ-R3 - DIS activities	Subject to
1. Any activity which does not comply with two or three standards for PER activities including (where a standard contains more than one control) two or three parts thereof, or is not a PER, CON, or RDIS activity.	a. LRZ-R5 where relevant.
LRZ-R4 - NC activities	Subject to
1. Any activity which does not comply with four or more standards for PER activities including (where a standard	

<i>contains more than one control) four or more parts thereof.</i>	
LRZ-R5 - Standards	
	LRZ including Kinloch LRZ in DEV1-Kinloch Development Area
Footprint	
1. Maximum Combined Coverage	5%
2. Maximum Plot Ratio	7.5%
3. Maximum Total Coverage	N/A
<i>NOTE: Maximum Combined Coverage is a calculation of the combined coverage of Building Footprint and any Structures that are not otherwise provided for as permitted activities.</i>	
Building Setbacks (minimum)	
4. Front boundary	10m unless otherwise provided within an existing subdivision consent
5. All other boundaries	10m unless otherwise provided within an existing subdivision consent
6. Common wall boundaries	0m
Height (maximum)	
7. Building height	8m or 5m within Height Restricted Areas unless otherwise indicated by Map D2. <i>EXCEPTION: Any structure attached to the building that which does not exceed 0.6m in any horizontal distance, or exceed the permitted height by more than 1.5m.</i>
8. Height to boundary	2.5m height at the boundary with a 45° recession plane except for common wall boundaries. <i>Height to boundary means the plane measured at the boundary of an allotment from ground level, through which no part of any building, including eaves, may project, except for a chimney, mast or antenna up to 0.8m in any horizontal direction and not exceeding 2.0m.</i>
LRZ-R6 Matters of Discretion	
1. When assessing Discretionary Activities the list of assessment criteria is not exclusive as other effects can be considered during assessment. 2. General Criteria a. Impact of the activity on the amenity and character of the Low Density Residential Zone, surrounding allotments, and other Zones. b. Potential for conflict between the activity and other existing activities within the Residential Zones. c. Consideration of any relevant Development Area Plan, Growth Management Strategy, Management Plan, Design Guidelines or Strategy as guidance during the resource consent process. 3. Development a. Whether the desired environmental outcome(s), with a consistent and appropriate standard of infrastructure, is achieved such as through compliance with the Council's Development Guidelines, Growth Management Strategy, and relevant Development Area Plans. ... 5. Building Height a. The extent to which the extra height will: i. adversely affect the character and visual amenity of the area and the Residential Zone by enabling development which is not consistent with the scale of development in the surrounding environment, ii. reduce the privacy of adjacent allotments by comparison with the effects of a complying activity, iii. result in large scale buildings or structures which will intrude into the outlook from nearby allotments by comparison with the effects of a complying activity, have an overbearing effect on sites within the LRZ b. Proposed methods for avoiding, remedying or mitigating any potential adverse effects, and the degree to which they would be successful, including the extent to which topography, alternative design, planting, or setbacks can mitigate the adverse effects of the extra height. 6. Height to Boundary a. The extent of additional shading from the projection, including the amount of shadow cast and the period of time the adjacent allotments are affected. b. The nature of the activities undertaken on any affected portion of adjoining allotments, noting in particular any adverse effect on outdoor living areas.	

- c. *The extent to which the projection is necessary due to the shape or nature and physical features of the allotment.*
- d. *The extent to which the projection leads to a loss of privacy and/or outlook for nearby allotments, by comparison with the effects of a complying activity.*
- e. *Proposed methods for avoiding, remedying or mitigating any potential adverse effects, and the degree to which they would be successful, including the ability to mitigate adverse effects through the use of screening, planting or alternative design.*

7. Coverage

- a. *The extent to which the increased coverage, total coverage, and/or plot ratio will:*
 - i. *adversely affect the character and visual amenity of the area and the LRZ by enabling development which is not consistent with the scale of development in the surrounding environment*
 - ii. *reduce the privacy and outlook of adjoining allotments by comparison with the effects of a complying activity*
 - iii. *result in large scale buildings or structures which will intrude into the outlook from nearby allotments by comparison with the effect of a complying activity*
 - iv. *result in a building or building(s) that is inconsistent with the character of the area due to long unbroken building facades along one or more boundaries*
 - v. *significantly shade useable outdoor living space on an adjacent allotment.*
- b. *Proposed methods for avoiding, remedying or mitigation of potential adverse effects, and the degree to which they would be successful including:*
 - i. *The design and location of the building(s) to avoid long unbroken building facades along one or more boundaries*
 - ii. *Design of buildings or groups of buildings which reflect the scale of the surrounding environment*
- c. *The ability to mitigate adverse effects through the imposition of conditions such as landscaping.*

8. Building Setback

- a. *The extent to which the reduced setback will:*
 - i. *adversely affect the amenity of the area, including the effect on reserves and Foreshore Protection Area, including the ability to maintain and enhance the openness and existing character and avoid the visual dominance of buildings in relation to those areas*
 - ii. *significantly reduce the privacy of adjacent allotments by comparison to the effect of a complying activity*
 - iii. *limit the safe and visible access of vehicles using the allotments.*
- b. *The extent to which the reduction in the setback is necessary due to the shape or nature and physical feature of the allotment.*
- c. *Proposed methods for avoiding, remedying or mitigating any potential adverse effects, and the degree to which they would be successful, including:*
 - i. *the ability of existing topography or vegetation to mitigate any adverse visual effects on the streetscape*
 - ii. *the ability to mitigate adverse effects of the reduced setback through screening, landscaping, planting and alternative design.*

LRZ-R7 Other Plan Matters

All activities shall comply with the relevant matters where applicable as identified below:

...

5. Chapter 10 Natural Environment

6. Chapter 11 Subdivision

LRZ - Principal Reasons

LRZ-PR1 *A typical scale and character of development and level of environmental effects has been established over time within the LRZ. This has resulted in a particular character and amenity within the Zone, which is valued by residents of the area.*

LRZ-PR2 *Threats to the character and amenity of the LRZ have been identified in the District Wide issues, policies, rules and standards.*

LRZ-PR3 *This section of the Plan recognises the changes to the LRZ which occur over time, and the desire of the community for minimum controls over activities while also retaining the valued amenity and character of the Zone. Accordingly the approach within this section is to place emphasis on assessing the potential environmental impacts through a series of standards which must be met in order for any activity to be permitted. Failure to meet one or more of these standards requires that an activity obtain resource consent, at which time a full and comprehensive assessment of environmental effects would be undertaken.*

LRZ-PR4 *This approach will protect the character and amenity of the LRZ while allowing for a range of activities to occur. The Low Density Residential Zone has different types of character that have established over time. This has resulted in different levels of amenity, which are accordingly provided for through the recognition of the different character types. Specific policies are needed to recognise and protect these areas.*

LRZ-PR5	<i>The Low Density Areas of the LRZ have often been referred to as the “rural residential” areas of the District. These areas provide for a special form of residential lifestyle with a semi-rural outlook. The predominant activity is still ‘residential’ in nature, resulting in the residential amenity and character of the area. As such, these areas have been identified within the LRZ, with standards which reflect the lower level of density than in the other parts of this Zone.</i>
LRZ - Anticipated Environmental Results	
LRZ-AER1	<i>Whilst predominantly consisting of residential activities, a variety of activities and development compatible in scale, amenity and character with development within the LRZ.</i>
LRZ-AER2	<i>New development does not create adverse impacts in terms of overshadowing, excessive building scale, vehicle movements, or lack of privacy.</i>
LRZ-AER3	<i>The recognition and protection of the different types of character and levels of development within the LRZ.</i>
LRZ-AER4	<i>A range of choice in housing types and densities in appropriate locations, able to be adequately serviced by roading infrastructure, utilities, and open space infrastructure.</i>

Section 13.4 GRUZ – General Rural Zone

OBJECTIVES	
GRUZ-O2	<i>Enable a range of activities in the General Rural Zone that are compatible with and cumulatively do not erode rural character.</i>
GRUZ-O5	<i>Reverse sensitivity effects on permitted, legally established, and/or consented activities within the General Rural Zone, including conflict with activities in neighbouring Zones, are avoided.</i>
POLICIES	
GRUZ-P1 <i>Maintaining the General Rural Character</i>	<i>Maintain the General Rural Zone character, as defined by:</i> <i>a. A predominance of Primary Production activities</i> <i>b. Renewable Electricity Generation Activities and electricity transmission and distribution, including geothermal areas</i> <i>c. Generally large open spaces between built structures</i> <i>d. A mix of buildings related Primary Production, visitor accommodation, tourism activity and Rural Industry</i> <i>e. Generally infrequent vehicle movements to and from a site</i> <i>f. Effects generated from rural activities including noise, vibration, odour, dust and light spill</i> <i>g. Limited signage that directly relates to the activity operating on the site.</i>
GRUZ-P2 <i>Rural Lifestyle Subdivision and Residential units</i>	<i>Avoid the cumulative effects of rural lifestyle development on the General Rural Environment by providing for these activities within the Rural Lifestyle Environment and otherwise limiting residential units and rural lifestyle subdivision that:</i> <i>a. Increases the demand for community infrastructure and services</i> <i>b. Results in the inefficient use of land or loss of future flexibility for productive uses</i> <i>c. Erodes the general rural character through its density, scale and location.</i> <i>d. Results in reverse sensitivity effects on permitted, lawfully established and/or consented neighbouring activities.</i>
GRUZ-P3 <i>Minor Residential Units</i>	<i>Manage the scale and location of minor residential units to ensure it is near the primary residential unit on the allotment, is of a suitable size, and to ensure that the future availability of the rural land resource will not be compromised.</i>
GRUZ-P4 <i>Avoiding Reverse Sensitivity</i>	<i>Any new activity must be managed so as to avoid reverse sensitivity effects on permitted, lawfully established and/or consented neighbouring activities.</i>

RULES	
GRUZ-R1 - PER activities	Subject to
1. Any activity	<i>a. Compliance with standards GRUZ-R4.1 to GRUZ-R4.6</i> <i>b. Compliance with standards from GRUZ-R5 Other Plan Matters</i> <i>c. is not identified as a CON, RDIS, DIS or NC activity within the GRUZ, and</i> <i>d. is not identified as a CON, RDIS, DIS or NC activity within the Other Plan Matters</i>
2. A minor residential unit	<i>a. GRUZ-R4.1 to GRUZ-R4.4 and GRUZ-R4.6</i>

7. One accessory building per allotment.	a. The maximum gross floor area of the accessory building shall not exceed 6m² b. The maximum height of the accessory building shall not exceed 2m
11. Fences and walls - or any combination of these, whether separate or joined together - 2m in height or less above ground level. 12. Retaining walls of 2m in depth or less below ground level.	
GRUZ-R3 - DIS activities	
1. Any activity that is not PER, CON, RDIS or a NC activity	Matters of discretion a. All actual and potential effects of the activity to be considered
GRUZ-R4 - Standards	
1. Footprint	
a. Maximum Combined Coverage	10% of the total allotment area
a. Maximum Building Size	5000m ² gross floor area for a single building
2. Building Setbacks (minimum)	
a. Front boundary	30m for residential units, minor residential units and other buildings
b. All other boundaries	i. 15m for residential units, and minor residential units and other buildings. ii. 200 metres for buildings for the management of farmed animals. Buildings with a floor area of 150 m² or less are exempt. iii. 30 metres for all new buildings from the legal boundary of an existing plantation forest. iv. 25m in Outstanding Landscape Areas from all boundaries.
3. Height (maximum)	
a. Building height	i. 12 metres ii. 5 metres in a height restricted area iii. 5 metres in an Outstanding and Natural Features Landscape
4. Maximum density of primary residential units	
a. One primary residential unit per 10 hectares.	
5. Minor residential units	
a. A maximum of one minor residential unit per primary residential unit. b. All minor residential units or accommodation activity units shall: i. Be no larger than 100m² in size (inclusive of garaging). ii. Be located no greater than 40 meters from the primary residential unit. iii. Share an accessway/driveway with the primary residential unit.	
GRUZ-R5 Other Plan Matters	
All activities shall comply with the relevant matters where applicable as identified below:	
...	
5. Chapter 10 Natural Environment	
6. Chapter 11 Subdivision	
...	
GRUZ - Principal Reasons	
GRUZ-PR1 The General Rural Zone makes up most of the land within the District. This area highlights the increasing need to protect the open space characteristics of the General Rural Zone and its production values, while also providing for the growth of the District.	
GRUZ-PR2 The General Rural Zone contains sites that are of significance, some of these are identified as Outstanding Natural Features and Landscapes. The General Rural Zone objectives and policies seek to manage land use activities in a way that reflects the productive nature of the land, the rural level of infrastructural services and the amenity values of the landscape, as well as managing effects. Other activities that are anticipated in the General Rural Zone are Rural	



Planning | Surveying | Engineering | Environmental

B22184 – 15, 37 and 40 Kaiapo Road, Acacia Bay
Transportation Assessment Report

Document Control

CKL Reference	B22184
Filename:	B22184-TR-ITA-ITA
Site Location:	15, 37 and 40 Kaiapo Road, Acacia Bay
Author:	Anna Young Senior Transportation Engineer
Reviewed By:	Judith Makinson Director
Authorised By:	Judith Makinson Director
Revision No.	1
Document Status:	Draft
Date:	27 May 2026

Contents

1	Introduction	1
2	Site Location	1
3	Existing Environment.....	4
3.1	Road Network	4
3.2	Public Transport	8
3.3	Walking and Cycling	8
3.4	Traffic Volumes	9
3.5	Road Safety	9
3.5.1	CAS Analysis	9
3.5.2	MegaMaps Analysis	10
3.6	Committed Environmental Changes	11
3.6.1	Subject Site Subdivision	11
3.6.2	TDC Long Term Plan 2024-2034	11
3.6.3	Other Residential Development.....	12
4	Policy Context	13
4.1	TD2050 Context.....	13
4.1.1	Growth Strategy	13
4.1.2	Transport Strategy	14
5	Proposed Rezoning	15
6	Trip Generation and Distribution.....	16
6.1	Land Use and Demographic Factors.....	16
6.2	Trip Generation	17
6.3	Trip Distribution	18
7	Capacity Modelling.....	18
7.1	Modelling Approach.....	18
7.2	Assessment Results	18
8	External Road Infrastructure Requirements.....	20
8.1	Kaiapo Road	20
8.2	Kaiapo Road/Mapara Road Intersection.....	20

8.2.1	Intersection Capacity	20
8.2.2	Intersection Sight Distance	21
8.3	Mapara Road	21
8.4	Mapara Road / Wakeman Road Intersection.....	21
9	Walking and Cycling Infrastructure.....	22
10	Road Safety Effects	25
11	Public Transport and School Bus Integration	26
12	Internal Access, Lot Access and Parking	26
13	Construction Effects.....	27
14	Staging and Rule Framework.....	27
14.1	Staged Infrastructure Requirements.....	27
14.2	Potential Rule Framework.....	28
15	Policy Alignment.....	30
15.1	Overarching Policy Documents	30
15.2	Low Density Residential Zone Objectives and Policies.....	32
16	Conclusion.....	33
Appendix 1 – SIDRA Analysis		34

1 Introduction

CKL has been engaged by Breda Investments Limited (the submitter) to provide an Integrated Transportation Assessment (ITA) for the proposed rezoning of land at 15, 37 and 40 Kaiapo Road in Acacia Bay. The rezoning is sought as part of the Plan Change 44 (PC44) amendments to residential zones in the Taupo District Council (TDC) District Plan.

The submitter seeks to rezone approximately 323 hectares (ha) of land from Rural to Low Density Residential, enabling in the order of 320 new lots. Consideration has also been given to whether additional residential lots could be accommodated in future, supported by additional transportation infrastructure.

This report addresses the transportation matters of the proposal and includes the following:

- Levels of vehicular traffic likely to be generated by the proposed rezoning and anticipated number of residential lots;
- Associated effects on the performance and safety of the surrounding road network;
- Transportation infrastructure requirements; and
- Consistency with overarching planning frameworks and District Plan policies and objectives.

These and other matters are addressed in detail within the report that follows. By way of summary, the assessment indicates that the proposed rezoning is unlikely to have a material effect on the safe and efficient operation of the surrounding transport network. While a number of transportation improvements and recommendations have been identified to support the rezoning, these generally relate to staged infrastructure delivery, enhancement of active mode connectivity, and management of local operational and safety matters as development progresses.

The assessment indicates that these matters can be appropriately addressed through staged implementation and future subdivision design processes. As such, it is assessed that there are no transportation engineering or transport planning reasons why the proposed rezoning cannot be confirmed.

2 Site Location

The subject site at 15, 37 and 40 Kaiapo Road is located to the west of Acacia Bay, as shown on Figure 1 below. By road it is approximately 10km from Taupo and 22km from Kinloch.

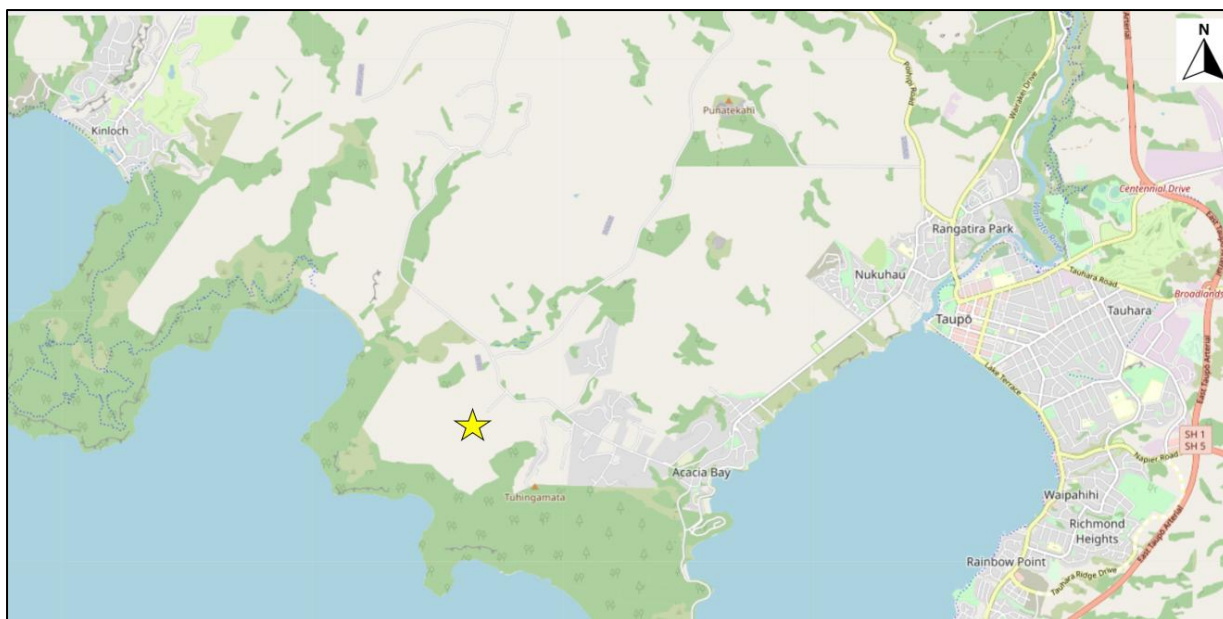


FIGURE 1: SITE LOCATION (MAP SOURCE: OPENSTREETMAP)

Figure 2 shows a map of the local area around Kaiapo Road and Mapara Road. This includes the various side roads along Kaiapo Road and Mapara Road that are referred to later in this report.

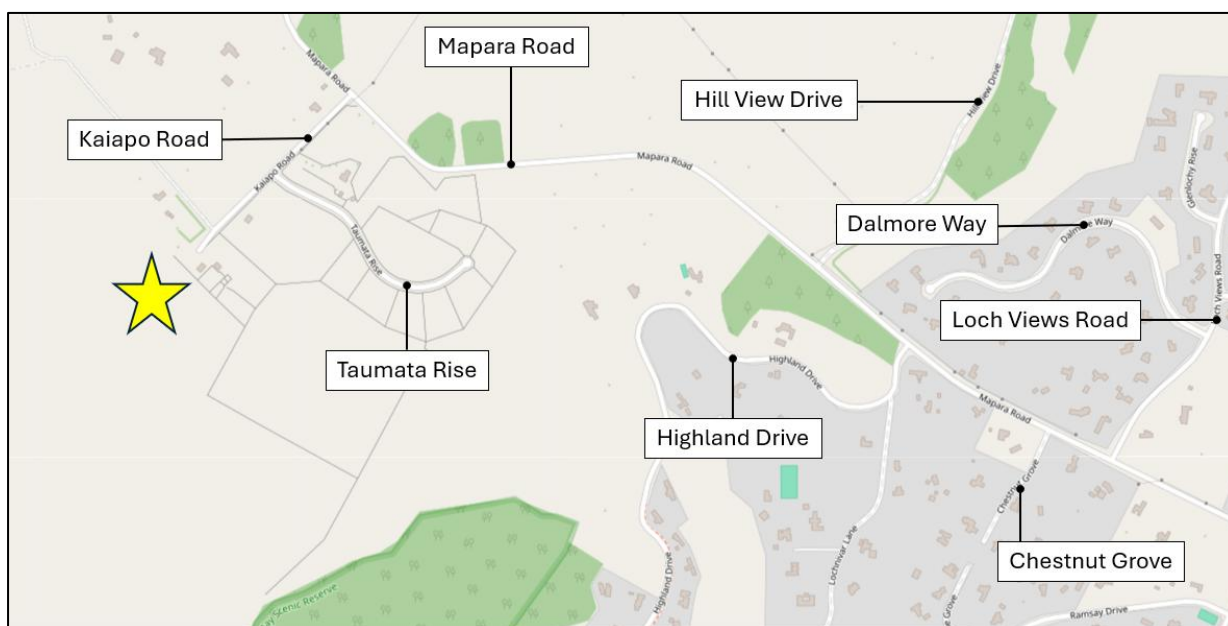


FIGURE 2: LOCAL AREA CONTEXT (MAP SOURCE: OPENSTREETMAP)

Figure 3 and Figure 4 show maps of Acacia Bay and the area around the Control Gates Bridge (CGB) in Taupo, respectively. These maps also show the various roads in these areas that are referred to later in this report.



3 Existing Environment

3.1 Road Network

Kaiapo Road is classified as a local road in the TDC road hierarchy and has a posted speed limit of 70km/hr. It is currently a no-exit road formed to a width of approximately 5.5m and has an unmarked two-way carriageway. The road sits in a cut with minimal shoulders and embankments on both sides.

Kaiapo Road meets Mapara Road at an uncontrolled T-intersection. Mapara Road is classified as a collector road in the TDC hierarchy and also has a posted speed limit of 70km/hr. It provides a connection south-east towards Acacia Bay and north-west towards Kinloch, via Poihipi Road. Aerial views of Kaiapo Road and Mapara Road are shown below as Figure 5 and Figure 6.



FIGURE 5: KAIAPO ROAD AND MAPARA ROAD AREA (AERIAL SOURCE: TDC MAPI)

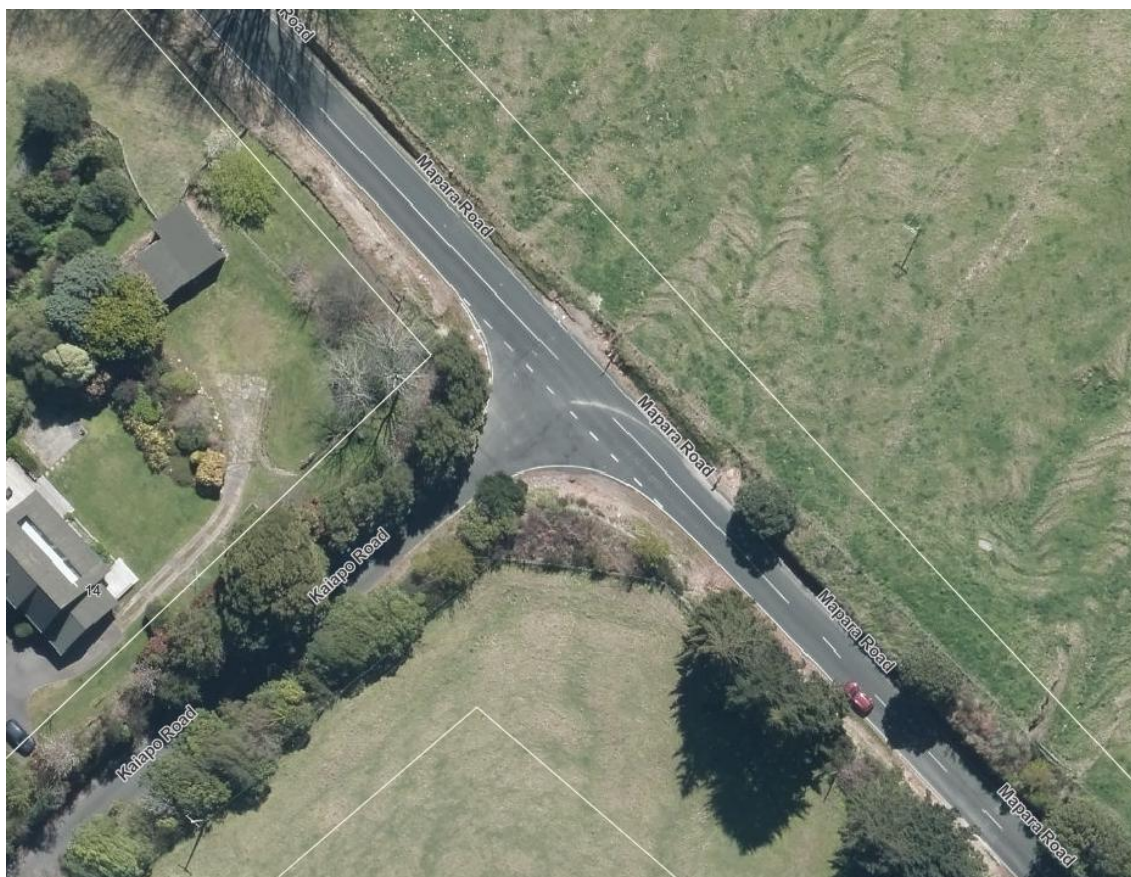


FIGURE 6: KAIAPO ROAD AND MAPARA ROAD INTERSECTION (AERIAL SOURCE: TDC MAPI)

Within Acacia Bay, Mapara Road meets Wakeman Road at a priority-controlled T-intersection. It is noted that the priority at this intersection is unusual in that the southern Wakeman Road approach gives way to the Mapara Road / Wakeman Road through route. Wakeman Road is classified as a district arterial road. It becomes Acacia Bay Road and then Norman Smith Street as it travels north-east towards Taupo, on approach to Wairakei Drive. These roads and intersections are shown as Figures 7, 8 and 9.

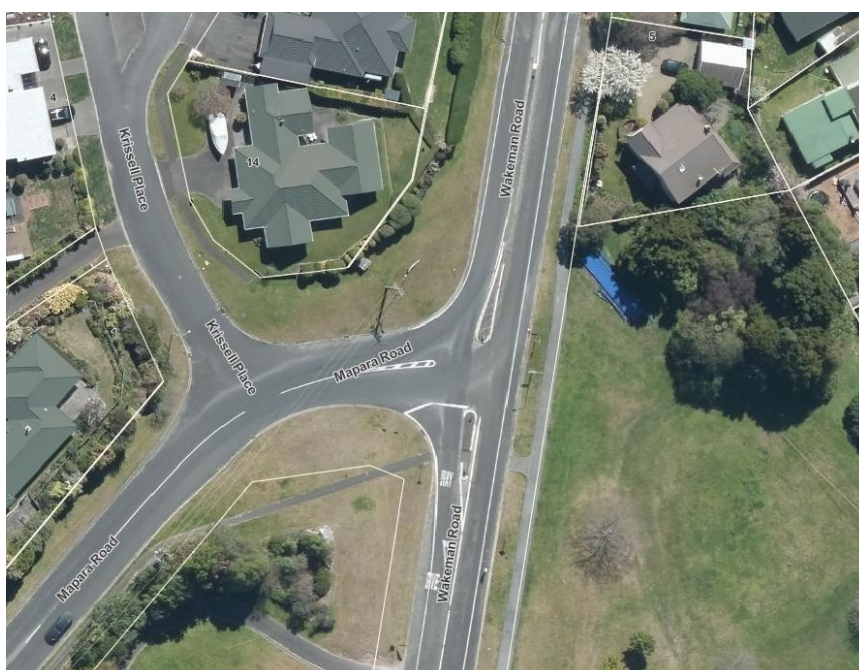


FIGURE 7: MAPARA ROAD/WAKEMAN ROAD INTERSECTION (AERIAL SOURCE: TDC MAPI)



FIGURE 8: WAKEMAN ROAD/ACACIA BAY ROAD INTERSECTION (AERIAL SOURCE: TDC MAPI)



FIGURE 9: ACACIA BAY ROAD/NORMAN SMITH STREET INTERSECTION (AERIAL SOURCE: TDC MAPI)

Norman Smith Street is a district arterial road in the road hierarchy and has a posted speed limit of 50km/hr. It is a largely two-lane urban road that intersects with Tongariro Street and Wairakei Drive at a signal-controlled intersection immediately to the north of the CGB. The intersection and the CGB to its immediate south are shown as Figure 10 and Figure 11 below.



FIGURE 10: NORMAN SMITH STREET/TONGARIRO STREET/WAIRAKEI DRIVE INTERSECTION (AERIAL SOURCE: TDC MAPi)

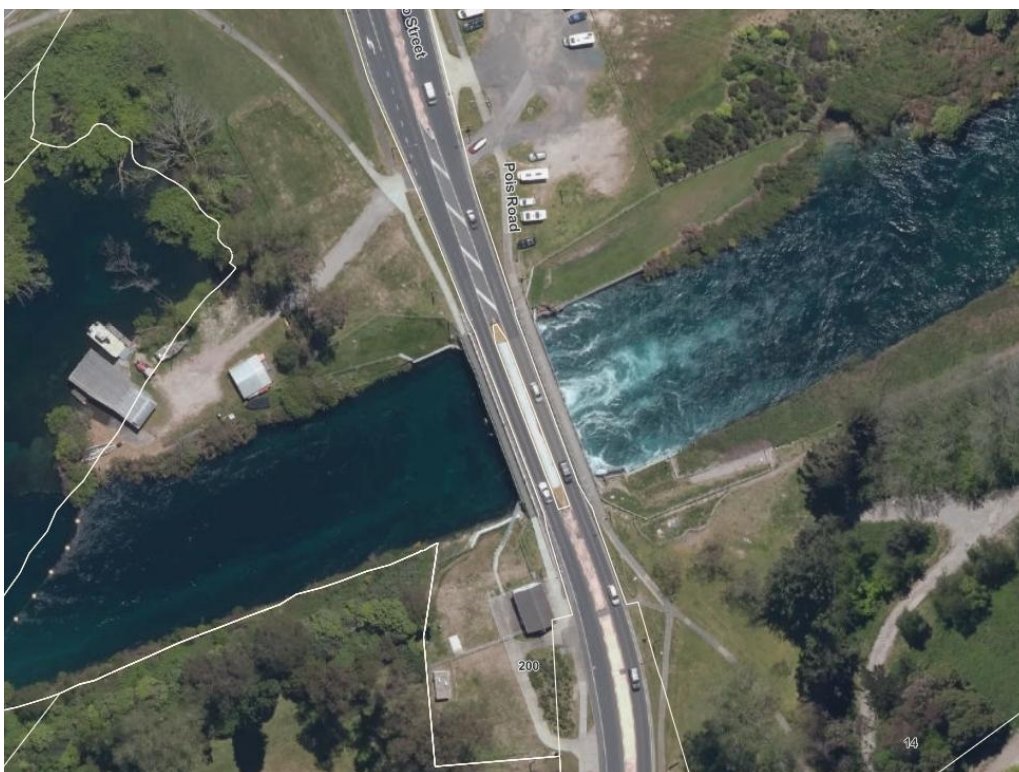


FIGURE 11: CONTROL GATES BRIDGE (AERIAL SOURCE: TDC MAPi)

Wairakei Drive and Tongariro Street form the corridor that was formerly State Highway 1 (SH1). This route is classed as a regional arterial road in the TDC road hierarchy. It is generally a two-lane road, with

additional turning lanes at intersections and operates under a 50km/hr speed limit. Tongariro Street intersects with Spa Road at a roundabout to the south of the CGB. Both Tongariro Street and Spa Road continue to be classed as regional arterial roads. The roundabout is shown as Figure 12 below.



FIGURE 12: TONGARIRO STREET/SPA ROAD ROUNDABOUT (AERIAL SOURCE: TDC MAPI)

3.2 Public Transport

Acacia Bay is served by the 34 'Connect2Taupo' (C2T) (Acacia Bay to Taupo) bus service. This service was introduced in October 2022 and runs twice daily (each way) on Mondays, Wednesdays, and Thursdays. It uses a combination of fixed and 'hail and ride' stops and circulates around Acacia Bay Road and Wakeman Road, within approximately 4km of the site.

The 33 service runs from Wharewaka to Nukuhau and provides four services each way in the morning and three services each way in the afternoon on weekdays. It also operates on Saturdays and provided three services each way in both the morning and afternoon. This route operates from Docherty Drive, across the CGB via Spa Road, Rifle Range Road and on to the Summerset Retirement Village at the south end of the Taupo township.

3.3 Walking and Cycling

Mapara Road has a footpath on its southern side. This starts east of Chestnut Grove, approximately 1.5km east of Kaiapo Road and connects into central Acacia Bay. West of this point on Mapara Road, and on Kaiapo Road, there are no specific provisions for walking and cycling.

In the wider area, a shared user path runs from the eastern side of Acacia Bay (approximately 200m east of Alberta Street) to Nukuhau.

3.4 Traffic Volumes

Current traffic volumes have been sourced from the Mobileroad website and are included as Table 1 below. Mobileroad provides daily traffic volumes and as such, peak hour volumes have been estimated as representing some 10% of the daily total.

TABLE 1: EXISTING TRAFFIC VOLUMES

Road	Daily (vpd)	Estimated Peak Hour (vph)
Kaiapo Road	40	4
Mapara Road (near site)	1,185	118
Mapara Road (east end)	3,200	320
Wakeman Road (south of Mapara Road)	800	80
Acacia Bay Road (north of Mapara Road)	3,330	333
Acacia Bay Road (south of Norman Smith Street)	11,290	1,129
Norman Smith Street	14,580	1,460
Wairakei Drive (north of CGB)	12,760	1,280
Control Gates Bridge	25,700	2,570
Spa Road	18,750	1,880
Tongariro Street (south of Spa Road)	6,620	660

Existing traffic volumes generally align with the functional role of roads within the TDC hierarchy, with lower volumes on local roads and progressively higher volumes occurring on collector and arterial routes closer to Taupo. Kaiapo Road, which is a local road, currently carries very low traffic volumes of approximately 40 vpd, while volumes on Mapara Road increase from approximately 1,185 to 3,200 vpd reflecting its collector function.

Further towards Taupo, Acacia Bay Road and Norman Smith Street, which form part of the district arterial network, carry in the order of 11,000 to 15,000 vpd, with the highest volumes occurring on the regional arterial network at CGB and Spa Road. This reflects the increasing movement function of the road network as traffic converges towards the wider urban area and key strategic transport links.

3.5 Road Safety

3.5.1 CAS Analysis

A search was made of the New Zealand Transport Agency (NZTA) Crash Analysis System (CAS) for all reported crashes that had occurred on Kaiapo Road or within a 250m radius of the Kaiapo Road/Mapara Road intersection. The search covered the five-year period 2021-2025 inclusive and any data from 2026 to date.

Six crashes were reported during the review period, including one serious injury crash, two minor injury crashes and three non-injury crashes. All reported crashes occurred on Mapara Road, one occurring at the Kaiapo Road intersection, one on the bend to the north-west and four on the bend to the south-east. No crashes were recorded on Kaiapo Road. The study area and crash locations are shown on Figure 13 below.



FIGURE 13: CRASH LOCATIONS (AERIAL SOURCE: GOOGLE EARTH)

A review of the individual crash records indicates that the crash pattern is predominantly associated with loss-of-control type events occurring on curved sections of Mapara Road rather than conflicts associated with the operation of the Kaiapo Road intersection. The reported crashes commonly involved vehicles leaving the carriageway and striking roadside features such as banks or embankments. A number of crashes also identified contributing factors including excessive speed for the prevailing conditions, alcohol impairment, driver inexperience and environmental factors such as wet pavement conditions.

Overall, the crash history does not identify any recurring pattern of turning, rear-end, failure-to-give-way or other intersection-related crashes that would indicate a systemic safety issue associated with the Kaiapo Road/Mapara Road intersection. Rather, the crash pattern appears more reflective of isolated driver behaviour and environmental factors occurring within a rural road environment. The crash patterns suggest that a review of the speed advisory signage on the bend to the south of Kaiapo Road be undertaken by TDC, regardless of the proposed rezoning.

3.5.2 MegaMaps Analysis

The NZTA MegaMaps database has been used to identify both the personal and collective risk ratings for the roads described above.

- Collective risk is the measure of how likely a crash is to happen along a given stretch of road network.
- Personal risk relates to the chance that if a crash does occur that it involves a given individual. It is not unusual to see higher personal risks on a road, particularly when there are low traffic numbers.

Table 2 below shows a summary of the MegaMaps Risk Ratings for surrounding roads.

TABLE 2: MEGAMAPS RISK RATINGS

Road	Collective Risk	Personal Risk
Mapara Road	Medium	Medium / High
Kaiapo Road	Low	Low

The MegaMaps assessment indicates a Medium collective risk and Medium–High personal risk rating for Mapara Road, while Kaiapo Road returns Low collective and personal risk ratings. Elevated personal risk ratings are not uncommon on lower-volume roads and do not necessarily indicate a high frequency of crashes occurring.

Overall, the MegaMaps outputs are broadly consistent with the observed crash history in the vicinity of the site and do not identify any particular systemic safety concerns within the surrounding road network. While Mapara Road returns a comparatively elevated personal risk rating, this is consistent with the recorded crash patterns and does not suggest that the surrounding road environment is operating outside expected levels.

3.6 Committed Environmental Changes

3.6.1 Subject Site Subdivision

In 2022, resource consent was granted for a 39-lot rural residential subdivision on part of the subject land. The subdivision was supported by an Integrated Transportation Assessment (ITA) prepared by Commute and an Engineering Services Report prepared by Cheal¹

The ITA concluded that the Kaiapo Road/Mapara Road intersection had sufficient capacity to accommodate the proposed development traffic, with no capacity-related upgrades identified as being necessary. The Engineering Services Report also identified that available intersection sight distances exceeded the relevant Safe Intersection Sight Distance (SISD) requirements, although minor vegetation clearance and embankment trimming were proposed to further improve visibility and address matters raised through the consenting process. Land was also vested to facilitate these works.

3.6.2 TDC Long Term Plan 2024-2034

The TDC LTP 2023-34 sets out TDC's infrastructure plans and priorities for the identified ten-year period. In relation to transport in and around Acacia Bay the LTP identifies:

- Cycling upgrades on Norman Smith Street (part of a \$14.9 million commitment to cycling upgrades); and
- Taupo Waikato River crossing (CGB) (\$76.9 million budgeted over 2024/25 – 2030/31 'Second Bridge Crossing' (\$390,000 in 2030/31 (for investigation))

The capacity of the existing CGB across the Waikato River is known road network bottleneck. This has been recognised through the Nukuhau plan change provisions which limit future development within this area until such time that the second crossing is provided.

¹ Kaiapo Bay Limited, 15 Kaiapo Road, Taupo, Engineering Services Report by Cheal (19 March 2018). Section 5.1.

A number of alternatives to a new /or wider bridge have been considered by TDC including:

- Better buses, walking and cycling connections;
- Demand management;
- Improving the road network either site; and
- Traffic management including promoting alternative entrances to the town.

These have been dismissed as either being appropriate for visitors / peak season only or the works having been completed and no more opportunity being available.

There is general funding for 'cycle facilities' in the LTP but no specific project is highlighted.

Appendix 3 of the LTP explores the issues associated with the Taupo Waikato River crossing / Northern Gateway and sets a clear timeframe with geotechnical investigation and consultation being expected to be completed by the end of 2027, consenting and design to be undertaken between 2027 and 2030 and construction being expected in 2030-2031.

3.6.3 Other Residential Development

As described later in Section 7.1, this ITA has made use of traffic modelling completed for the Seven Oaks subdivision in Kinloch. This modelling includes allowances for traffic generated by other consented developments in and around Kinloch and their various expected delivery dates.

The adopted lot numbers and anticipated timing for each development are summarised in Table 3 below. The 2027 future year has been considered as the anticipated year when the control gates bridge upgrade would commence.

TABLE 3: OTHER RESIDENTIAL DEVELOPMENTS

Development	Total Lots	Timing	Lots by 2027
Hunt Club Inc	30	2030-2035	0
The Terraces	55	2025-2035	17
Seven Oaks	160	2020-2026	160
Oakdale Drive	12	2025-2030	7
Workshop Site	6	2025	6
The Poplars	12	2020-2025	12
The Fairways	54	2020-2040	8
Kinloch Golf Course	108	2035-2050	0
The Kinloch Manor	12	2025-2030	7
Edmund Hillary Outdoor Education	1	2025	1
Locheagle Developments	30	2020-2035	10
Total	480		228

The Nukuhau Plan change thresholds on residential development have also been taken in to account in relation to assessing combined effect of future known development.

4 Policy Context

4.1 TD2050 Context

4.1.1 Growth Strategy

The Future Development Strategy (FDS) “TD2050” (adopted March 2025) identifies where and how TDC anticipates accommodating future urban growth. It identifies that there is a mismatch between housing typology supply and demand and that there is latent demand for lifestyle living of around 1,200 dwellings in the Acacia Bay/Mapara area. This is in the context of needing to build some 12,400 households over the next 35 years to accommodate expected population growth. However, the FDS considers that there is sufficient zoned land to meet this need under the medium growth forecasts.

The future Taupo township is shown as Figure 14 below. The site is within 640m of this future township boundary.

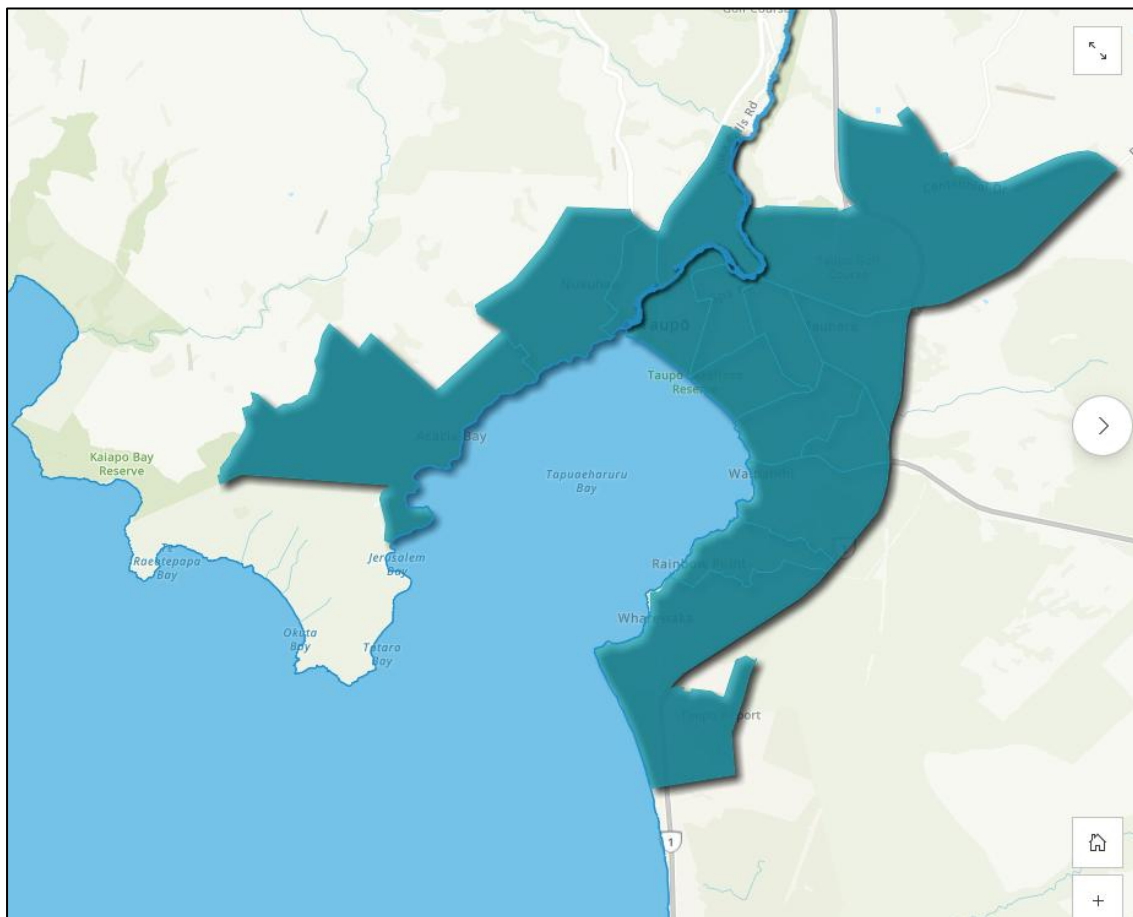


FIGURE 14: FDS TAUPU TOWNSHIP

In terms of future growth, a significant area of land is identified linking the Nukuhau Residential Zone with the Lochviews Area, as illustrated on Figure 15 below. This aligns with the general policy of holding the Eastern Taupo Arterial (ETA) road as a hard boundary for the town and accommodating growth to the west instead.

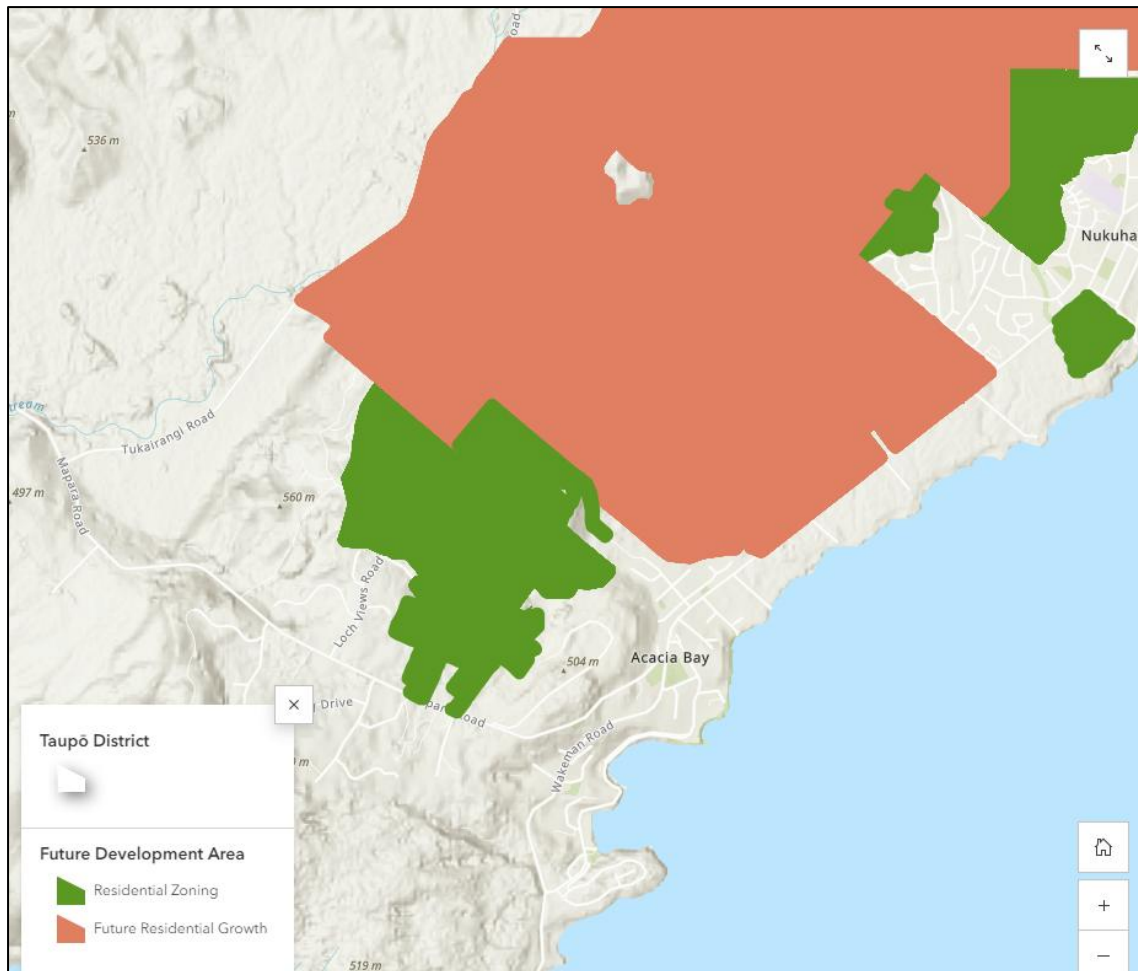


FIGURE 15: FUTURE RESIDENTIAL GROWTH AREAS (TAUPO TOWNSHIP)

The FDS also acknowledges the existing road network capacity constraints at the CGB and at the intersections to either side of it. Addressing this constraint forms part of the Implementation Plan and is referenced in the LTP 2024-34.

The Kinloch Sevenoaks subdivision hearing decision also recognised that it is appropriate to continue to support development to the north and west of the river, subject to identifying increases in existing queue lengths and delays at the CGB being less than minor, rather than using the CGB as a brake and stopping all development until this problem has been solved.

4.1.2 Transport Strategy

The TDC Transport Strategy (Connecting Taupo 2020-2050) sets out TDC's transport focus areas and their priority as follows:

- Safety
- Inclusive transport
- Walking and cycling to support sustainable choices
- Supporting vibrancy of town centres and fostering social and economic interactions
- Well connected to the rest of New Zealand
- Resilient and reliable
- Maintaining predictable travel times in the face of growth

It also includes a plan for an extended strategic walking and cycling network, including the Acacia Bay area shown below as Figure 16.

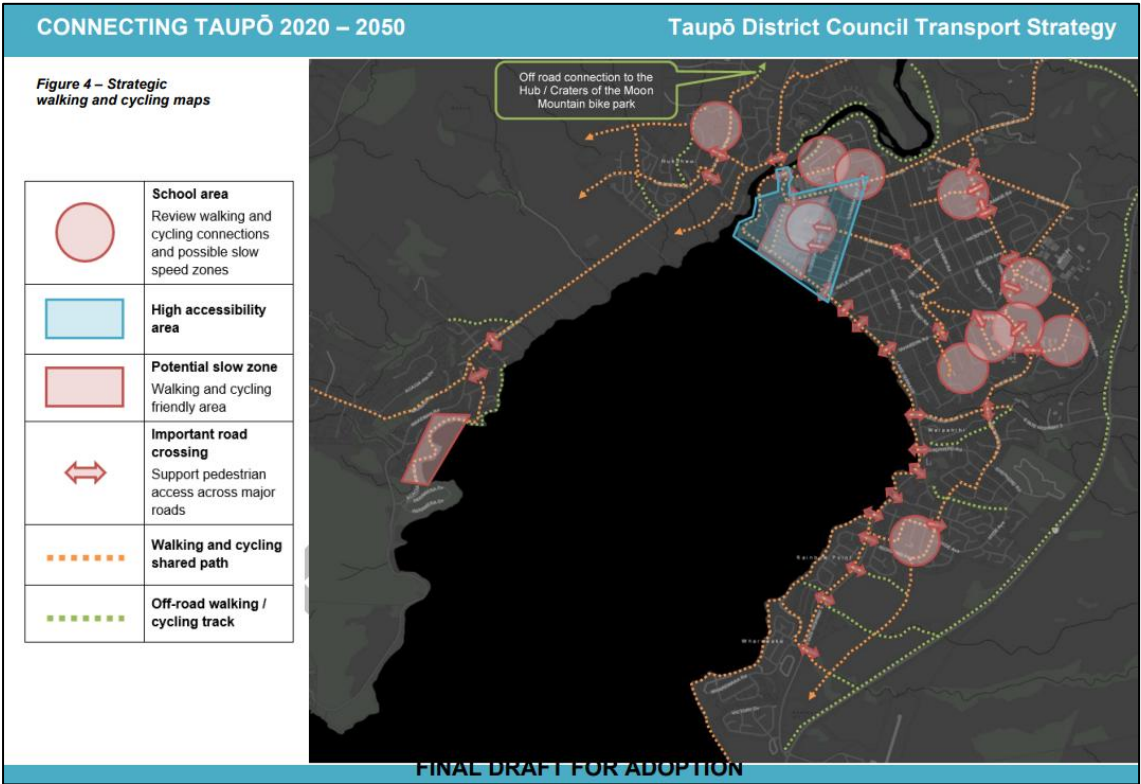


FIGURE 16: CONNECTING TAUPŌ 2020-2050 STRATEGIC WALKING AND CYCLING NETWORK

The planned network includes extension of the Acacia Bay Road shared walking and cycling path from its current termination point further west towards the site and south towards the lakefront. Acacia Bay Road is also recognised as a strategic sport/distance route for road cyclists.

5 Proposed Rezoning

An Outline Development Plan (ODP) for the proposed rezoning area is shown as Figure 17 below. The proposed Low Density Residential zoning is expected to yield approximately 320 lots.

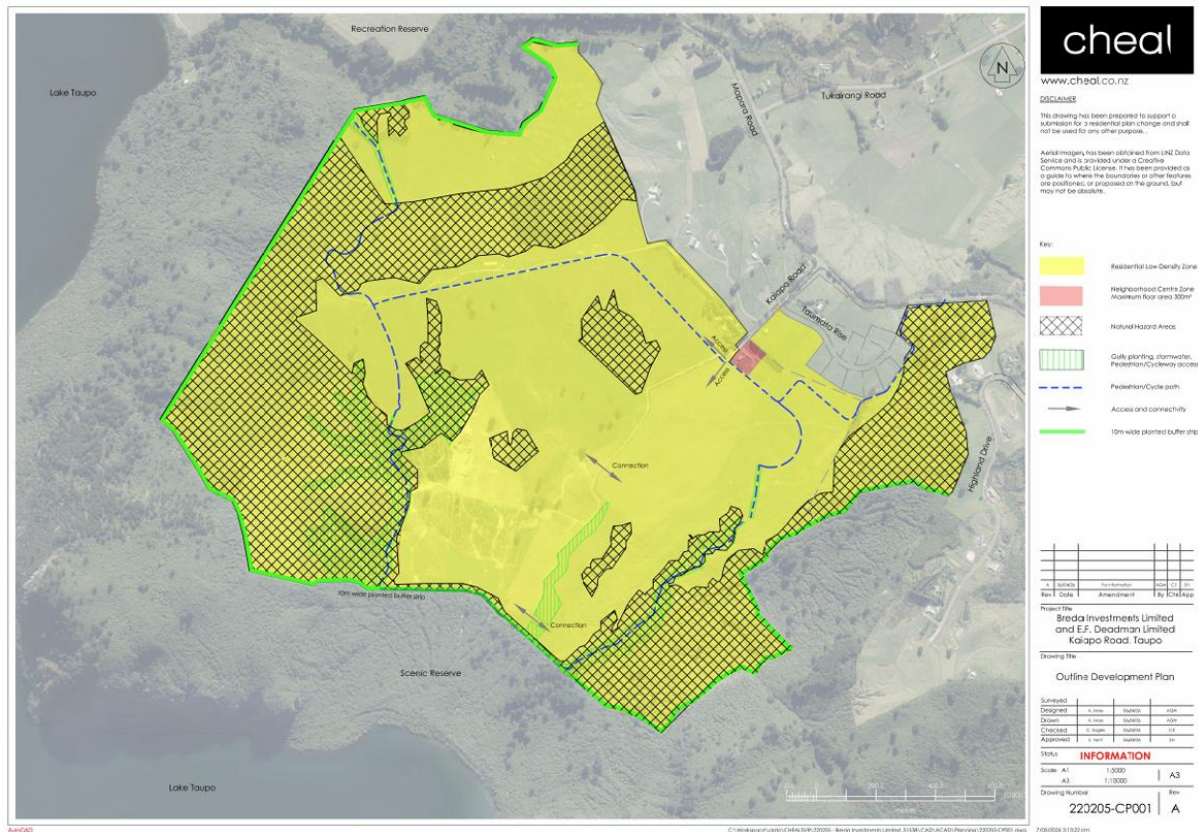


FIGURE 17: PROPOSED OUTLINE DEVELOPMENT PLAN (PREPARED BY CHEAL)

The ODP includes predominantly low-density residential zoning with a supporting neighbourhood centre zone. This allows for a maximum floor area of 300m². A pedestrian and cycle path is shown circling the site with connections to both the off-road path to the west and also to Mapara Road to the east of the Taumata Rise development. A central connection across the site is also proposed to ensure walking and cycling around any future subdivision is well supported and is not reliant on the roading network.

It is expected that all on site roading within any future subdivision will comply with the relevant provisions of the TDC Development of Land Code of Practice (CoP).

6 Trip Generation and Distribution

6.1 Land Use and Demographic Factors

The land use environment in Acacia Bay, both in terms of the built environment and the underlying District Plan zoning, is predominantly residential in nature. Residential, Low Density Residential and New Residential zones cover the area, surrounded by General Rural Environment zoning. There are a small number of commercial activities including a local scale shopping centre on the Acacia Bay Road/Alberta Street corner.

As at the 2018 Census, Acacia Bay had a population of 1,654 people. There were 987 dwellings, 31% of which were unoccupied (and most likely used as holiday homes). By the 2023 Census, the number of households had increased to 1,047, of which 33% were unoccupied. The 2023 Census also records a normally resident population of 1,770 (increase of 7% since 2018). There has been a 6% increase in the number of households overall and a 2% increase in unoccupied households. This suggests that more people are living permanently within Acacia Bay.

In 2023 the population included approximately 996 resident workers and 324 resident students. The travel patterns of these groups can be summarised as follows:

For the working population:

- 24% worked from home in Acacia Bay with a further 6% remaining within Acacia Bay for work;
- The most common destinations outside of Acacia Bay were Taupo Central² (26%), Tauhara (10%), Hilltop (4%) and Wairakei-Broadlands (4%); and
- The most common travel modes were private or company car (70%) and working from home. This is a decrease from 77% in the 2018 census
- 27 people travelled into Acacia Bay for work.

There are no schools in Acacia Bay and only one primary school (St Patrick's Catholic School in Nukuhau) on the western side of Taupo (west of the Waikato River). In 2023, 15% of students studied at home in Acacia Bay and 85% left the area.

6.2 Trip Generation

The NZTA Research Report 453 (RR453) gives trip generation rates for various land use types. The rates for outer suburban residential areas are summarised in Table 4 below.

TABLE 4: RR453 TRIP RATES

Land Use Category	Daily (vpd/unit)		Peak Hour (vph/unit)	
	85 th Percentile	50 th Percentile	85 th Percentile	50 th Percentile
Outer Suburban	8.2	6.9	0.9	-

If assessed as a typical outer suburban residential subdivision, the area proposed to be rezoned could generate approximately 2,620 vpd including 290 vph during the peak hours of the day assuming a yield of around 320 residential lots.

However, this approach does not take account of the high level of unoccupied houses (33%). During the Kinloch Sevenoaks hearing in August 2025, a trip generation rate of 0.59 vph/lot was adopted based on a survey of a 188-lot subdivision off Alec Craig Way in Whangaparoa.

This survey resulted in a trip generation rate of 0.59 vph/lot, with a 95% occupancy rate based on Census data. The Kinloch Sevenoaks subdivision considered adopting a pro rate percentage reduction in the RR453 standard trip generation rate of 0.9 vph/lot based on occupancy levels, but adopted the value of 0.59vph/lot to give a degree of robustness to the assessment.

When allowing for occupancy levels (33%) and people who work from home (24%), the peak hour trip rate of the proposed rezoned land would be some 0.51 vph/lot. Use of 0.59 vph/lot consistent with the Kinloch Sevenoaks hearing is assessed as appropriate given this approach was agreed with TDC technical advisors through extensive consultation. On this basis, it is anticipated that the proposed rezoning could result in some 189 vph during peak hours of the day.

² Includes the Taupo Central West and Taupo Central East Census areas.

6.3 Trip Distribution

Based on Census travel patterns published on the Commuter Waka website, it is expected that approximately 47% of trips would utilise the CGB corridor. This route supports movement from areas including Taupo Central, Centennial, Hilltop and Tauhara. The balance of movements would travel either to and from the west from the site, move to and from the north at Norman Smith Street.

This results traffic demands at the CGB of some 89 vph. For residential development, traffic patterns typically exhibit an outbound bias during the AM peak hour (approximately 80% outbound and 20% inbound), with the PM peak hour generally exhibiting a more balanced pattern of approximately 40% outbound and 60% inbound trips.

The resulting site-generated directional trips at the CGB are shown in Table 5 below.

TABLE 5: SITE-GENERATED MOVEMENTS AT THE CGB (320 LOTS)

Direction at CGB	AM Peak Hour (vph)	PM Peak Hour (vph)
Northbound	18	53
Southbound	71	36

In the AM peak hour, the predominant movement would be southbound, with the proposed rezoning expected to generate approximately one additional vehicle crossing the CGB every 40-50 seconds. During the PM peak hour, the predominant movement would be northbound, with the proposal expected to generate approximately one additional vehicle every minute.

7 Capacity Modelling

7.1 Modelling Approach

Intersection modelling has been undertaken using SIDRA Intersection software to assess the operation of the Norman Smith Street/Wairakei Drive signalised intersection and the Tongariro Street/Spa Road roundabout.

As a starting point for the assessment, the SIDRA models developed as part of the Seven Oaks subdivision application have been adopted for these two intersections. These models were selected as they have recently been subject to detailed review through the TDC consenting process and reflect a modelling basis that has been developed collaboratively between CKL, Council and Council's peer reviewer. This process included review and agreement of traffic demand assumptions, network loading, signal phasing inputs and sensitivity testing of key parameters to confirm model robustness. These models also include the expected residential development outlined in Section 3.6.3.

For the purposes of this assessment, the future "base + development" scenarios established through the Seven Oaks modelling have been used as the baseline network condition. Traffic generated by the proposed Kaiapo Road rezoning has then been added to these baseline scenarios to isolate and assess the incremental effects attributable to the rezoning proposal.

7.2 Assessment Results

Prior to undertaking detailed assessment, a range of development yields were reviewed to understand the relationship between additional residential development and changes in network performance at the

critical intersections surrounding the CGB corridor. The purpose of this review to identify a level of development that was broadly comparable to the scale of effects previously accepted through the Seven Oaks assessment process.

A development scenario of approximately 150 lots was identified as the level at which changes in average delay at intersection generally remained within approximately 10 seconds or less. The 150-lot scenario has therefore been adopted as a practical assessment threshold for considering the scale of development that could reasonably occur prior to implementation of wider strategic network upgrades.

In addition, a scenario has been modelled with the development of 320 lots, representing the anticipated full development yield of the proposed rezoning area. Detailed SIDRA outputs for all assessed scenarios are provided in Appendix 1.

For the Norman Smith Street/Wairakei Drive signalised intersection, the AM peak hour assessment indicates that development of 150 lots results in an increase in overall average intersection delay from approximately 110 seconds per vehicle (s/veh) in the base case to 118 s/veh with a proposed 150 Kaiapo Road lots in place. This represents an increase of approximately 8 s/veh. During the PM peak hour, average intersection delay increases from approximately 18 s/veh to 19 s/veh, representing an increase of less than 1 s/veh.

The modelling indicates that the additional delay occurs primarily on the Wairakei Drive northbound through movement and Norman Smith Street right turn movement, which are already identified as the critical movements under the baseline scenario. The additional development traffic increases utilisation of these movements but does not introduce any new critical movements or materially alter the operational characteristics of the intersection.

For the Tongariro Street/Spa Road roundabout, the AM peak hour assessment indicates that development of 150 lots results in average intersection delay increasing from approximately 34 s/veh to 42 s/veh, representing an increase of approximately 8 s/veh. During the PM peak hour, average delay increases from approximately 188 s/veh to 198 s/veh, representing an increase of approximately 10 s/veh.

The modelling indicates that these changes occur predominantly on the Spa Road right turn movement, which is already identified as the critical movement under the baseline scenario. Similar to the Norman Smith Street/Wairakei Drive intersection, the additional traffic does not create new operational deficiencies but rather contributes incrementally to movements that are already operating under constrained conditions.

The full development (320 lot) scenarios are also included in Appendix 1. The assessment indicates additional increases in delay and queue lengths relative to the 150-lot scenario, however, these increases continue to occur predominantly on movements already operating under constrained conditions within the baseline network scenario. No new critical movements or capacity deficiencies are introduced.

Overall, the SIDRA assessment indicates that development up to approximately 150 lots results in relatively minor increases in delay, generally in the order of 10 seconds or less, and can be accommodated within the operation of the wider transport network. This level of change is unlikely to be discernible to drivers. Development toward the full anticipated yield of approximately 320 lots results in additional increases in delay, however, these effects remain incremental in nature and do not materially alter the operational characteristics of the assessed intersections.

8 External Road Infrastructure Requirements

8.1 Kaiapo Road

Kaiapo Road would provide access to around 320 lots and carry a daily traffic volume of around 2,620 vpd based on industry standard trip rates and full occupation of the development. If it assumed that 33% of homes are not permanently occupied that volume would reduce to some 1,700 vpd, including 189 vph during the peak hours of the day.

Based on these traffic volumes, the appropriate cross-section from the CoP³ would be a 20m wide corridor with a 7.0m traffic carriageway and 2m wide parking lanes on both sides, regardless of the degree of occupation within the subdivision.

Although it is not specifically stated in the CoP, a footpath or shared user path is recommended to be provided on at least one side of the Kaiapo Road. However, in this instance, the footpath/cycle path connection to Mapara Road is proposed to be provided further to the east and segregated from Kaiapo Road, as per the ODP shown as Figure 17 in Section 5.

It is assessed that for the incised section of Kaiapo Road, on-street parking is not appropriate as there is no direct frontage to land use activity along this section of the road. Given the cycle path / footpath connection is also being provided via an alternative solution, it is assessed that this short section of Kaiapo Road should be widened by approximately 1.5m to form a 7m carriageway to support the proposed rezoning. This work would all require further cutting and vegetation removal.

In terms of staging, the CoP allows for around 20 lots to be accessed via a residential road with a minimum carriageway width of 5.0m. There are currently 17 residential dwellings or subdivided lots gaining access from Kaiapo Road. There is also a previous resource consent for 39 rural residential lots on this site. That consent required an intersection upgrade, but not an upgrade of Kaiapo Road. As such it is assessed that allowing the development of up to 40 lots within the rezoned area prior to an upgrade to the width of Kaiapo Road would be appropriate, and reflective of the existing resource consent.

Once such an upgrade has been achieved, it is assessed that the level of development within the rezoned area could exceed 320 households, subject to other transport infrastructure upgrades.

8.2 Kaiapo Road/Mapara Road Intersection

8.2.1 Intersection Capacity

The ITA prepared by Commute for the 39-lot subdivision included a morning and evening peak hour survey of the Mapara Road/Kaiapo Road intersection, undertaken in August 2021. The surveys showed light existing traffic volumes, with 78-79 vph using the intersection at peak times. From Table 1 there has been an increase in existing traffic volumes to some 120 vph based on the estimated traffic volumes.

Although Mapara Road is not a State Highway, the NZTA Planning Policy Manual (Appendix 5B) provides guidance⁴ about appropriate intersection treatments for different combinations of major and minor road volumes at rural T-intersections.

³ TDC COP Figure 3.1R, Residential Environment, >30 sites, volume 1,500 -5,000 vpd.

⁴ Figure 8-2 DSI Crash Boundary – Larger (>250 vpd) 3 Leg Rural Intersection

Assuming a daily volume of 2,700 vpd on Kaiapoi Road (allowing 2,620 vpd for the rezoning plus 40 vpd existing and rounding up) and 1,200 vpd on Mapara Road (from Table 1), a priority-controlled T-intersection without a right turn bay is the appropriate treatment.

This remains the case if the yield is assumed to increase to 400 residential lots (taking the Kaiapo Road volume to approximately 3,300 vpd) and if (as a sensitivity test) the volume on Mapara Road doubled.

The operational capacity of the intersection should be assessed and confirmed as part of future subdivisions however this analysis indicates that a priority-controlled T-intersection has adequate capacity to support the proposed rezoning.

8.2.2 Intersection Sight Distance

The Mapara Road/Kaiapo Road intersection will need to meet minimum sight distance requirements. The ITA prepared by Commute describes the available sight distances as 170m to the north and 210m to the south. These distances exceed the relevant safe intersection sight distance (SISD) requirements for the measured speed environments (71km/h for northbound traffic and 66km/h for southbound traffic).

The Engineering Services Report prepared by Cheal notes that although the sight distance was assessed by Commute as being adequate, minor bank trimming and vegetation clearing were also proposed (at the request of TDC). The works are expected to extend beyond the original road reserve, and this land has been vested in TDC to enable the upgrade to proceed.

It is also understood that a layout design for an improved intersection has already been undertaken and that land has been set aside at the intersection within the client's ownership to accommodate this. It is anticipated that the proposed intersection can continue to accommodate the expected level of occupation that could result from the proposed rezoning.

Once suitable sightlines have been provided, it is assessed that the anticipated 320 households could be accommodated, as could a potential increased yield of 400 households.

8.3 Mapara Road

Mapara Road currently carries around 1,200 vpd. The proposed rezoning and consented lots on Kaiapo Road could increase this to around 3,800 vpd (assuming full occupation of lots in the Plan Change area). The two-lane two-way configuration of Mapara Road has adequate capacity to accommodate this increase and would not need any additional vehicle capacity for some 320 lots to be developed within the subject site. There is also likely to be suitable capacity available for a higher yield of some 400 residential lots.

8.4 Mapara Road / Wakeman Road Intersection

Existing and proposed volumes at this intersection have also been checked against the NZTA PPM guidance, for urban T-intersections⁵.

The existing volumes (Table 1) at this intersection are some 800 vpd on the minor approach (Wakeman Road south) and 3,200-3,300 vpd on the major road which is formed by Mapara Road and Wakeman Road north). This combination of volumes is well within the zone where a priority-controlled T-intersection without a right turn bay treatment is appropriate.

⁵Figure 8-3 DSI Risk, Urban 3 Leg 'T' Intersection

This remains the case when the major road volume is increased by the 2,620-3,300 vpd increase associated with 320-400 lots on the subject site.

The intersection has a somewhat unorthodox layout (shown earlier on Figure 8) where the priority arrangement is not intuitive from the road geometry. Improvements to better define the layout and clarify vehicle priority are assessed as likely to provide road safety benefits. It is recommended that these upgrades be assessed and detailed prior to occupation of the 150th lot within the proposed rezoned land.

9 Walking and Cycling Infrastructure

In a residential setting, active mode infrastructure can be considered as both transportation infrastructure that is used for the purpose of moving from point to point, and social or recreational infrastructure that is used as an activity in its own right. Figure 18 and Figure 19 below show heatmaps (sourced from the fitness app Strava) of relative levels of walking/running and cycling activity in the area around the site.



FIGURE 18: WALKING/RUNNING HEAT MAP (SOURCE: STRAVA)



FIGURE 19: CYCLING HEAT MAP (SOURCE: STRAVA)

Figure 18 shows limited walking and running along Mapara Road (as expected), with higher levels of activity in the local areas around Highland Drive, Hill View Drive and Dalmore Way. Figure 19 shows on-road cycling on these roads and Mapara Road. Walking, running and cycling (on and off road) are all common in the Whakaipo Bay recreation reserve area, which is at the end of the “W2K” section of the Great Lake Trails. This is a 23km long off-road trail from Whakaipo Bay to Kinloch.

It is recommended that a direct connection from the site be provided as shown on the ODP and that the existing footpath which terminates at Chestnut Grove be extended to meet this new connection. It is recommended that this be provided to support the development of more than 50 lots.

The recommended threshold of approximately 50 lots reflects a practical staging approach to infrastructure delivery. Existing consented development within the area (approximately 40 lots) has previously been assessed as capable of operating without a dedicated off-site path connection and, in isolation, a relatively small increase beyond this level would not be expected to materially change active mode demands.

However, once development begins to extend beyond the currently consented environment, the cumulative increase in residents and associated walking and cycling activity is assessed as being sufficient to justify provision of dedicated active mode infrastructure. This approach allows infrastructure delivery to occur at a point where there is likely to be a meaningful user base while avoiding the need to construct substantial off-site infrastructure ahead of development occurring.

A desktop inspection of the available berm widths suggests that the best opportunity would be to extend the path from its current termination point on the southern side of the road and cross over Mapara Road in the vicinity of the Highland Drive intersection (noting that any crossing would need to achieve appropriate safety standards for the speed environment). This would integrate with the pedestrian access to Dalmore Way on the northern side of the road. This southern area is shown below as Figure 20.



FIGURE 20: PATH OPTION (SOUTHERN AREA)

The path could then extend further on the northern side of the road, across Hillview Drive and along the northern berm. Again, subject to appropriate sight distance being available, the path could cross Mapara Road and run into the site directly as shown as **Error! Reference source not found.** below.



It is assessed that a dedicated walking and cycling connection is an important component of the transportation infrastructure required to support rezoning of the site. Without such a connection, the rezoned area would be largely reliant on vehicle access and would remain physically separated from the existing Acacia Bay residential area by the current rural road environment on Mapara Road. Extending the existing path network to connect with the site would help integrate the rezoned land with the established urban area, support local walking and cycling trips, and provide residents with a realistic alternative to private vehicle travel for some journeys.

This connection would also improve active mode connectivity for the wider area, including the communities around Dalmore Way and Highland Drive, and would align with the strategic walking and cycling direction identified in Connecting Taupo 2020–2050 (Section 4.1.2). Cyclists could potentially be accommodated through provision of a shared path of sufficient width, although on-road cycling facilities may also be appropriate if future road upgrades result in a more urban cross-section on Mapara Road.

10 Road Safety Effects

The road safety environment has been assessed having regard to the existing crash history, MegaMaps risk ratings, existing road form, likely changes in traffic volumes and the infrastructure upgrades recommended to support staged development of the rezoned area.

As outlined earlier in this report, the recorded crash history does not identify a recurring pattern of crashes associated with the operation of the Kaiapo Road/Mapara Road intersection. Rather, the reported crashes on Mapara Road are generally associated with loss-of-control type events, driver behaviour and environmental factors. The MegaMaps assessment is also generally consistent with this pattern.

The proposed rezoning would increase traffic activity on Kaiapo Road and at its intersection with Mapara Road. It is therefore recommended that the previously identified sight distance improvement works at the Kaiapo Road/Mapara Road intersection be implemented before further development occurs beyond the level already anticipated by the existing consented subdivision. These works would improve the safety and legibility of the intersection and are appropriate as an early-stage infrastructure requirement.

Kaiapo Road would also need to be upgraded as development progresses. While the road currently carries very low traffic volumes, the existing narrow formation would not be appropriate for the longer-term level of residential traffic anticipated under the rezoning. Widening Kaiapo Road to provide a 7.0m carriageway, together with appropriate edge treatment and drainage, would provide a road environment more suited to two-way residential traffic movements and would reduce the potential for conflict between opposing vehicles.

The Mapara Road/Wakeman Road intersection has also been identified as having an unorthodox layout where the priority arrangement is not intuitive from the road geometry. While the intersection form does not preclude the proposed rezoning, improvements to better define the layout and clarify vehicle priority are assessed as likely to provide road safety benefits. It is therefore recommended that this intersection be reviewed and upgraded prior to occupation of the 150th lot within the proposed rezoned land.

The provision of walking and cycling infrastructure is also relevant to road safety. The recommended connection between the rezoned area and the existing Mapara Road footpath network would provide for active mode movements without relying on pedestrians walking along the existing rural road edge. Any crossing points on Mapara Road would need to be designed having regard to the prevailing speed

environment, sight distance and appropriate crossing treatments. This can be addressed through future subdivision design and engineering approval processes.

Overall, the safety matters identified through this assessment can be appropriately managed through staged infrastructure upgrades and future subdivision-level design controls. Subject to the recommended works being implemented at the relevant development thresholds, it is assessed that the proposed rezoning can be supported without creating unacceptable road safety effects.

11 Public Transport and School Bus Integration

2023 Census travel to work data for Acacia Bay indicates a relatively simple pattern of commuter movement. Of the residents that leave Acacia Bay for work, around half travel to central Taupo. This creates the potential for residents to use a public transport service (for example an extension of the 34 C2T services) as a means of travel to work and an alternative to private car transport.

The internal site transport network should allow for future access by public transport services. This would typically involve providing a bus-compatible route and a supporting network of roads/footpaths that provide safe and convenient walking access for residents who use the service.

A future public transport service would not need to circulate extensively within the site itself. The Waikato Regional Public Transport Plan (RPTP) has signalled a move away from circuitous routes that provide a high degree of geographic coverage, to those that are more linear and can provide a more frequent service and shorter travel time. New developments are preferably serviced by short deviations from existing services.

In the context of the site, this means that a centralised bus stop (or series of stops) offering regular services to Taupo is likely to be more effective than a service that meanders throughout the area, even if people need to walk further from their home to access it.

Bus infrastructure and bus compatible streets would also be advantageous for school bus routes which are funded by the Ministry of Education (MoE) and coordinated by the participating schools. Routes are regularly reviewed and based on the current MoE criteria, students who attend their closest school and live at least 3.2km (primary/intermediate) or 4.8km (secondary) from the school are eligible for free bus transport. There are no schools within 4.8km (or 3.2km) of Acacia Bay so it is expected that there would be a high level of eligibility for school bus services. This would address the 'journey to school' car trips associated with the site.

12 Internal Access, Lot Access and Parking

The submission relates to the rezoning of land rather than a detailed subdivision proposal and, as such, the detailed layout of roads, individual lot access arrangements and parking provision has not been developed at this stage.

Future subdivision and/or development applications within the rezoned area would be required to provide detailed transportation design information, including the internal road network layout, lot access arrangements and parking provision. It is expected that the internal road network would be designed in accordance with the relevant requirements of the TDC CoP including appropriate road hierarchy, carriageway widths, intersection design, pedestrian connectivity and servicing requirements.

Individual lot access arrangements and parking provision would also be required to comply with the relevant District Plan provisions applying at the time of subdivision and development. As such, it is assessed that these matters can be appropriately addressed through future subdivision design and consenting processes and do not represent a constraint to the proposed rezoning.

13 Construction Effects

The submission relates to the rezoning of land rather than a detailed subdivision proposal and therefore the nature, scale and timing of construction activities are not yet known. Construction activities associated with future subdivision and development are likely to include earthworks, road formation, infrastructure installation and building construction.

Construction traffic effects typically relate to temporary increases in heavy vehicle movements, potential interaction with general traffic and active transport users, temporary disruption to the local road network and effects associated with construction vehicle access arrangements. These effects are generally temporary in nature and are commonly managed through standard construction planning and traffic management measures.

Future subdivision and development applications would be expected to include a Construction Traffic Management Plan (CTMP), where required by TDC, setting out matters including:

- Construction dates and hours of operation including any specific non-working hours for traffic congestion, noise, etc;
- Diagrams identifying which routes trucks will use to travel to and from the site;
- Temporary traffic management signage / details to appropriately manage vehicles and pedestrians in the vicinity of the site; and
- Details of site access / egress over the entire construction period noting that all access points to be located so that appropriate visibility is achieved onto the adjacent road network.

Preparation of a CTMP is standard practice for developments of this nature and would enable construction-related traffic effects to be appropriately managed through the detailed design and consenting process.

Overall, it is assessed that any construction traffic effects associated with future development of the rezoned land would be temporary and can be appropriately managed through standard industry practice and future subdivision-level controls.

14 Staging and Rule Framework

14.1 Staged Infrastructure Requirements

The transportation assessment indicates that infrastructure upgrades do not need to be implemented at the commencement of development but can instead be delivered progressively as development uptake and transportation demand increase. A staged approach is considered appropriate as it allows infrastructure to be provided in a proportionate manner while ensuring that the transportation network continues to operate safely and efficiently throughout the development lifecycle.

The assessment has considered both local transportation effects and wider strategic network effects. This has included review of the local road environment, safety assessment, active mode connectivity and SIDRA modelling of the wider network. Development up to approximately 150 lots has been specifically modelled

as an interim development scenario and was found to result in relatively minor increases in network delay at critical intersections, generally in the order of 10 seconds or less, with no new operational deficiencies identified. Additional testing of the anticipated full development yield indicates that the effects remain incremental in nature and primarily affect movements already operating under constrained conditions.

Based on the assessment undertaken, the transportation infrastructure requirements associated with development of the proposed rezoned area are summarised in Table 6 below.

TABLE 6: STAGED TRANSPORT INFRASTRUCTURE REQUIREMENTS

Development Threshold	Required Infrastructure
Existing development and approved subdivision (~40 lots)	Completion of the Kaiapo Road/Mapara Road intersection improvements associated with the existing approved subdivision, including sightline improvements and associated earthworks/vegetation clearance.
More than 40 lots and up to 50 lots	Upgrade Kaiapo Road toward a 7.0m carriageway standard through the constrained section. On-street parking lanes and footpaths within Kaiapo Road are not considered necessary. Construct a shared walking/cycling connection between the site and Mapara Road, including extension of the existing footpath west from Chestnut Grove. Opportunities for delivery in conjunction with TDC should be explored.
More than 50 lots and up to 150 lots	Review and upgrade the Mapara Road/Wakeman Road intersection to better define the road layout and clarify vehicle priority arrangements.
More than 150 lots and up to approximately 320–400 lots	Development beyond 150 lots should occur in conjunction with implementation of wider strategic transport improvements, including upgrades associated with the Taupo Waikato River Crossing project (CGB) or equivalent improvements providing comparable network capacity outcomes.

The staged approach outlined above is considered appropriate as it aligns infrastructure provision with the scale of development and ensures that upgrades are delivered at points where they provide meaningful operational or safety benefits. It also recognises that some improvements, particularly those associated with the wider strategic network, are appropriately addressed as part of TDC's broader growth and infrastructure planning framework rather than through early stages of site development.

14.2 Potential Rule Framework

Consideration has been given to potential rules to support development as follows:

1. Stage 1 Development Threshold

Subdivision and development resulting in a cumulative total of up to 40 residential units within the precinct is a Controlled Activity provided that:

- a. the Kaiapo Road / Mapara Road intersection upgrade has been completed in general accordance with an engineering design approved by Taupō District Council; and
- b. the upgrade includes:
 - i. sight distance improvements;
 - ii. vegetation clearance and/or embankment trimming;
 - iii. any associated road widening; and
 - iv. sealing, drainage and traffic control measures necessary to achieve safe operation.

2. Stage 2 Development Threshold

Subdivision and development resulting in a cumulative total of more than 40 residential units and up to 50 residential units within the precinct is a Restricted Discretionary Activity provided that:

- a. the requirements of Rule 1 are satisfied; and
- b. Kaiapo Road has been upgraded to achieve:
 - i. a minimum 7.0m carriageway width;
 - ii. appropriate edge treatment and stormwater drainage; and
 - iii. any retaining, earthworks or vegetation clearance necessary to achieve the required formation width; and
- c. a shared walking and cycling connection has been provided between the precinct and the existing Mapara Road footpath network, including:
 - i. extension of the existing footpath west of Chestnut Grove;
 - ii. safe road crossing facilities where required; and
 - iii. internal pedestrian and cycle connections linking to the external path network.

Council restricts its discretion to:

1. traffic safety and efficiency;
2. walking and cycling connectivity;
3. road design standards;
4. staging and timing of infrastructure delivery;
5. effects on the surrounding transport network;
6. consistency with any approved Outline Development Plan.

3. Stage 3 Development Threshold

Subdivision and development resulting in a cumulative total of more than 150 residential units within the precinct is a Non-Complying Activity until:

- a. the Taupō Waikato River Crossing project, or equivalent upgrade to the western Taupō strategic transport network providing equivalent network capacity outcomes, is operational.

4. Development Following Strategic Network Upgrade

Following completion of the infrastructure identified in Rule 3(a):

- a. Up to 150 residential units:

Subdivision and development resulting in a cumulative total of more than 50 residential units and up to 150 residential units within the precinct is a Restricted Discretionary Activity.

Council restricts its discretion to:

1. internal road layout and connectivity;
2. traffic safety and efficiency;
3. walking and cycling infrastructure;
4. public transport accessibility;

5. staging and sequencing of development;
 6. infrastructure servicing.
- b. More than 150 residential units and up to 400 residential units:

Subdivision and development resulting in a cumulative total of more than 150 residential units and up to 400 residential units within the precinct is a Restricted Discretionary Activity provided that:

- i. the Mapara Road / Wakeman Road intersection has been upgraded to improve the operational efficiency and priority of traffic movements between Mapara Road and Wakeman Road toward Taupō; and
- ii. the upgrade has been designed and constructed in accordance with engineering plans approved by Taupō District Council.

5. Integrated Transport Assessment

An Integrated Transport Assessment shall be provided with any subdivision or development application generating for any application seeking development beyond a transport staging threshold.

The assessment shall address:

1. trip generation and distribution;
2. effects on the Kaiapo Road / Mapara Road intersection;
3. effects on the wider western Taupō transport network;
4. walking and cycling connectivity;
5. public transport accessibility;
6. staging of infrastructure delivery;
7. consistency with the assumptions adopted in the Future Development Strategy and Long Term Plan.

15 Policy Alignment

15.1 Overarching Policy Documents

The proposed rezoning has been assessed against the relevant transportation-related outcomes summarised earlier in Section 4. These include the Future Development Strategy (FDS), the Long Term Plan (LTP), and the Connecting Taupo 2020–2050 Transport Strategy.

FDS Outcome 1 - Contained urban communities

FDS Outcome 1 seeks to achieve a district characterised by contained urban communities, bordered by a productive and functional rural environment, including through efficient use of urban land and avoiding unnecessary rural development. The proposed rezoning is located immediately west of existing residential development and within the broader western Taupo growth area identified through the FDS. The proposal therefore represents a logical extension of the existing urban form and responds to identified demand for additional housing capacity and lifestyle residential opportunities, rather than creating isolated development disconnected from the existing urban area.

FDS Outcome 4 - Compact, connected and walking/cycling friendly urban areas

FDS Outcome 4 seeks to create connected urban communities through well-designed urban environments and active transport opportunities. As outlined earlier in this assessment, provision of walking and cycling connections between the proposed development area and the existing Acacia Bay community is assessed as an important transportation component of the rezoning. These connections would improve accessibility for active modes, integrate the proposed residential area with the existing urban environment, and reduce reliance on private vehicle travel for local trips.

FDS Outcome 6 - Efficient and effective infrastructure provision

FDS Outcome 6 seeks to ensure that existing infrastructure is used efficiently and that new infrastructure is planned and delivered to integrate with growth. This ITA has considered the known transport constraints within the wider network, including those associated with the CGB corridor, and identifies a staged approach to transportation infrastructure delivery as development progresses. The assessment indicates that transportation infrastructure can be provided in a manner that aligns with growth and recognises the long-term function of the wider network.

LTP - Infrastructure planning and growth

The LTP recognises the importance of planning and investing in infrastructure to support growth and housing development, while ensuring infrastructure is managed efficiently and sustainably over the long term. The LTP identifies several key infrastructure challenges for the district, including transport constraints associated with movement across the Waikato River and through Taupo, together with ongoing investment in accessibility, walking and cycling improvements and wider transport infrastructure.

This ITA has considered these existing and future transport constraints and recommends a staged approach to transportation infrastructure delivery as development progresses. The proposed rezoning therefore aligns with the broader infrastructure direction identified in the LTP by recognising existing network constraints and providing a framework through which transportation improvements can occur alongside growth.

Connecting Taupo 2020-2050

The Connecting Taupo transport strategy seeks to maintain safe and reliable transport networks while responding to growth through efficient use of existing infrastructure rather than reliance on major new transport facilities. The strategy also promotes maintaining the strategic road hierarchy, supporting predictable travel times, and ensuring new developments provide for walking, cycling and future public transport opportunities.

The proposed rezoning is generally consistent with these outcomes. This ITA has evaluated the ability of the surrounding network to accommodate growth while recognising that some increase in traffic demand is expected as urban development occurs. Opportunities for active mode connections and future transport choice are also identified as part of the wider development framework.

15.2 Low Density Residential Zone Objectives and Policies

The proposed rezoning has also been assessed against the relevant transportation-related objectives and policies of the TDC Low Density Residential Zone (LDRZ), as follows:

LRZ-O1 and LRZ-P1 - Character and amenity

The LDRZ seeks to maintain residential character and amenity, including a safe and functionally effective environment for vehicles and pedestrians, and low levels of environmental effects associated with activities.

The proposed rezoning seeks to establish a Low Density Residential environment and would generate traffic effects consistent with that form of development. This ITA indicates that effects on the surrounding road network are generally incremental in nature and can be managed through staged infrastructure upgrades. Active mode connections are also proposed to improve pedestrian and cycling connectivity. Accordingly, the proposal is assessed as being consistent with the anticipated character and amenity outcomes of the LDRZ.

LRZ-O2 - Infrastructure capacity

This objective seeks to ensure development takes into account the capacity of supporting infrastructure.

This ITA has assessed both local and wider network effects associated with development of the site, including testing of up to 320-400 lots. The assessment indicates that development up to approximately 150 lots can be accommodated with relatively minor operational effects, with staged transportation improvements recommended as development progresses. The proposal therefore recognises infrastructure constraints and provides a framework for transportation upgrades to occur in step with growth.

LRZ-P3 and LRZ-P4 - Development planning and management of effects

These policies seek to ensure that relevant strategies and guidelines are considered and that adverse effects are avoided, remedied or mitigated.

The assessment has considered the Future Development Strategy, Long Term Plan infrastructure planning and wider transportation network context. A range of transportation recommendations are identified including Kaiapo Road upgrades, intersection improvements and active mode connections. These measures are assessed as appropriately managing transportation effects associated with the proposed rezoning.

LRZ-P7 - Supporting infrastructure

This policy seeks to ensure development can be effectively serviced without creating adverse effects on supporting infrastructure.

This ITA indicates that the surrounding transport network is capable of accommodating the proposed rezoning, subject to the recommended staged infrastructure improvements and future subdivision-level design processes. Accordingly, transportation infrastructure is not considered to represent a constraint to the proposed rezoning.

16 Conclusion

The submitter seeks to rezone approximately 323ha of land at 15, 37 and 40 Kaiapo Road, Acacia Bay from Rural to Low Density Residential as part of Plan Change 44. The rezoning is anticipated to enable development of approximately 320 residential lots, with consideration also given to the potential for additional development supported by future transportation infrastructure improvements.

The proposed rezoning is estimated to generate approximately 189 vehicle trips during peak hours of the day, with daily traffic volumes in the order of 1,700-2,620 vehicles per day, depending on assumptions relating to dwelling occupancy. The assessment indicates that these traffic demands can be accommodated on the surrounding road network and that increases in traffic volumes generally remain consistent with the anticipated function of the surrounding road hierarchy.

SIDRA modelling has been undertaken to assess the effects of development on the wider strategic transport network. Particular focus has been placed on a 150-lot development scenario, reflecting the proposed staging framework. The assessment indicates that development up to this level results in relatively minor increases in delay, generally in the order of 10 seconds or less, with no new critical movements or operational deficiencies identified. Testing of the anticipated full development yield of approximately 320 lots indicates additional increases in delay and queue lengths; however, these effects remain incremental and primarily affect movements already operating under constrained conditions.

The assessment has identified a number of transportation improvements that are appropriate to support staged development of the site. These include:

- improvements to sight distance at the Kaiapo Road/Mapara Road intersection;
- widening of Kaiapo Road through constrained sections;
- provision of walking and cycling connections to the existing Mapara Road network;
- review and upgrade of the Mapara Road/Wakeman Road intersection; and
- implementation of wider strategic transport improvements to support later stages of development.

These improvements are recommended to occur progressively in line with development thresholds and are assessed as providing an appropriate framework to manage transportation effects associated with future development.

Overall, the assessment indicates that the transportation effects associated with the proposed rezoning can be appropriately managed and that the surrounding transportation network is capable of accommodating the anticipated growth. Accordingly, it is concluded that there are no transportation engineering or transport planning reasons to preclude the proposed rezoning of the site.

CKL

Appendix 1 – SIDRA Analysis

SITE LAYOUT

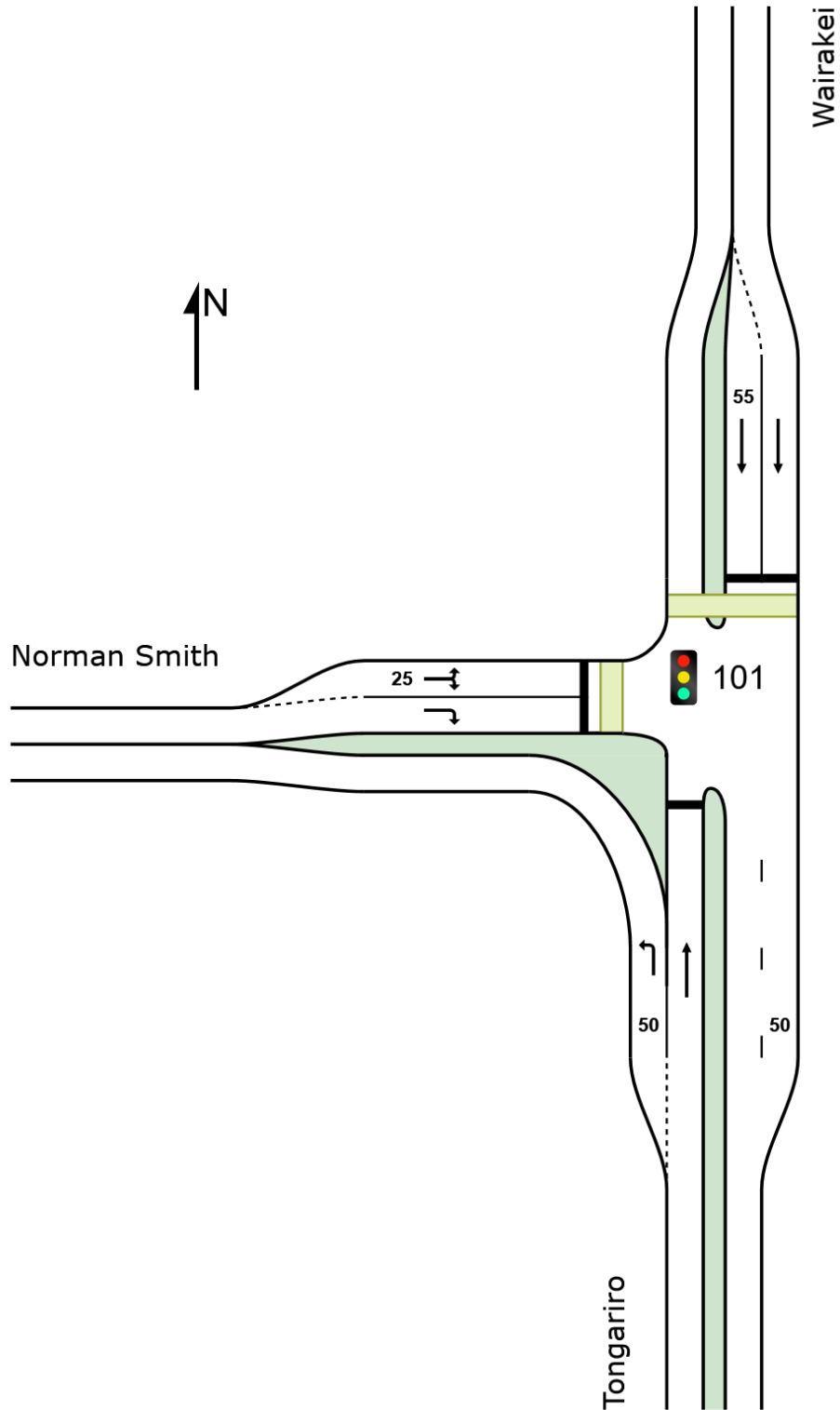
 **Site: 101 [ExistingAM WSP 2025#2 withDev (Site Folder: Wairakei NormanSmith)]**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Created: Thursday, 21 May 2026 2:57:30 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 Site: 101 [ExistingAM WSP 2025#2 withDev (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
South: Tongariro															
1	L2	All MCs	385	5.0	385	5.0	0.215	4.5	LOS A	0.0	0.0	0.00	0.46	0.00	46.4
2	T1	All MCs	304	5.0	304	5.0	0.460	21.9	LOS C	9.3	67.8	0.82	0.70	0.82	38.5
Approach			689	5.0	689	5.0	0.460	12.2	LOS B	9.3	67.8	0.36	0.57	0.36	42.6
North: Wairakei															
8	T1	All MCs	882	5.0	882	5.0	* 1.122	135.9	LOS F	58.3	425.4	0.94	1.77	2.07	18.8
Approach			882	5.0	882	5.0	1.122	135.9	LOS F	58.3	425.4	0.94	1.77	2.07	17.7
West: Norman Smith															
10	L2	All MCs	4	5.0	4	5.0	0.370	32.1	LOS C	7.3	53.3	0.62	0.73	0.62	40.0
12	R2	All MCs	1181	5.0	1181	5.0	* 1.136	146.9	LOS F	82.5	601.9	0.90	1.48	2.07	18.0
Approach			1185	5.0	1185	5.0	1.136	146.5	LOS F	82.5	601.9	0.90	1.48	2.06	16.7
All Vehicles			2756	5.0	2756	5.0	1.136	109.5	LOS F	82.5	601.9	0.78	1.34	1.64	20.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Wairakei												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
West: Norman Smith												
P4	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians		100	105	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Wednesday, 20 May 2026 6:09:05 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

PHASING SUMMARY

 Site: 101 [ExistingAM WSP 2025#2 withDev (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Four-Phase Leading Right Turns

Input Phase Sequence: A, B

Output Phase Sequence: A, B

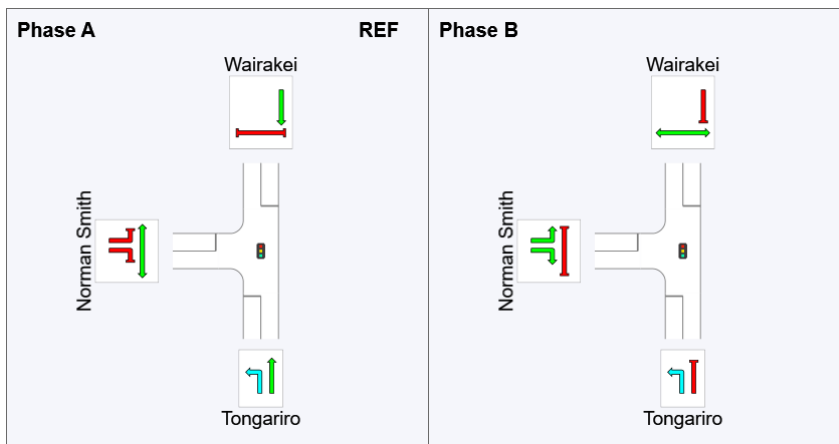
Reference Phase: Phase A

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	33
Green Time (sec)	28	42
Phase Time (sec)	33	47
Phase Split	41%	59%
Phase Frequency (%)	100.0	100.0

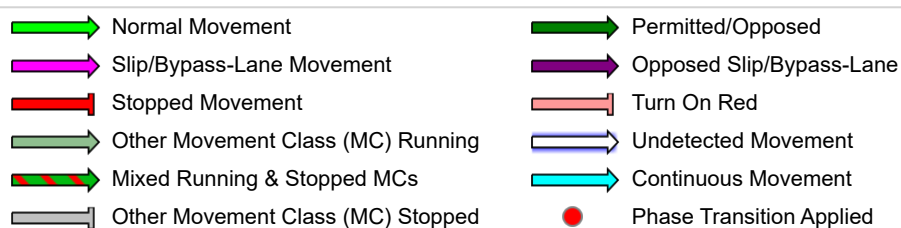
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Wednesday, 20 May 2026 6:09:05 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

Site: 101 [ExistingAM WSP 2025#2 withDev plus Kaiapo 150 lots (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue	Dist	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	m				km/h
South: Tongariro															
1	L2	All MCs	393	5.0	393	5.0	0.219	4.5	LOS A	0.0	0.0	0.00	0.46	0.00	46.4
2	T1	All MCs	304	5.0	304	5.0	0.460	21.9	LOS C	9.3	67.8	0.82	0.70	0.82	38.5
Approach			697	5.0	697	5.0	0.460	12.1	LOS B	9.3	67.8	0.36	0.57	0.36	42.6
North: Wairakei															
8	T1	All MCs	882	5.0	882	5.0	* 1.122	136.3	LOS F	58.3	425.4	0.94	1.77	2.07	18.8
Approach			882	5.0	882	5.0	1.122	136.3	LOS F	58.3	425.4	0.94	1.77	2.07	17.7
West: Norman Smith															
10	L2	All MCs	4	5.0	4	5.0	0.379	32.4	LOS C	7.5	54.5	0.62	0.74	0.62	40.0
12	R2	All MCs	1214	5.0	1214	5.0	* 1.164	164.6	LOS F	90.7	662.3	0.90	1.56	2.22	16.6
Approach			1218	5.0	1218	5.0	1.164	164.1	LOS F	90.7	662.3	0.90	1.56	2.22	15.5
All Vehicles			2797	5.0	2797	5.0	1.164	117.5	LOS F	90.7	662.3	0.78	1.38	1.71	19.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Wairakei												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
West: Norman Smith												
P4	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians		100	105	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:47:03 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

PHASING SUMMARY

 Site: 101 [ExistingAM WSP 2025#2 withDev plus Kaiapo 150 lots (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Four-Phase Leading Right Turns

Input Phase Sequence: A, B

Output Phase Sequence: A, B

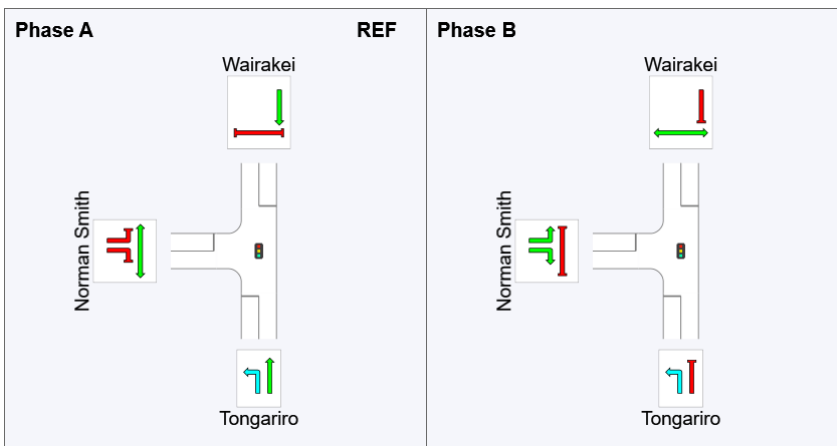
Reference Phase: Phase A

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	33
Green Time (sec)	28	42
Phase Time (sec)	33	47
Phase Split	41%	59%
Phase Frequency (%)	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

 Normal Movement	 Permitted/Opposed
 Slip/Bypass-Lane Movement	 Opposed Slip/Bypass-Lane
 Stopped Movement	 Turn On Red
 Other Movement Class (MC) Running	 Undetected Movement
 Mixed Running & Stopped MCs	 Continuous Movement
 Other Movement Class (MC) Stopped	 Phase Transition Applied

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:47:03 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 Site: 101 [ExistingAM WSP 2025#2 withDev plus Kaiapo 320 lots (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
South: Tongariro															
1	L2	All MCs	403	5.0	403	5.0	0.225	4.5	LOS A	0.0	0.0	0.00	0.46	0.00	46.4
2	T1	All MCs	304	5.0	304	5.0	0.477	22.8	LOS C	9.5	69.2	0.84	0.71	0.84	38.1
Approach			707	5.0	707	5.0	0.477	12.4	LOS B	9.5	69.2	0.36	0.57	0.36	42.5
North: Wairakei															
8	T1	All MCs	882	5.0	882	5.0	* 1.158	159.3	LOS F	63.7	465.3	0.95	1.91	2.26	16.9
Approach			882	5.0	882	5.0	1.158	159.3	LOS F	63.7	465.3	0.95	1.91	2.26	16.0
West: Norman Smith															
10	L2	All MCs	4	5.0	4	5.0	0.382	31.6	LOS C	7.5	54.9	0.61	0.73	0.61	40.2
12	R2	All MCs	1252	5.0	1252	5.0	* 1.172	169.1	LOS F	95.4	696.1	0.90	1.58	2.26	16.3
Approach			1256	5.0	1256	5.0	1.172	168.7	LOS F	95.4	696.1	0.89	1.58	2.25	15.2
All Vehicles			2845	5.0	2845	5.0	1.172	126.9	LOS F	95.4	696.1	0.78	1.43	1.79	18.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Wairakei												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
West: Norman Smith												
P4	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06
All Pedestrians		100	105	34.3	LOS D	0.1	0.1	0.93	0.93	188.1	200.0	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:52:18 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

PHASING SUMMARY

 Site: 101 [ExistingAM WSP 2025#2 withDev plus Kaiapo 320 lots (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Four-Phase Leading Right Turns

Input Phase Sequence: A, B

Output Phase Sequence: A, B

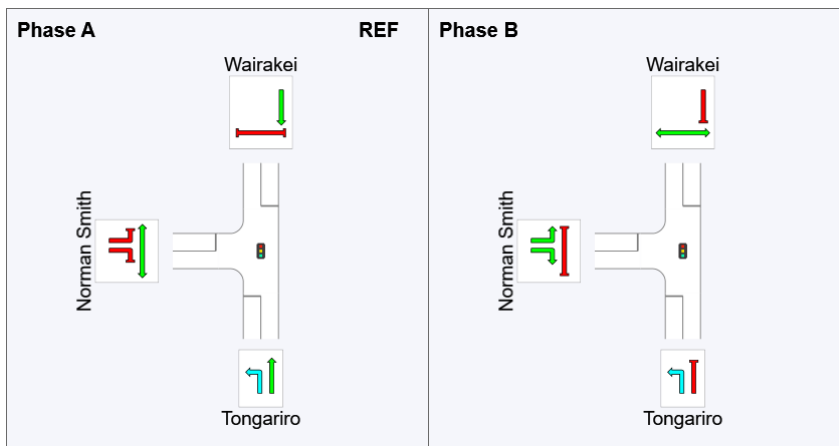
Reference Phase: Phase A

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	32
Green Time (sec)	27	43
Phase Time (sec)	32	48
Phase Split	40%	60%
Phase Frequency (%)	100.0	100.0

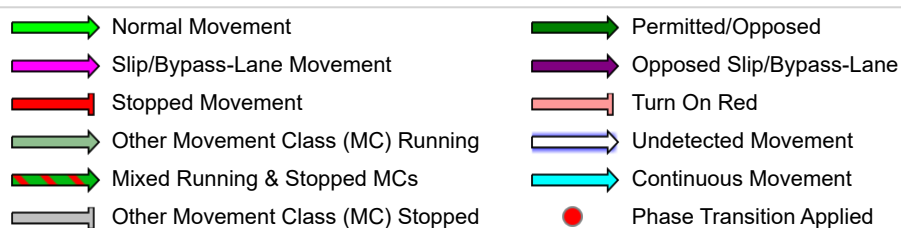
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:52:18 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 Site: 101 [ExistingPM WSP 2025#2 withDev (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Tongariro															
1	L2	All MCs	1185	5.0	1185	5.0	0.661	4.9	LOS A	0.0	0.0	0.00	0.62	0.00	45.9
2	T1	All MCs	814	5.0	814	5.0	* 0.898	29.1	LOS C	25.4	185.3	0.98	1.29	1.35	37.2
Approach			1999	5.0	1999	5.0	0.898	17.1	LOS B	25.4	185.3	0.40	0.89	0.55	40.1
North: Wairakei															
8	T1	All MCs	446	5.0	446	5.0	0.372	8.9	LOS A	5.3	38.7	0.65	0.55	0.65	44.7
Approach			446	5.0	446	5.0	0.372	8.9	LOS A	5.3	38.7	0.65	0.55	0.65	44.7
West: Norman Smith															
10	L2	All MCs	1	5.0	1	5.0	0.291	25.0	LOS C	3.2	23.0	0.79	0.75	0.79	39.0
12	R2	All MCs	609	5.0	609	5.0	* 0.893	36.7	LOS D	14.1	103.2	0.94	1.02	1.31	34.7
Approach			610	5.0	610	5.0	0.893	36.7	LOS D	14.1	103.2	0.94	1.02	1.31	32.8
All Vehicles			3055	5.0	3055	5.0	0.898	18.3	LOS B	25.4	185.3	0.55	0.87	0.72	39.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Wairakei												
P3	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15
West: Norman Smith												
P4	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15
All Pedestrians		100	105	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Wednesday, 20 May 2026 6:10:27 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

PHASING SUMMARY

 Site: 101 [ExistingPM WSP 2025#2 withDev (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Four-Phase Leading Right Turns

Input Phase Sequence: A, B

Output Phase Sequence: A, B

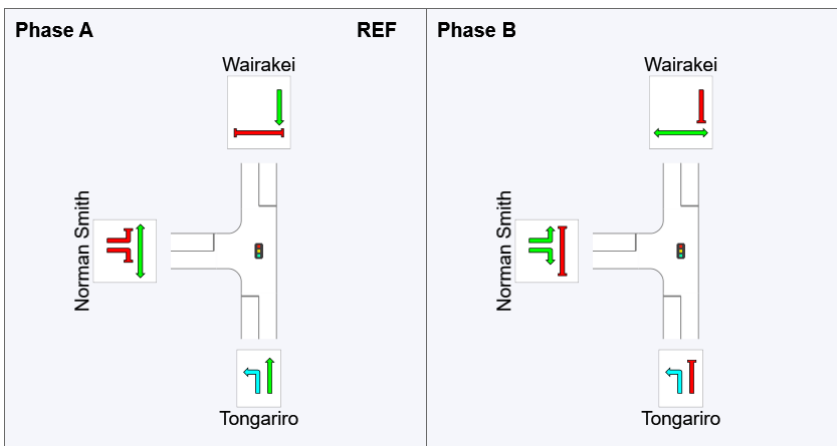
Reference Phase: Phase A

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	29
Green Time (sec)	24	16
Phase Time (sec)	29	21
Phase Split	58%	42%
Phase Frequency (%)	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

 Normal Movement	 Permitted/Opposed
 Slip/Bypass-Lane Movement	 Opposed Slip/Bypass-Lane
 Stopped Movement	 Turn On Red
 Other Movement Class (MC) Running	 Undetected Movement
 Mixed Running & Stopped MCs	 Continuous Movement
 Other Movement Class (MC) Stopped	 Phase Transition Applied

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Wednesday, 20 May 2026 6:10:27 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 Site: 101 [ExistingPM WSP 2025#2 withDev plus Kaiapo 150 lots (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Tongariro															
1	L2	All MCs	1210	5.0	1210	5.0	0.675	4.9	LOS A	0.0	0.0	0.00	0.63	0.00	45.9
2	T1	All MCs	814	5.0	814	5.0	* 0.898	29.1	LOS C	25.4	185.3	0.98	1.29	1.35	37.2
Approach			2024	5.0	2024	5.0	0.898	17.0	LOS B	25.4	185.3	0.40	0.89	0.54	40.2
North: Wairakei															
8	T1	All MCs	446	5.0	446	5.0	0.372	9.0	LOS A	5.3	38.7	0.65	0.55	0.65	44.7
Approach			446	5.0	446	5.0	0.372	9.0	LOS A	5.3	38.7	0.65	0.55	0.65	44.7
West: Norman Smith															
10	L2	All MCs	1	5.0	1	5.0	0.301	25.5	LOS C	3.3	23.9	0.79	0.75	0.79	39.0
12	R2	All MCs	626	5.0	626	5.0	* 0.924	41.0	LOS D	15.9	115.8	0.94	1.08	1.42	33.5
Approach			627	5.0	627	5.0	0.924	41.0	LOS D	15.9	115.8	0.94	1.08	1.42	31.6
All Vehicles			3097	5.0	3097	5.0	0.924	19.2	LOS B	25.4	185.3	0.54	0.88	0.74	38.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Wairakei												
P3	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15
West: Norman Smith												
P4	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15
All Pedestrians		100	105	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:50:30 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

PHASING SUMMARY

 Site: 101 [ExistingPM WSP 2025#2 withDev plus Kaiapo 150 lots (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Four-Phase Leading Right Turns

Input Phase Sequence: A, B

Output Phase Sequence: A, B

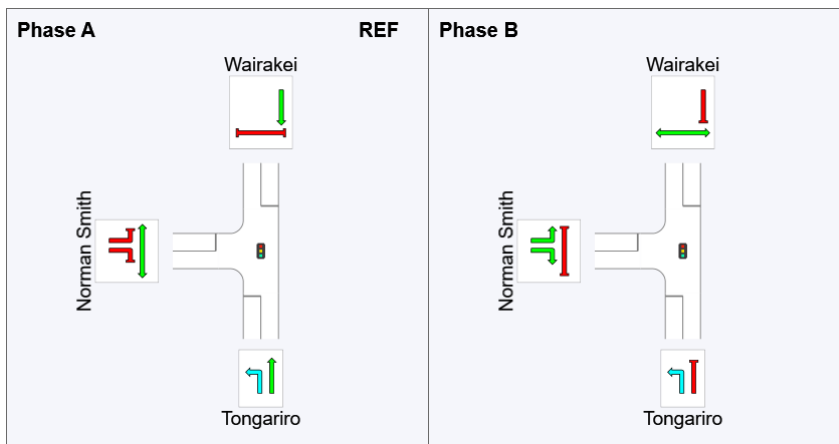
Reference Phase: Phase A

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	29
Green Time (sec)	24	16
Phase Time (sec)	29	21
Phase Split	58%	42%
Phase Frequency (%)	100.0	100.0

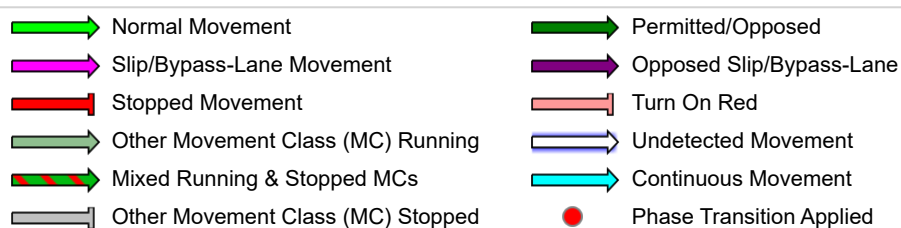
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase



SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:50:30 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 Site: 101 [ExistingPM WSP 2025#2 withDev plus Kaiapo 320 lots (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Tongariro															
1	L2	All MCs	1238	5.0	1238	5.0	0.690	4.9	LOS A	0.0	0.0	0.00	0.62	0.00	45.9
2	T1	All MCs	814	5.0	814	5.0	* 0.937	38.2	LOS D	29.4	214.3	1.00	1.42	1.55	34.3
Approach			2052	5.0	2052	5.0	0.937	20.9	LOS C	29.4	214.3	0.40	0.94	0.61	38.5
North: Wairakei															
8	T1	All MCs	446	5.0	446	5.0	0.389	9.7	LOS A	5.5	40.3	0.68	0.57	0.68	44.3
Approach			446	5.0	446	5.0	0.389	9.7	LOS A	5.5	40.3	0.68	0.57	0.68	44.3
West: Norman Smith															
10	L2	All MCs	1	5.0	1	5.0	0.292	24.4	LOS C	3.3	23.9	0.77	0.75	0.77	39.3
12	R2	All MCs	645	5.0	645	5.0	* 0.897	36.9	LOS D	15.1	110.4	0.94	1.02	1.31	34.7
Approach			646	5.0	646	5.0	0.897	36.9	LOS D	15.1	110.4	0.94	1.02	1.31	32.8
All Vehicles			3144	5.0	3144	5.0	0.937	20.8	LOS C	29.4	214.3	0.55	0.90	0.77	37.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Wairakei												
P3	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15
West: Norman Smith												
P4	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15
All Pedestrians		100	105	19.4	LOS B	0.1	0.1	0.88	0.88	173.2	200.0	1.15

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:52:14 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

PHASING SUMMARY

 Site: 101 [ExistingPM WSP 2025#2 withDev plus Kaiapo 320 lots (Site Folder: Wairakei NormanSmith)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Four-Phase Leading Right Turns

Input Phase Sequence: A, B

Output Phase Sequence: A, B

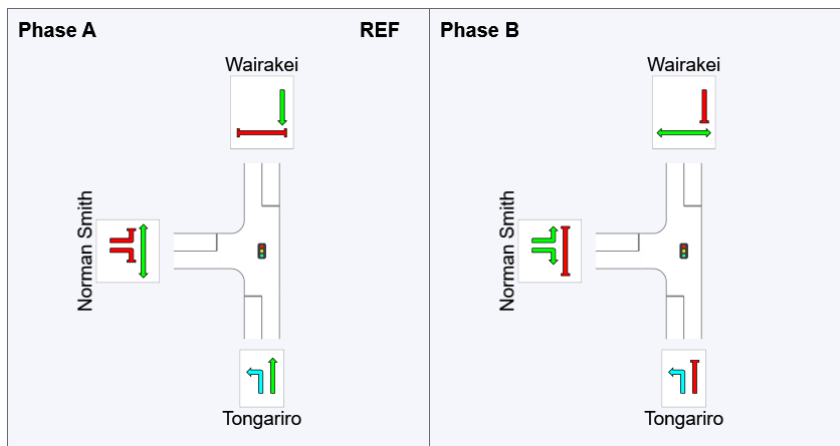
Reference Phase: Phase A

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	28
Green Time (sec)	23	17
Phase Time (sec)	28	22
Phase Split	56%	44%
Phase Frequency (%)	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase

VAR: Variable Phase

 Normal Movement	 Permitted/Opposed
 Slip/Bypass-Lane Movement	 Opposed Slip/Bypass-Lane
 Stopped Movement	 Turn On Red
 Other Movement Class (MC) Running	 Undetected Movement
 Mixed Running & Stopped MCs	 Continuous Movement
 Other Movement Class (MC) Stopped	 Phase Transition Applied

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:52:14 pm

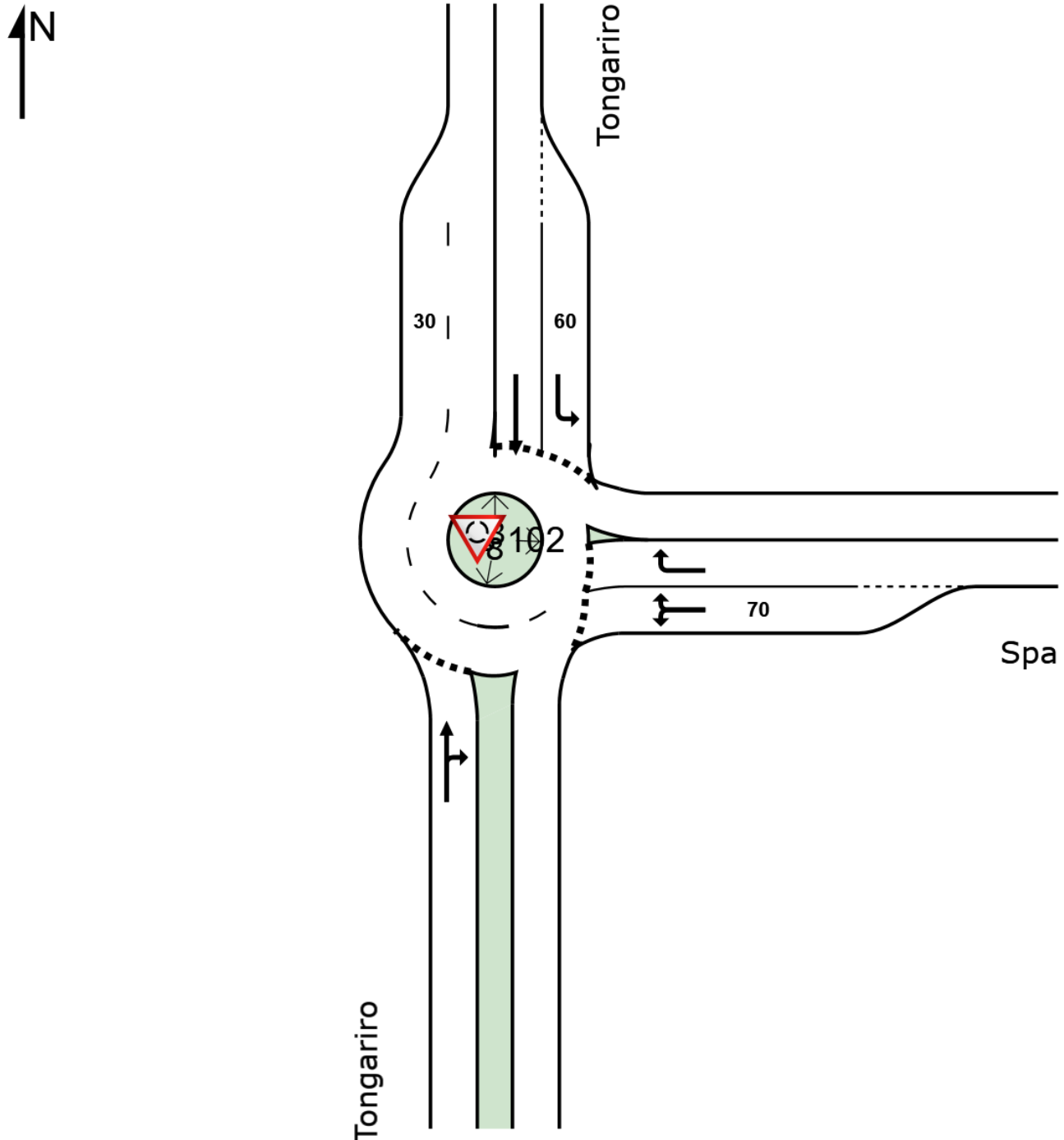
Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

SITE LAYOUT

 Site: 102 [AM WSP 2025#2 50%Adjust withDev (Site Folder: Tongariro Spa)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Created: Thursday, 21 May 2026 2:59:35 pm

Project: C:\Users\anna\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 **Site: 102 [AM WSP 2025#2 50%Adjust withDev (Site Folder: Tongariro Spa)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Tongariro															
2	T1	All MCs	197	5.0	197	5.0	0.297	6.4	LOS A	2.1	15.1	0.73	0.66	0.73	44.4
3	R2	All MCs	94	5.0	94	5.0	0.297	9.3	LOS A	2.1	15.1	0.73	0.66	0.73	43.9
Approach			291	5.0	291	5.0	0.297	7.3	LOS A	2.1	15.1	0.73	0.66	0.73	44.2
East: Spa															
4	L2	All MCs	65	5.0	65	5.0	0.325	14.6	LOS B	2.6	19.1	1.00	0.81	1.00	40.1
6	R2	All MCs	580	5.0	580	5.0	1.133	155.9	LOS F	56.3	411.1	1.00	2.82	5.43	15.9
Approach			645	5.0	645	5.0	1.133	141.6	LOS F	56.3	411.1	1.00	2.61	4.98	17.0
North: Tongariro															
7	L2	All MCs	1147	5.0	1147	5.0	0.785	5.8	LOS A	12.3	90.0	0.67	0.52	0.67	44.3
8	T1	All MCs	1004	5.0	1004	5.0	0.779	5.2	LOS A	11.8	86.3	0.71	0.48	0.71	44.8
Approach			2152	5.0	2152	5.0	0.785	5.5	LOS A	12.3	90.0	0.69	0.50	0.69	44.5
All Vehicles			3087	5.0	3087	5.0	1.133	34.1	LOS C	56.3	411.1	0.76	0.96	1.59	33.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Wednesday, 20 May 2026 4:50:52 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 **Site: 102 [AM WSP 2025#2 50%Adjust withDev plus Kaiapo 150 lots (Site Folder: Tongariro Spa)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Tongariro															
2	T1	All MCs	199	5.0	199	5.0	0.293	6.3	LOS A	2.0	14.9	0.72	0.66	0.72	44.4
3	R2	All MCs	94	5.0	94	5.0	0.293	9.1	LOS A	2.0	14.9	0.72	0.66	0.72	43.9
Approach			293	5.0	293	5.0	0.293	7.2	LOS A	2.0	14.9	0.72	0.66	0.72	44.3
East: Spa															
4	L2	All MCs	65	5.0	65	5.0	0.343	15.1	LOS B	2.8	20.3	1.00	0.83	1.00	39.9
6	R2	All MCs	586	5.0	586	5.0	1.195	198.2	LOS F	68.8	501.9	1.00	3.18	6.29	13.5
Approach			652	5.0	652	5.0	1.195	179.9	LOS F	68.8	501.9	1.00	2.94	5.76	14.4
North: Tongariro															
7	L2	All MCs	1166	5.0	1166	5.0	0.797	5.8	LOS A	13.0	94.7	0.69	0.53	0.69	44.3
8	T1	All MCs	1021	5.0	1021	5.0	0.792	5.2	LOS A	12.4	90.4	0.73	0.49	0.73	44.7
Approach			2187	5.0	2187	5.0	0.797	5.5	LOS A	13.0	94.7	0.71	0.51	0.71	44.5
All Vehicles			3132	5.0	3132	5.0	1.195	42.0	LOS D	68.8	501.9	0.77	1.03	1.76	30.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:53:50 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 **Site: 102 [AM WSP 2025#2 50%Adjust withDev plus Kaiapo 320 lots (Site Folder: Tongariro Spa)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Tongariro															
2	T1	All MCs	202	5.0	202	5.0	0.290	6.1	LOS A	2.0	14.7	0.71	0.65	0.71	44.5
3	R2	All MCs	94	5.0	94	5.0	0.290	9.0	LOS A	2.0	14.7	0.71	0.65	0.71	44.0
Approach			296	5.0	296	5.0	0.290	7.1	LOS A	2.0	14.7	0.71	0.65	0.71	44.3
East: Spa															
4	L2	All MCs	65	5.0	65	5.0	0.364	15.6	LOS B	3.0	21.7	1.00	0.84	1.00	39.7
6	R2	All MCs	594	5.0	594	5.0	1.270	251.3	LOS F	83.1	606.7	1.00	3.55	7.19	11.3
Approach			659	5.0	659	5.0	1.270	227.9	LOS F	83.1	606.7	1.00	3.28	6.57	12.1
North: Tongariro															
7	L2	All MCs	1187	5.0	1187	5.0	0.811	5.9	LOS A	13.8	100.5	0.72	0.53	0.72	44.2
8	T1	All MCs	1039	5.0	1039	5.0	0.805	5.3	LOS A	13.0	95.1	0.76	0.49	0.76	44.6
Approach			2226	5.0	2226	5.0	0.811	5.6	LOS A	13.8	100.5	0.73	0.51	0.73	44.4
All Vehicles			3181	5.0	3181	5.0	1.270	51.8	LOS E	83.1	606.7	0.79	1.10	1.94	28.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:57:15 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 **Site: 102 [PM WSP 2025#2 50%Adjust withDev (Site Folder: Tongariro Spa)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Tongariro															
2	T1	All MCs	487	5.0	487	5.0	1.563	533.8	LOS F	124.9	912.1	1.00	5.87	13.13	6.1
3	R2	All MCs	31	5.0	31	5.0	1.563	534.6	LOS F	124.9	912.1	1.00	5.87	13.13	6.0
Approach			518	5.0	518	5.0	1.563	533.9	LOS F	124.9	912.1	1.00	5.87	13.13	6.1
East: Spa															
4	L2	All MCs	34	5.0	34	5.0	0.361	8.1	LOS A	2.6	19.0	0.73	0.69	0.73	42.8
6	R2	All MCs	1643	5.0	1643	5.0	1.260	204.8	LOS F	186.9	1364.0	0.94	4.73	10.06	13.2
Approach			1677	5.0	1677	5.0	1.260	200.8	LOS F	186.9	1364.0	0.94	4.65	9.87	13.4
North: Tongariro															
7	L2	All MCs	553	5.0	553	5.0	0.340	4.7	LOS A	2.9	21.5	0.16	0.51	0.16	45.3
8	T1	All MCs	545	5.0	545	5.0	0.377	3.9	LOS A	3.3	24.4	0.17	0.40	0.17	46.3
Approach			1098	5.0	1098	5.0	0.377	4.3	LOS A	3.3	24.4	0.16	0.46	0.16	45.8
All Vehicles			3293	5.0	3293	5.0	1.563	187.7	LOS F	186.9	1364.0	0.69	3.44	7.15	14.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Sunday, 16 February 2025 12:36:01 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 **Site: 102 [PM WSP 2025#2 50%Adjust withDev plus Kaiapo 150 lots (Site Folder: Tongariro Spa)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Tongariro															
2	T1	All MCs	494	5.0	494	5.0	1.568	537.6	LOS F	127.0	926.7	1.00	5.94	13.29	6.0
3	R2	All MCs	31	5.0	31	5.0	1.568	538.3	LOS F	127.0	926.7	1.00	5.94	13.29	6.0
Approach			524	5.0	524	5.0	1.568	537.7	LOS F	127.0	926.7	1.00	5.94	13.29	6.0
East: Spa															
4	L2	All MCs	34	5.0	34	5.0	0.369	8.4	LOS A	2.7	19.5	0.74	0.70	0.74	42.7
6	R2	All MCs	1663	5.0	1663	5.0	1.287	223.9	LOS F	201.7	1472.3	0.95	5.01	10.74	12.4
Approach			1697	5.0	1697	5.0	1.287	219.6	LOS F	201.7	1472.3	0.94	4.93	10.54	12.6
North: Tongariro															
7	L2	All MCs	561	5.0	561	5.0	0.344	4.7	LOS A	3.0	22.0	0.16	0.51	0.16	45.3
8	T1	All MCs	554	5.0	554	5.0	0.382	3.9	LOS A	3.4	25.0	0.17	0.40	0.17	46.3
Approach			1115	5.0	1115	5.0	0.382	4.3	LOS A	3.4	25.0	0.16	0.46	0.16	45.8
All Vehicles			3336	5.0	3336	5.0	1.568	197.6	LOS F	201.7	1472.3	0.69	3.59	7.51	13.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:55:54 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

MOVEMENT SUMMARY

 **Site: 102 [PM WSP 2025#2 50%Adjust withDev plus Kaiapo 320 lots (Site Folder: Tongariro Spa)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Tongariro															
2	T1	All MCs	500	5.0	500	5.0	1.568	537.5	LOS F	128.4	937.4	1.00	5.99	13.42	6.0
3	R2	All MCs	31	5.0	31	5.0	1.568	538.2	LOS F	128.4	937.4	1.00	5.99	13.42	6.0
Approach			531	5.0	531	5.0	1.568	537.5	LOS F	128.4	937.4	1.00	5.99	13.42	6.0
East: Spa															
4	L2	All MCs	34	5.0	34	5.0	0.379	8.8	LOS A	2.8	20.2	0.75	0.70	0.75	42.7
6	R2	All MCs	1686	5.0	1686	5.0	1.320	247.2	LOS F	219.5	1602.3	0.95	5.34	11.54	11.5
Approach			1720	5.0	1720	5.0	1.320	242.5	LOS F	219.5	1602.3	0.94	5.25	11.33	11.6
North: Tongariro															
7	L2	All MCs	572	5.0	572	5.0	0.351	4.7	LOS A	3.1	22.6	0.16	0.51	0.16	45.3
8	T1	All MCs	564	5.0	564	5.0	0.389	3.9	LOS A	3.5	25.7	0.17	0.40	0.17	46.3
Approach			1136	5.0	1136	5.0	0.389	4.3	LOS A	3.5	25.7	0.17	0.45	0.17	45.8
All Vehicles			3386	5.0	3386	5.0	1.568	208.8	LOS F	219.5	1602.3	0.69	3.76	7.91	13.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SIDRA INTERSECTION 9.1 | Copyright © 2000-2024 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: AJW | Licence: NETWORK / 1PC | Processed: Thursday, 21 May 2026 2:57:17 pm

Project: C:\Users\annaj\OneDrive\AW Consulting\Projects\XXX CKL Kaiapo Road ITA 2026\In docs\Kinloch modeling\B22049 Kinloch plus Kaiapo.sip9

Breda Development & EF Deadman

Plan Change 44 Submission

Desktop Ecological Assessment
Updated May 2026.

Prepared for: Cheal Consultants

NSES Ltd report 51:2024/25



SINGERS
ECOLOGICAL

Author(s): Alana Delich for Nicholas Singers Ecological Solutions Ltd.

Date: 20/12/2024. Updated May 2026.

Reviewed by: Nicholas Singers.

DISCLAIMER

This report has been prepared by Nicholas Singers Ecological Solutions Ltd (NSES Ltd.) exclusively for and under contract to Cheal Consultants. Unless otherwise agreed in writing by NSES Ltd., NSES Ltd. accepts no responsibility for any use of, or reliance on any contents of this report by any person other than Cheal Consultants and shall not be liable to any person other than Cheal Consultants, on any ground, for any loss, damage or expense arising from such use or reliance.

This work is subject to copyright. The copying, adaptation, or issuing of this work to the public on a non-profit basis is welcomed. No other use of this work is permitted without the prior consent of the copyright holder(s).

CONTENTS

CONTENTS.....	3
1. Introduction	5
1.1. Purpose.....	5
1.2. Proposal.....	5
1.3. Location and site context	6
2. Methodology.....	7
3. Relevant Policies and Plans.....	8
3.1. Wildlife Act 1953	8
3.2. National Policy Statement for Indigenous Biodiversity (NPSIB 2023 - Amended December 2025)	8
3.3. Waikato Regional Plan.....	8
3.4. Taupō District Plan.....	8
4. Ecological Values.....	9
4.1. Indigenous Vegetation.....	9
4.2. Indigenous Fauna	10
4.2.1. Birds	10
4.2.2. Lizards	10
4.2.3. Bats	11
4.2.4. Freshwater Habitats.....	11
4.3. Summary of values	11
5. Assessment of potential effects and mitigation options	12
5.1. Potential impacts of domestic cats on native wildlife.....	12
Mitigation options.....	12
5.2. Loss of potential bat roosts	12
Mitigation options.....	13
5.3. Loss of potential lizard habitat.	13
Mitigation options.....	13
5.4. Weed Invasion into natural areas.....	13
Mitigation options.....	13
5.5. Human encroachment in natural areas.....	14
Mitigation options.....	14

Breda Deadman Plan Change 44 Submission – Desktop Ecological Assessment. Prepared for Cheal Consultants. © Nicholas Singers Ecological Solutions Ltd. NSES Ltd Report 51, 20 December 2024, updated May 2026.

5.6.	Nutrient Impacts on Freshwater	14
	Mitigation options.....	14
6.	Summary of potential effects	15
7.	References	16

1. Introduction

1.1. Purpose

Singers Ecological was contracted by Cheal Consultants to prepare a desktop ecological assessment to accompany a Plan Change 44 Submission to Taupō District Council. The purpose of this report is to provide a desktop assessment as to the potential ecological effects of the proposed rezoning and development of land near Kaiapō Bay.

This initial assessment considers the actual and potential ecological values of indigenous vegetation and habitat of indigenous fauna within the proposed development area, and in the adjoining Significant Natural Areas (SNA's). It then assesses the likely potential adverse effects of a development on the ecological values and recommends methods by which adverse effects can be avoided, remedied, mitigated or offset.

1.2. Proposal

The proposed development area is located on approximately 300 ha of rural land over three properties owned by Breda Investments Ltd and E F Deadman Ltd, at the end of Kaiapō Road, Taupō (hereafter referred to as the Project). The submission seeks to rezone three parcels – Lot 1 DP 410435, Lot 2 DP 337255 and Lot 12 DP 582081 – to Low Density Residential Zone and Neighbourhood Centre Zone with a Development Plan (Kaiapo Outline Development Plan).

The submission also seeks to include new subdivision rules for Kaiapo Outline Development Plan being:

- Controlled Activity in all areas excluding Natural Hazard Areas when in accordance with Development plan,
- Restricted Discretionary Activity within Natural Hazard Areas,
- Discretionary Activity when not in accordance with Development Plan.

Low Density Residential Zoning provides for large lot residential housing on properties approximately 5000 m², dwellings approx. 250 m² to 350 m², onsite wastewater disposal via advanced wastewater systems, trickle feed reticulated water supply, semi-rural roads with limited footpaths, some linkage via walkways to other roads, and revegetation of some areas.

Subject to a design process and the need to exclude areas for reserves, geotechnical reasons, landscape assessment, ecological or other reasons, approximately 250 to 320 lots may be created within the Project.



Figure 1.1: The potential development area taken from the eastern corner, looking southwest over Kaiapō Bay Scenic Reserve and Lake Taupō (supplied by Cheal Consultants).



Figure 1.2: The potential proposed development area taken from Lake Taupō (Nick Singers, 17th October 2024)

1.3. Location and site context

The three properties within the Project are located above Kaiapo Bay, adjoining the Department of Conservation (DOC) Kaiapō Bay Scenic Reserve to the South, the Whakaipō 1D Māori Land block to the east, the DOC Whakaipō Bay Recreation Reserve to the North, and private land to the northeast.

The land within the Kaiapō Scenic Reserve and Whakaipō 1D Māori land blocks are listed as SNA's in the Taupō district Plan. They are SNA 186 (Kaiapō Scenic reserve) and SNA 318 (Extension to Kaiapo Bay Scenic Reserve).

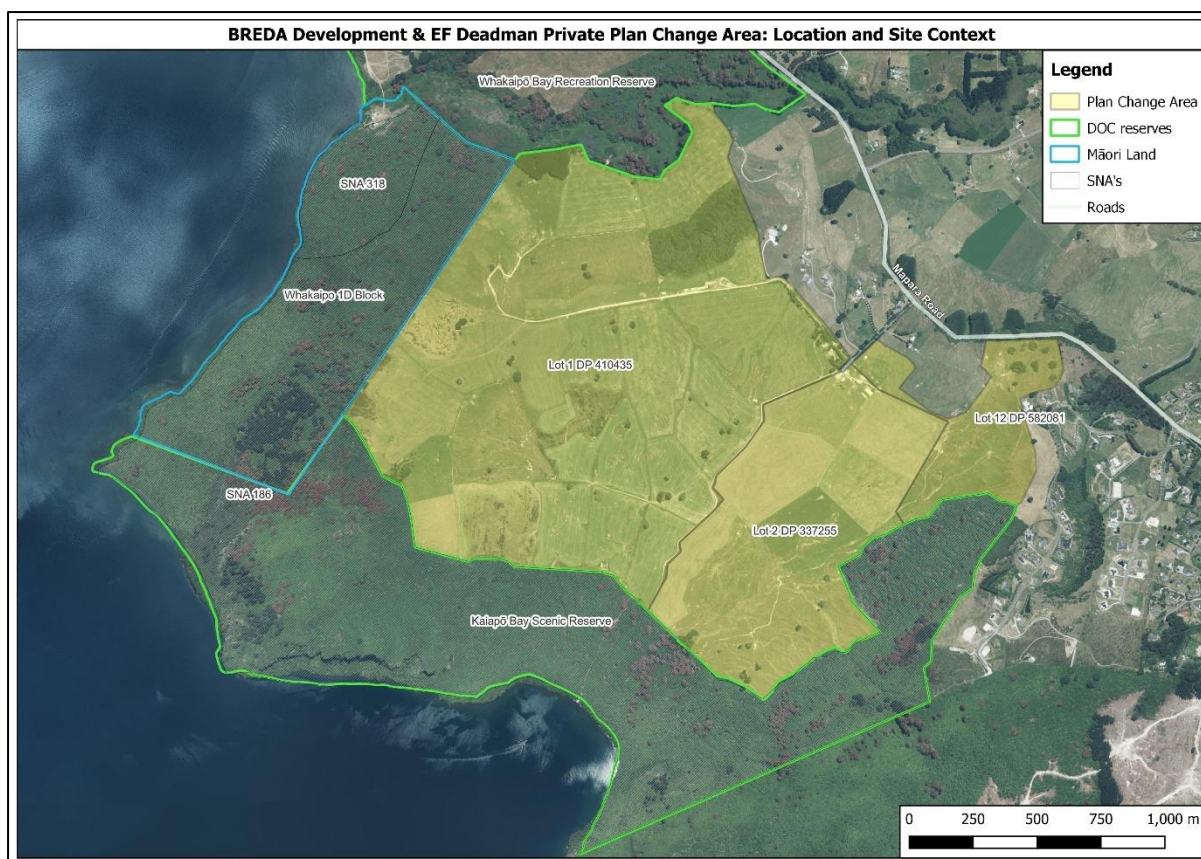


Figure 1.3: Location and site context of the potential proposed development area.

2. Methodology

This assessment is based on:

- the authors local ecological knowledge,
- a review of existing information, including the Taupō District Plan and the Waikato long-tailed bat distribution from the DOC National Bat Database (version 22 June 2022), Overdyck (2020), the NZ Herpetological Society lizard factsheets, the citizen Science Platform iNaturalist and examination of available aerial imagery using the QGIS platform.

The Project was not visited for the purposes of this desktop assessment but was visited by Alana Delich on the 13th of March 2024 for an unrelated visit to assess the need for animal pest control. The Project and adjoining reserves were visited between 2021 and 2023 for planning and monitoring wilding conifer control in the adjoining reserves.

As no dedicated survey has taken place, no detailed fauna surveys such as acoustic bat monitoring or lizard surveys have been undertaken. Given the local knowledge of this area, we have a reasonably high level of confidence in the potential ecological values identified in this report.

As this is an early high-level assessment of potential ecological effects, and a design is not yet finalised, nor a full site visit undertaken, the EIANZ Guidelines (Roper-Lindsay et al. 2018) were not closely followed for this report. Any future full Environmental Impact assessment should follow this method.

3. Relevant Policies and Plans

The Policies and Plans which are reference in this Document are:

3.1. Wildlife Act 1953

The Wildlife Act (WA, 1953) provides legal protection to listed species classed as wildlife. Under the Act, the majority of native New Zealand vertebrate species, and some invertebrates, are protected by law, and may not be hunted, killed, eaten or possessed. This includes the accidental killing of wildlife due to development activities.

3.2. National Policy Statement for Indigenous Biodiversity (NPSIB 2023 - Amended December 2025)

The purpose of the NPSIB is to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity. Where necessary, the NPSIB requires restoration and enhancement of ecosystems and habitats.

The development proposal should consider the NPSIB, and if the development can occur in such a way that biodiversity in the surrounding area can be maintained, and if there are opportunities to restore and enhance the surrounding ecosystems and habitats.

The NPSIB requires that adverse effects on SNAs through new subdivisions must be managed (Section 3.10), and the following adverse effects avoided:

- a) loss of ecosystem representation and extent:
- b) disruption to sequences, mosaics, or ecosystem function:
- c) fragmentation of SNAs or the loss of buffers or connections within an SNA:
- d) a reduction in the function of the SNA as a buffer or connection to other important habitats or ecosystems:
- e) a reduction in the population size or occupancy of Threatened or At Risk (declining) species that use an SNA for any part of their life cycle.

The NPSIB is also relevant to the development in that there is the potential for specified highly mobile fauna to be using the development area. A highly mobile fauna area means an area outside an SNA that is identified under clause 3.20 as an area used intermittently by specified highly mobile fauna. There is the potential that specified highly mobile fauna: Kārearea/bush falcon, pīhoihoi/NZ pipit and pekapeka-tou-roa/long-tailed bat are intermittently using the Project area.

3.3. Waikato Regional Plan

Sections 3.10 of the Waikato Regional Plan outlines objectives and policies to protect the water quality of the Lake Taupo Catchment by managing inputs of nutrients within the catchment.

3.4. Taupō District Plan

The Resource Management Act requires the Taupō District Council to provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.

Section 3i in the Objectives and Policies of the Taupō District Plan relates to the protection of Natural Values. Areas with significant natural values have been identified based on defined criteria and are termed Significant Natural Areas (SNA's).

4. Ecological Values

4.1. Indigenous Vegetation

There are no tracts of indigenous vegetation within proposed development area, though occasional indigenous shrubs and vines may be present in gully areas. Therefore, the potential development is not expected to have any effects on indigenous vegetation within the proposed development area. There may however be indirect potential effects on adjoining significant indigenous vegetation.

The adjoining vegetation within SNA 186 and SNA 318 is primarily secondary whauwhaupaku (*Pseudopanax arboreus*) - kōhūhū (*Pittosporum tenuifolium*) forest, with kōwhai (*Sophora tetraptera*) -kānuka (*Kunzea robusta*) forest near the lake shore. Most forest in these areas regenerated since these areas were reserved as part of the Lake Taupō Reserves scheme, in the 1960's. At the top of Kaiapō Headland in SNA 186 there is an area that was formerly dominated by wilding *Pinus radiata*, which was treated by drill-and-fill methods within the adjoining SNAs between 2021 and 2023.

Within Kaiapō Bay there are stands of culturally important pohutukawa (*Metrosideros excelsa*) on the cliff margins at either end of the bay. There are also specimens of culturally important karaka (*Corynocarpus laevigatus*) and ngaio (*Myoporum laetum*) within the Kaipō Scenic Reserve. These are trees which do not naturally grow within the Taupō catchment but were brought to the area by Māori for medicinal and food uses and are occasionally found growing in frost free microclimates around Lake Taupō where former settlements were located.

There are no known threatened or at-risk native plant species in the adjoining natural areas though these areas have been poorly surveyed. The most likely species to potentially be present are:

- *Pimelea tomentosa* (Threatened – nationally endangered, de Lange et al. 2024) which is either an early succession shrub (following fire) or grows on cliffs and is known to occur on the Whakaipō Headland.
- Tupaia/white mistletoe (*Tupeia antarctica*, At-risk declining,) which commonly grows on kōhūhū around Taupō, and is known for lake shore reserves around the south of Lake Taupō,
- Pua-o-te-reinga/wood rose (*Dactylanthus taylorii*, Threatened – nationally vulnerable) which grows in regenerating broadleaved forest and there are some nearby records, including being known from Kinloch.
- Dwarf mistletoe (*Korthalsella salicornioides*, At Risk – Declining). This commonly grows on kānuka around Lake Taupō.

Regionally threatened plants may also be present including:

- Green mistletoe (*Ileostylus micranthus*) which commonly grows a wide range of trees around Taupō, and is known within the Taupō to Oruanui area.

Mistletoes and pua-o-te-reinga are highly palatable to possums. Mistletoes were recovering until recent time with the OspriTB free possum control which ceased in 2017. With the cessation of widespread possum control in recent years in these plants are likely to be heavily impacted and now in decline.

4.2. Indigenous Fauna

4.2.1. Birds

There is limited native bird habitat within proposed development area. There are likely to be common native birds within the adjoining Kaiapō Reserve, and Whakaipō 1D Māori Land block, which may occasionally enter the proposed development area. Common native bird species pīwakawaka/fantail (*Rhipidura fuliginosa*), riroriro/grey warbler (*Gerygone igata*), tuī (*Prosthemadera novaeseelandiae*), korimako/bellbird (*Anthornis melanura*), popokotea/whitehead (*Mohoua albicilla*) and kotare/sacred kingfisher (*Todiramphus sanctus*) have been recorded at nearby Rangatira Point and Whakaipō Bay by the authors, and on iNaturalist.

Though there is no suitable habitat within the proposed development area, mātātā/North Island fernbird (*Bowdleria punctata*; At Risk -Declining) were recorded in several locations along the Mapara Stream gully in Whakaipō Recreation Reserve, on the northern boundary of the proposed development area in June 2020 by the authors, and there is likely to be a fairly healthy population present. This species is in decline primarily because of the impacts of predators, but survives in wetlands, bracken fernland and dense scrub. It may be present elsewhere especially in areas of low scrub and bracken fernland.

The most likely *At Risk or Threatened* bird species to be present within the proposed development area is New Zealand pipit (*Anthus novaeseelandiae novaeseelandiae*). Pipit are classified as At Risk-Declining (Robertson et al. 2021). I have recorded pipit in rough grazed grassland just to the east of Taupō, and it has also been recorded at Karapiti/Craters of the Moon, and Kinloch on iNaturalist. Rough grassland habitat is found within the proposed development site. Therefore, there is potential for pipit to be present within the proposed development site. Kārearea (*Falco novaeseelandiae ferox*, threatened – Nationally Increasing) have been recorded throughout the Taupō area, and likely will be using parts of the Project for hunting. Karearea nest on the ground, though generally prefer pedestals such as cliffs, tree root plates and within treeferns and some cover (e.g. bushes, fallen trees) in their nesting area, so are unlikely to be nesting within the proposed development area.

4.2.2. Lizards

Volcanic activity especially the Taupō 232AD eruption reduced the lizard diversity within the Taupō District and comparatively the area has fewer species than neighbouring districts. The lizard species recorded in the North Taupō Area on the citizen science platform iNaturalist are the crenulate skink (*Oligosoma robinsonii*), and mokokakariki/elegant gecko (*Naultinus elegans*). Both species are At-Risk Declining (Hitchmough et al. 2021). There are multiple records for both of these species in the wider Taupō area.

Several other species occur nearby. The small scaled skink occurs on Motutaiko Island and is nationally vulnerable. This small lizard occurs within rocky and pumice refugia within farmland near Taihape and east of Taupo and could also be present within the general area.

The non threatened raukawa gecko (*Woodworthia maculata*) could also be present within suitable habitat, it is a predominantly ground-dwelling species. The co-occurring forest gecko (*Mokopirirakau granulatus*), is known from forest areas around Lake Taupō. This is a predominantly arboreal species.

Within the Project, habitat such as eroded pumice gullies exist for skinks. Similar habitat on farmland near Poihipi Road has a population of the crenulate skink (Tamati Reed pers. comm to Nicholas Singers). Adjoining forest areas provide more optimal habitat. Mokokakariki and forest gecko tend to be arboreal (tree dwelling) and may be found along the edges of Kaiapo Reserve and Whakaipō 1D Māori Land block.

Therefore, there is the potential for native lizards to be present within the Project.

4.2.3. Bats

The pekapeka-tou-roa/long-tailed bat (*Chalinolobus tuberculatus*) has a threat status of Nationally Critical (O'Donnell et al. 2023). It is adapted to forest edge habitat, and species occurs widely throughout the Waikato Region. It roosts in cavities and under large bark flakes in both native and exotic trees and can be found in landscapes where the dominant mature trees are exotic. The habitat within the proposed development area is unsuitable for short-tailed bats (*Mystacina tuberculata*) as the species requires large tracts of mature native forest.

The map of Waikato Region Bat Distribution (version 17 June 2025) shows no records of bats within the Project, however the Project or surrounding reserves have not had any acoustic surveys. The nearest record of pekapeka-tou-roa is 11 km away near the Taupō Golf Course. Kerry Borkin has detected pekapeka-tou-roa, near Wairakei Village, in Opepe Scenic and Historic Reserve and in forest around Mt Tauhara¹. These sites are all within a 15 km radius of the Project. We are also aware of anecdotal reports made in April 2020 of bats flying on the Kinloch golf course.

Within the proposed development area there are several old mature pine trees, which have the potential to provide roosting habitat in cavities or large flakes of bark, there is an abundance of similarly large dead pines within the reserves. The edges of the reserves of the Project may function as flight paths, as well as provide roost sites.

Although no long-tailed bats have been recorded within the proposed development area, the presence of potential roost trees and flight paths, together with records of long-tailed bats within the wider landscape, means that there is a moderate probability of long-tailed bats being present within the Project on a regular or seasonal basis.

4.2.4. Freshwater Habitats

While there are overland flow paths through the site, there are no permanent streams. Therefore, there are no aquatic habitats within the Project. No wetlands are known to be within the Project.

However, the proposed development area is within the Lake Taupō catchment. Therefore, there are groundwater values that will require protection in order to protect the water quality of Lake Taupō.

4.3. Summary of values

Based on currently available information the Project likely has low ecological values and no areas within the site qualify as significant indigenous vegetation.

¹ <https://www.nzherald.co.nz/nz/taupo-scientist-wins-scholarship-to-study-bats/NPUF53U77MS3722R6R4XG4FNBY/>

Breda Deadman Plan Change 44 Submission – Desktop Ecological Assessment. Prepared for Cheal Consultants. © Nicholas Singers Ecological Solutions Ltd. NSES Ltd Report 51, 20 December 2024, updated May 2026.

There is however a moderate chance that one or more native species may occur within the Project, such as native lizards, long-tailed bats or pipits. If these are confirmed to be present in future then parts of the Project may provide significant habitat for indigenous fauna, notably the pumice gullies, old mature pine trees or forest edges.

While the proposed development site is likely of low ecological value, the adjoining Significant Natural Areas are of high ecological value and notably contain a confirmed recent record of at-risk mātātā/North Island Fernbird in the Mapara Stream Gully, in Whakaipō Bay Recreation Reserve to the north of the proposed development area. There are likely to be other notable species present.

5. Assessment of potential effects and mitigation options

Development of the Project into Low Density Residential zoning has the potential to result in the following impacts.

5.1. Potential impacts of domestic cats on native wildlife

Domestic cats can prey on native birds, lizards and bats (Kikillus et al. 2017, Scrimgeour et al. 2012). A recent study from the U.K. found that cats living next to natural areas use nearby natural habitats have larger home ranges, and returned over twice as many prey than suburban cats (Pirie et al. 2022); and a study in Auckland found that more native birds were caught by cats in the urban/forest fringe area than in the fully urban habitat (Gilles and Clout 2003).

The project area currently will have a low domestic and feral cat population. Within 300 hectares the feral cat population abundance is likely to be less than 5 individuals (Nottingham et al. 2022) and could be as low as 1-3. Domestic cats are the most common pet in New Zealand with the 2020 population estimated to be 1.2 million or 41% of households. Based on this percentage, between 100 and 130 cats could reside within the Project once fully developed (assuming a cat-owning household has only a single cat). Therefore, there is potential for domestic cats to greatly increase the total population of cats within the Project and to have an adverse effect on populations of native birds, and potentially also lizards and bats within the neighbouring DOC reserves and SNA's.

Mitigation options

The potential impacts of domestic cats could be managed by having covenants in place prohibiting the keeping of cats in the Project, or requiring all cats to be kept inside, or with access to the outdoors only provided in specially constructed cat runs or "catio" areas.

There may also be an opportunity to offset potential effects of domestic cats on native wildlife populations through a financial contribution targeted to ongoing animal pest management within the neighbouring SNA's.

5.2. Loss of potential bat roosts

The large old mature pine trees may potentially provide roosting habitat for long tailed bats. Felling roost trees could kill or injure bats and reduces potential habitat available to them which would be an offence under the Wildlife Act (1953).

Mitigation options

Prior to removing any large old radiata pine trees we recommend undertaking an acoustic survey for bats using a suitably qualified ecologist, given the proximity to bat records. If bats are found to be present, then felling of roost trees should follow the Department of Conservation's Protocol for Minimising the Risk of Felling Bat Roosts. This protocol is designed to avoid the risk of harming or killing bats prior to felling. Loss of bat roosts should be compensated for by installation of artificial bat roost boxes. The Kent style roosting boxes have been shown to be used by long tailed bats (Robinson et al. 2024).

There may also be an opportunity to offset potential effects to long tailed bats through a financial contribution targeted to ongoing animal pest management within the neighbouring SNA's.

5.3. Loss of potential lizard habitat.

There is potential for the loss of skink habitat due to earthworks within the Project. While no lizards have been recorded in the proposed development area, there are records of at-risk native lizards in the wider Taupō area, and areas of potential lizard habitat within the Project. All native lizards are protected under the Wildlife Act 1953.

Mitigation options

It is recommended that a lizard tracking tunnel survey is carried out at the site, within areas of potential lizard habitat.

If lizards are found to be present, the results of the survey should be used to inform the preparation of a lizard management plan (LMP) that would ensure that the risk of lizards being killed or injured during site clearance is minimised.

There may also be an opportunity to offset potential effects to lizard habitat through the installation of artificial cover objects (ACOs), rock piles and targeted planting within the site, and ongoing animal pest management around lizard habitat areas.

5.4. Weed Invasion into natural areas

The development has the potential to create garden escapee weed issues in the adjoining reserves. The number and abundance of exotic weeds in native forest fragments are known to correlate with the distance to the nearest large town. Sullivan et al. (2005) found that the number of houses within 250 m of a forest area, explained 66.8% of the variation in the number of exotic plant species in these forests. This was a much stronger influence than ecological conditions within the forest remnants.

Sullivan et al. (2005) concluded that properly managing the locations and densities of new subdivisions, as well as the species grown in gardens in existing and new subdivisions near forest reserves, will reduce the weed pressure and subsequent cost of weed control in these reserves.

The effect of weed spread is cumulative and long lasting and has historically been difficult to avoid.

Mitigation options

We recommend any development within the project area has a covenant restricting planting all of the 386 plants from the DOC "List of environmental weeds in New Zealand 2024" weed list (McAlpine and Howell 2024). Landscaping using only native plant species should be encouraged.

There may be opportunities to provide a buffer to existing indigenous broadleaved forest habitats by undertaking native revegetation within the development area.

There may also be an opportunity to offset potential effects of weed invasion through a financial contribution to ongoing wilding conifer management and other weed control within the neighbouring SNA's.

5.5. Human encroachment in natural areas

The introduction of 250 to 320 lots within the Project has the potential to introduce human impacts to the adjoining reserves. There have been incidents in the Taupō District in the past of encroachment of neighbours into reserves, including felling of native trees to improve views, removal of shrubland edge to increase lawn space, and creation of unofficial walking tracks.

Mitigation options

A planted buffer to the reserve, rather than having sections directly adjacent to the reserve boundary, and official walking tracks within the Project would help to reduce these effects.

5.6. Nutrient Impacts on Freshwater

There are no permanently flowing water courses or wetlands within the proposed development area, However, consideration has been given to the potential change of nutrient inputs as a result of this proposal.

The proposal removes farm operations from within the Lake Taupō Catchment area. In the Lake Taupo Catchment module of the Waikato Regional Plan, the Landuse change from a controlled nitrogen leaching farming activity to a low-density residential subdivision is considered to be a lower nitrogen activity.

However, there are some provisions in the Lake Taupo Catchment module of the Waikato Regional Plan. Low density residential is at a higher density than the permitted activity rule for new wastewater systems (3.10.6.3: J. no more than one conventional wastewater system per four hectares of land area). Wastewater systems must be designed to be nitrogen removing systems, to a high standard (as per Rule 3.10.6.4).

Given that these plots are around 0.5 ha, there will also be a need to ensure that any pet livestock kept on site do not breach the permitted low stocking rate and fertiliser standards for rural residential lots (Rule 3.10.5.1).

Mitigation options

Any potential effects on the water quality of Lake Taupō will need to be managed through designing nitrogen removing wastewater systems to the required standard and putting mechanisms such as covenants in place to ensure low stocking rates and fertiliser standards are met. This is an issue for resolution and discussion.

6. Summary of potential effects

The development site is highly modified and supports no significant indigenous vegetation and therefore there will be no significant adverse effects on the intrinsic value of the vegetation. Potential adverse effects will be limited to effects on fauna and indirect effects on SNAs adjacent to the Project.

The Potential effects within the Project, and on the adjoining SNA's from this proposal include:

- Disruption to ecosystem representativeness and ecosystem function of the indigenous broadleaved forest habitats in the adjoining lakeshore reserves (SNA 186, SNA 318) due to weed invasion and impacts of domestic cats from the development common native fauna species.
- A reduction in the population size or occupancy of the At-Risk declining species Mātātā, North Island Fernbird within the adjoining SNA's, due to impacts of domestic cats from the development.
- A reduction in the population size or occupancy of the lizard species, potentially including the crenulate skink and mokokakariki/elegant gecko (if present), within the Project, or adjoining SNAs due to impacts of domestic cats from the development.
- A reduction in the population size or occupancy of the specified highly mobile fauna species pekapeka-tou-roa/long-tailed bat (if present), pihoihoi/New Zealand pipit, or kārearea within the Project due to direct impacts on habitat, or within adjoining SNAs due to impacts of domestic cats from the development.
- Potential for human encroachment on natural areas.
- Potential effects of nutrients on Lake Taupō water quality.

Potential mitigations for these potential effects

- Maintain the condition of indigenous broadleaved forest habitats in the adjoining lakeshore reserves (SNA 186) by preventing weed invasion and impacts of domestic cats through covenants on properties within the development.
- Provide a buffer to existing indigenous broadleaved forest habitats by undertaking native revegetation within the development area.
- Consider if there are opportunities to restore and enhance the adjoining indigenous broadleaved forest through contributions to weed management and animal pest control.
- If found within the development area, provide additional more secure habitat such as artificial roosts or artificial cover objects for bats and lizards, accompanied by animal pest control.
- A planted buffer and defined walking tracks within the Project would help reduce the potential for human encroachment on natural areas.
- Manage potential effects on the water quality of Lake Taupō through high-standard nitrogen removing wastewater systems and putting mechanisms such as covenants in place to ensure low stocking rates and fertiliser standards are met.

With such measures in place, it is expected that future development of the site could be undertaken in a manner in which adverse effects to indigenous fauna, and the forest habitat on adjacent SNAs can be managed so that the indigenous biodiversity across Aotearoa New Zealand is maintained.

7. References

- de Lange, P.J.; Gosden, J.; Courtney, S.P.; Fergus, A.J.; Barkla, J.W.; Beadel, S.M.; Champion, P.D.; Hindmarsh-Walls, R.; Makan, T.; Michel, P. 2024: Conservation status of vascular plants in Aotearoa New Zealand, 2023. New Zealand Threat Classification Series 43. Department of Conservation, Wellington. 105 p.
- Gillies, C., & Clout, M. (2003). The prey of domestic cats (*Felis catus*) in two suburbs of Auckland City, New Zealand. *J. Zool.*, 259, 309-315.
- Kays, R., Dunn, R. R., Waldstein Parsons, A., McDonald, B. 2020. The small home ranges and large local ecological impacts of pet cats. *Animal Conservation*, 23. 10.1111/acv. 12563.
- Hitchmough, R.A.; Barr, B.; Knox, C.; Lettink, M.; Monks, J.M.; Patterson, G.B.; Reardon, J.T.; van Winkel, D.; Rolfe, J.; Michel, P. 2021: Conservation status of New Zealand reptiles, 2021. New Zealand Threat Classification Series 35. Department of Conservation, Wellington. 15 p.
- iNaturalist NZ—Mātaiki Taiao. (<https://www.inaturalist.org/>). Accessed 18/12/2024.
- Kikillus, K. & Chambers, Geoff & Farnworth, Mark & Hare, Kelly. (2017). Research challenges and conservation implications for urban cat management in New Zealand. *Pacific Conservation Biology*. 23. 10.1071/PC16022.
- McAlpine, K. G. and Howell, C. J. 2024. List of environmental weeds in New Zealand 2024. *Science for Conservation* 340. Department of Conservation, Wellington. 37 p.
- Ministry for the Environment. 2024. National Policy Statement for Indigenous Biodiversity 2023. <https://environment.govt.nz/assets/publications/NPSIB-amended-october-2024.pdf>
- New Zealand Legislation. Wildlife Act 1953. https://www.legislation.govt.nz/act/public/1953/0031/latest/whole.html?search=ts_act%40bi%40regulation%40deemedreg_Wildlife+Act+1953_resel_25_a&p=1#DLM276814
- Nottingham, C. M., Buckley, H. L., Case, B. S., Glen, A. S., & Stanley, M. C. (2022). Factors affecting home range size of feral cats. *New Zealand Journal of Ecology*, 46(2), 1-10.
- O'Donnell, C.F.J.; Borkin, K.M.; Christie, J.; Davidson-Watts, I.; Dennis, G.; Pryde, M.; Michel, P. 2023: Conservation status of bats in Aotearoa New Zealand, 2022. New Zealand Threat Classification Series 41. Department of Conservation, Wellington. 18 p.
- QGIS.org, 2024. QGIS Geographic Information System. QGIS Association. <http://www.qgis.org/>
- Overdyck, Elizabeth. (2020). Nationally threatened and regionally uncommon species of the Waikato Region. Waikato Regional Council. [TR201928.pdf \(waikatoregion.govt.nz\)](https://www.waikatoregion.govt.nz/assets/Uploads/TR201928.pdf)
- Tara J. Pirie, T.J., Thomas, R. L. and Fellowes, M.D.E. 2022. Pet cats (*Felis catus*) from urban boundaries use different habitats, have larger home ranges and kill more prey than cats from the suburbs. *Landscape and Urban Planning*, Volume 220. <https://doi.org/10.1016/j.landurbplan.2021.104338>.
- Breda Deadman Plan Change 44 Submission – Desktop Ecological Assessment. Prepared for Cheal Consultants. © Nicholas Singers Ecological Solutions Ltd. NSES Ltd Report 51, 20 December 2024, updated May 2026.

- Robinson, H., Ling, N., & Tempero, G. W. (2024). Occupation of artificial roosts by long-tailed bats (*Chalinolobus tuberculatus*) in Hamilton City, New Zealand. *New Zealand Journal of Zoology*, 51(2), 186-199.
- Roper-Lindsay, J., Fuller S.A., Hooson, S., Sanders, M.D., Ussher, G.T. 2018. Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.
- Scrimgeour, J., Beath, A., & Swanney, M. (2012). Cat predation of short-tailed bats (*Mystacina tuberculata rhyocobia*) in Rangataua Forest, Mount Ruapehu, Central North Island, New Zealand. *New Zealand Journal of Zoology*, 39(3), 257–260.
<https://doi.org/10.1080/03014223.2011.649770>
- Sullivan, J. J., Timmins, S. M. and Williams, P. A. 2005. Movement of exotic plants into coastal native forests from gardens in northern New Zealand. *New Zealand Journal of Ecology* 29(1): 1-10
- Waikato Region Bats Distribution. (Last updated 17 June 2025).
<https://waikatomaps.waikatoregion.govt.nz/Viewer/?map=dfdf663dd7744e3e990ef26021e3a57f#>
- Weedbusters. 2007. Plant me instead - Waikato Region. Published by Weedbusters. ISBN: 978-0-9582844-4-8.
https://www.weedbusters.org.nz/site/assets/files/1085/plant_me_instead_waikato.pdf

Kaiapo Bay Development

Economics Assessment

Prepared for Breda Investments Ltd and EF Deadman Ltd

18 May 2026



Authors

Derek Foy

derek@formative.co.nz

021 175 4574

Rodney Yeoman

rodney@formative.co.nz

021 118 8002

Tom Worley

tom@formative.co.nz

Disclaimer

Although every effort has been made to ensure the accuracy and reliability of the information provided in this report, Formative Limited and its employees accepts no liability for any actions or inactions taken based on its contents.

© Formative Limited, 2021

Contents

1	Introduction.....	1
1.1	Background	1
1.2	Report structure.....	2
2	Kaiapo Bay overview	4
3	Planning context	8
3.1	NPS-UD.....	8
3.2	NPS-HPL.....	8
3.3	Taupō Future Development Strategy 2025.....	9
3.4	District Plan	11
3.5	Findings – planning context	16
4	Residential Demand context.....	17
4.1	Residential demand situation	17
4.2	Residential demand projections	20
4.3	Low Density Residential	22
4.4	Rural Lifestyle Demand	25
4.5	Findings – demand context.....	26
5	Residential Supply context	29
5.1	Residential capacity	29
5.2	Low Density residential capacity.....	30
5.3	Rural Lifestyle capacity	33
5.4	Findings – potential supply	34
6	Economic activity enabled by Kaiapo Bay.....	36
6.1	Approach.....	36
6.2	Economic role findings.....	37
7	Wider economic benefits.....	39
7.1	Rural production	39
7.2	Infrastructure	41
7.3	Transport.....	41

7.4	Well-functioning Urban Environment.....	42
7.5	Taupō competitive advantage	42
7.6	Local Convenience needs and Commercial Centres	43
7.7	Findings – Wider Economic Benefits.....	45
8	Outcomes	46
Appendix 1	Economic-Linkages-Model.....	48
A1.1	Input-Output Table	48
A1.2	Key Modelling Steps.....	50

Figures

Figure 2.1:	Site location	4
Figure 2.2:	Kaiapo Bay assumed development profile site plan.....	6
Figure 2.3:	Kaiapo Bay assumed development profile	6
Figure 3.1:	LUC on the Site.....	9
Figure 3.2:	Taupō FDS Sufficiency - Capacity vs Projected demand (Medium and High)	10
Figure 3.3:	Taupō FDS Future Residential Growth Areas.....	11
Figure 3.4:	PC42 Rural Lifestyle Areas vs Operative District Plan	14
Figure 4.1:	Taupō District historic population age structure	18
Figure 4.2:	Median house price sales for Taupō, Waikato, Rotorua, Hamilton, and New Zealand.....	19
Figure 4.3:	Taupō average and median house price sales	20
Figure 4.4:	Taupō District dwellings – historic TDC projections and development scenario	21
Figure 4.5:	Acacia Bay (Mapara Road) LDR lots size distribution	23
Figure 4.6:	LDR lots Demand.....	24
Figure 4.7:	Update Demand Projection - Taupō District rural lifestyle and low density lots	27
Figure 5.1:	Taupō vacant remaining LDR capacity (2025 – TDC Capacity Model)	30
Figure 5.2:	Taupō LDR Situation – TDC demand (Constrained) and Supply (Theoretical)	32
Figure 5.3:	Taupō LDR Situation – Demand (Unconstrained) and Supply (Realisable).....	32
Figure 5.4:	Rural Lifestyle Areas Capacity Assessment 2019	33
Figure 5.5:	Taupō Rural Lifestyle Situation – Demand (Updated to FDS) and Supply (Theoretical).....	34
Figure 6.1:	Direct expenditure arising from development of the Site (\$m)	38
Figure 6.2:	Economic impact arising from development of the Site	38
Figure 7.1:	Commercial floorspace sustainable at Kaiapo Bay	44

1 Introduction

Breda Investments Ltd (“BIL”) and E.F Deadman Ltd (“EDL”) own 15, 37 and 46 Kaiapo Road in Acacia Bay, Taupō (“the Site” or “Kaiapo Bay”). They are proposing that this the Site to be rezoned from the operative rural zone to Low Density Residential (“LDR”) zone.

BIL and EDL are making a submission on Plan Change 44 (“PC44”), which is Taupō District Councils (“TDC”) proposed changes to the residential zones to match the National Planning Standards, allow for intensification to meet the requirements of the National Policy Statement on Urban Development (“NPS-UD”) and to support and manage that growth in a logical and coordinated manner as outlined in the recently adopted Taupō Future Development Strategy (“FDS”)

Formative Limited has been commissioned by BIL and EDL to provide research on the economic implications of rezoning the Site as proposed. This research focuses on three key issues:

- ❖ How the proposed development will change the residential demand-supply environment in Taupō, with a focus on LDR lots. Demand for LDR is different to general residential demand.
- ❖ Why the Site is appropriate for LDR uses.
- ❖ The economic effects of rezoning the Site to LDR uses.

1.1 Background

Taupō District has experienced significant population growth. The latest provisional population estimates from Statistics NZ for the Taupō District show a current (2025) estimated population of 42,700, up from 38,600 in 2018, which is equivalent to 1.5% per annum.¹ In total 1.0% of the national population growth from 2018 to 2025 was located in Taupō District. Importantly, since 2023 growth has been tracking at a rate that is close to the Statistics New Zealand High Projection.²

Accompanying this population growth, the Taupō District economy has also experienced strong employment growth, up from around 19,700 jobs in 2018 to 21,500 in 2025.³ Employment in the District has grown by 1.2% per annum, again much faster than most districts in New Zealand. However, Taupō’s economy has been affected by the impacts of the national recession and global shocks, with

¹ Statistics New Zealand (2025) Subnational Population Estimates.

² Statistics New Zealand (2025) Projected Population Scenarios – 2023 base, Low, Medium, and High.

³ Formative (2025) Business and Employment Database – Total Employment Count which includes both working proprietors and employees.

growth in economic activity declining over the past two years, albeit less severe than that observed in the national economy.⁴

Up until recently, the TDC had been planning for population to peak in the late 2030s, with negative migration and an aging population driving a slow decline in population over the following decades.⁵ That is understandable, as for most regional parts of New Zealand there had been a consistent trend of migration of younger population to the large centres (Auckland, Tauranga, Hamilton, etc) and an aging of the remaining population.

However, nationally there has been a recent reversal of historic trends, with positive net migration to many regional areas, and unanticipated positive population growth. This has caused issues in many regions where council planning has not been able to adapt to provide sufficient supply, with house prices and shortages being observed in many townships. This reversal has been driven by a number of factors, potentially the most influential of which has been the relatively affordable housing in regional areas compared to the large urban areas, and the more recent changes in work practises post Covid-19 (e.g. remote working).

These national trends have also affected Taupō, which has experienced rapid recent growth. The district's population now exceeds the peak level that was planned for in the District Growth Management Strategy.⁶ Most of the TDC planning framework is over ten years old, which means that it does not account for the recent changes in demand.

Council is currently updating the planning framework to provide more supply, the FDS notes that if demand is high then there may be insufficient capacity to meet the needs of the community and that an action is "to identify and enable additional low density residential locations".⁷

1.2 Report structure

This report provides an assessment of the economic aspects of the Kaiapo Bay plan change and how it will contribute to Taupō. The report has the following sections:

- ❖ Section 2: provides an overview of the development that could be enabled by rezoning.
- ❖ Section 3: outlines the relevant planning context.
- ❖ Section 4: assesses demand for lifestyle blocks around Taupō.

⁴ Infometrics (2025) Taupō District Quarterly Economic Monitor Reports.

⁵ Taupō District Council (2018) Taupō District 2050 - District Growth Management Strategy.

⁶ Taupō District Council (2006) Taupo District 2050: District growth management strategy – revised 2018.

⁷ Taupō District Council (2025) Taupō District Future Development Strategy.

- ❖ Section 5: assesses the supply context, and capacity for accommodating expected demand.
- ❖ Section 6: provides an economic assessment of the development that would be enabled by the development within the Taupō economy, which includes activity during the consenting, land development, build development and then completion with associated residents.
- ❖ Section 7: provides a discussion of the wider economic benefits and other economic implications of the Kaiapo Bay development.
- ❖ Section 8: concludes the report with findings from the different aspects of the economic assessment of the Kaiapo Bay development.

2 Kaiapo Bay overview

The specifics of the development have been detailed in the other submission documents, and are recapped only briefly in this report. The relevant details include:

- ❖ The Site is 323.9ha gross area, and is located on the northern edge of Lake Taupō, between the settlements of Kinloch (to the east) and Acacia Bay (to the west, Figure 2.1). The Site is bounded to the west, south and east by private and Department of Conservation land that is covered in bush. The northern edge of the Site shares boundaries with a small number of rural properties.
- ❖ The Site is accessible via an extension of Kaiapo Road, connecting to Mapara Road, and is 3.5km west of Acacia Bay and 10km from the Taupō CBD. Kinloch is 20km by road from the Site, despite being only 6km as the crow flies, due to topography constraining road access.
- ❖ Currently the land is zoned General Rural and is mostly used for cattle grazing. The soils are shallow and have low productivity capacity.

Figure 2.1: Site location



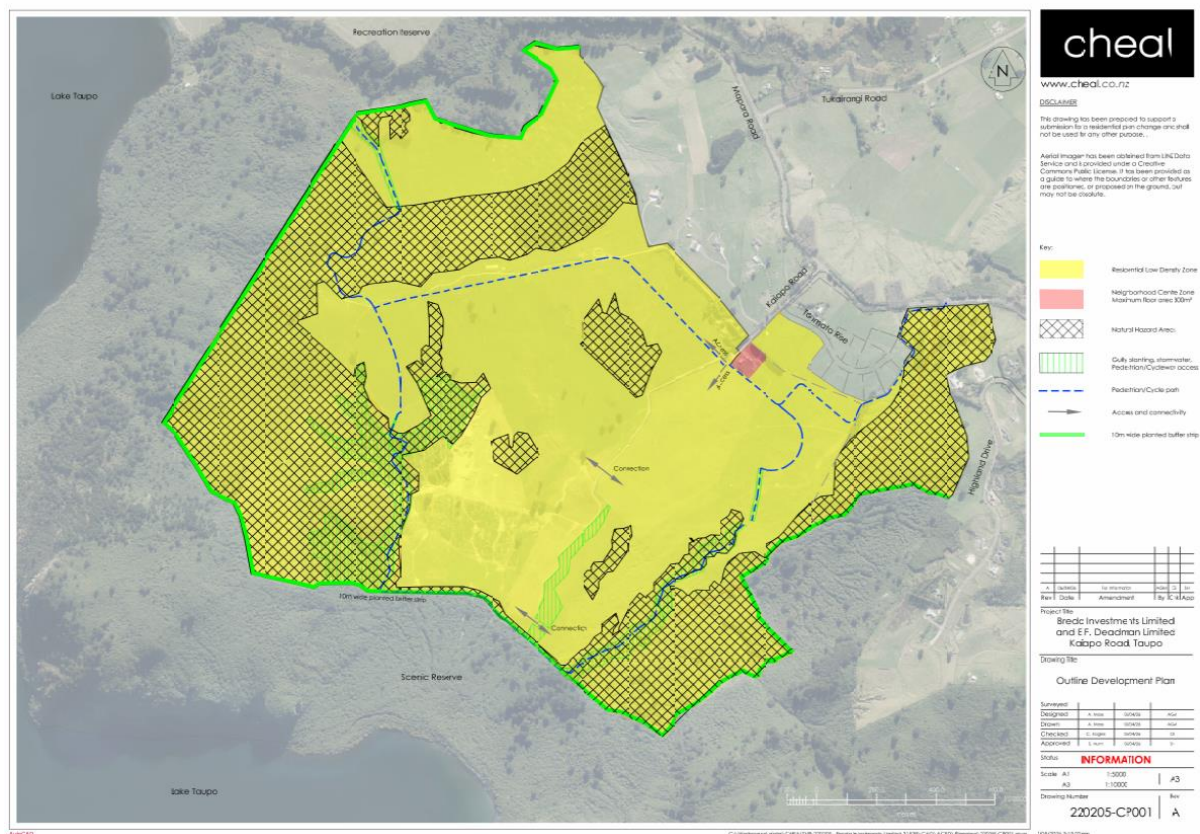
The Kaiapo Bay development could enable the development of LDR lots. To guide this economic assessment, we have assumed an indicative development profile as provided by the submitter, that shows one potential configuration of the Site if the LDR was adopted. That development profile is for 322 low density residential lots, with most being just larger than 5,000m², with an average area of approximately 8,500m² across the Site. The Site would provide residential lots targeting a specific market, and as such are different to most Taupō residential lots:

- ❖ The lots will be much smaller than most rural lots, but larger than urban lots, with a 5,000m² minimum so as to not require connection to reticulated wastewater supply.
- ❖ The Site is located on the edge of Lake Taupō and is surrounded on three sides by native bush, with views from most lots over the lake towards Mt Ruapehu. Properties on the northern edge of the property will have views of farmland and Whakaipo Bay.
- ❖ Dwellings on the Site will not be highly visible, apart from within the development, and from limited locations on the lake, due to the Site's topography, and location.
- ❖ There are proposed to be covenants on each lot that will limit building colours and construction materials, and require planting of vegetation. Design guidelines will ensure an upmarket feel is provided to all landowners. Approximately 3,000 trees are expected to be planted over the course of the development, which will help to connect the Site with the surrounding Department of Conservation land and support native wildlife throughout the site.
- ❖ Lots of the size anticipated are likely to accommodate larger than average, and architecturally designed dwellings, resulting in construction costs and property values that are likely to be considerably higher than the District average.
- ❖ Whakaipo Bay, less than 1km away has lake access via a beach and recreation areas which will be easily accessible by residents. As the site plans evolve, the incorporation of public spaces will be investigated, in order to help build a sense of community and connect residents. Unsuitable land for housing will be retained as open space and/or planted as ecologically connection to lakeshore conservation areas.
- ❖ Provide a small commercial centre to support the day-to-day convenience needs of the local community and contribute to the existing hierarchy of centres and a well-functioning urban environment.

Together, these characteristics provide a key differentiator for the Site compared to other areas identified by Council for rural lifestyle developments, positioning the development as appealing to buyers at higher price points. We understand that a number of properties are now under contract in a small scale adjacent development of around 10 lots between the Site and Mapara Road. The buyers of those properties are primarily to people looking to move out of larger North Island towns and cities,

which provides some indication that there may be broad geographic appeal for lots within the area as well.

Figure 2.2: Kaiapo Bay assumed development profile site plan



The development profile assumed has an average of just under one lot per hectare (322 lots on 334ha of gross land area), with 76% of lots sized between 5,000 and 6,000m² (0.5-0.6ha). Larger lots are primarily those around the edge of the Site, and those with steep topography that might constrain building platform location (Figure 2.3).

Figure 2.3: Kaiapo Bay assumed development profile

Parcel size (ha)	Parcel count	Share of parcels
<0.5	0	0%
0.5-0.6	246	76%
0.6-0.8	36	11%
0.8-1.0	7	2%
1.0-2.0	10	3%
2.0-5.0	17	5%
5+	6	2%
Total	322	100%

The economic assessment assumes that zoning is granted in 2026, earthworks and infrastructure would begin in early 2027, and dwelling construction in 2028. Earthworks and construction would then occur progressively in response to market demand, with assumed completion of the last dwellings in 2036. For the purposes of assessing economic impacts, dwellings are assumed to be single storey with an average floor area of 250m². Some lots owners may choose to build secondary buildings for garaging or storage purposes, although those are not captured in the assessment, making the economic impacts assessment conservative. Infrastructure and earthworks will contribute to expenditure, as explained in section 6.

3 Planning context

The planning framework that applies to Acacia Bay and the Site is important to guide the economic assessment. The following discussion covers the relevant parts of the national and TDC planning environment, including the NPS-UD and Highly Productive Land (“NPS-HPL”), the Taupō Future Development Strategy, the District Plan and the District Plan Review.

3.1 NPS-UD

The NPS-UD includes a set of reporting requirements relating to urban development capacity, for both residential and business activity. A key part of the requirements is that Tier 1, 2 and 3 councils must investigate how much capacity is enabled within their planning frameworks and the extent to which this capacity may be developed by the market. Councils are also required to assess the potential future demands of the community and businesses.

Taupō District Council is defined as a Tier 3 local authority, and is required to implement some aspects of the NPS-UD and encouraged to meet others.⁸ So far TDC has removed carparking requirements from the District Plan⁹ and has adopted a Future Development Strategy.¹⁰

The comparison of the demand forecasts and the amount of developable supply enabled by the District Plan provides an indication of whether there is at least sufficient urban development capacity to meet expected demand for housing in the short, medium and long term.¹¹ If there is insufficient supply, councils must act to increase development capacity as soon as practicable.

In 2025, TDC developed new demand projections and also undertaken a capacity assessment that measures some of the theoretical capacity types outlined in the NPS-UD (i.e. plan-enabled and infrastructure-ready capacity), but has not assessed other important practical aspects such as commercial feasibility or reasonably realisable capacity. This assessment was part of the FDS process and is discussed in the following sections.

3.2 NPS-HPL

The NPS-HPL was released on September 18 2022, with the objective that “Highly productive land is protected for use in land-based primary production, both now and for future generations.” Highly productive land is land that is predominantly identified as Land Use Capability (“LUC”) Class 1, or 2. There is no HPL on the Site, with the vast majority of the Site classified as LUC 6. The highest class soils

⁸ Minister for the Environment (2020) National Policy Statement Urban Development – s1.5.

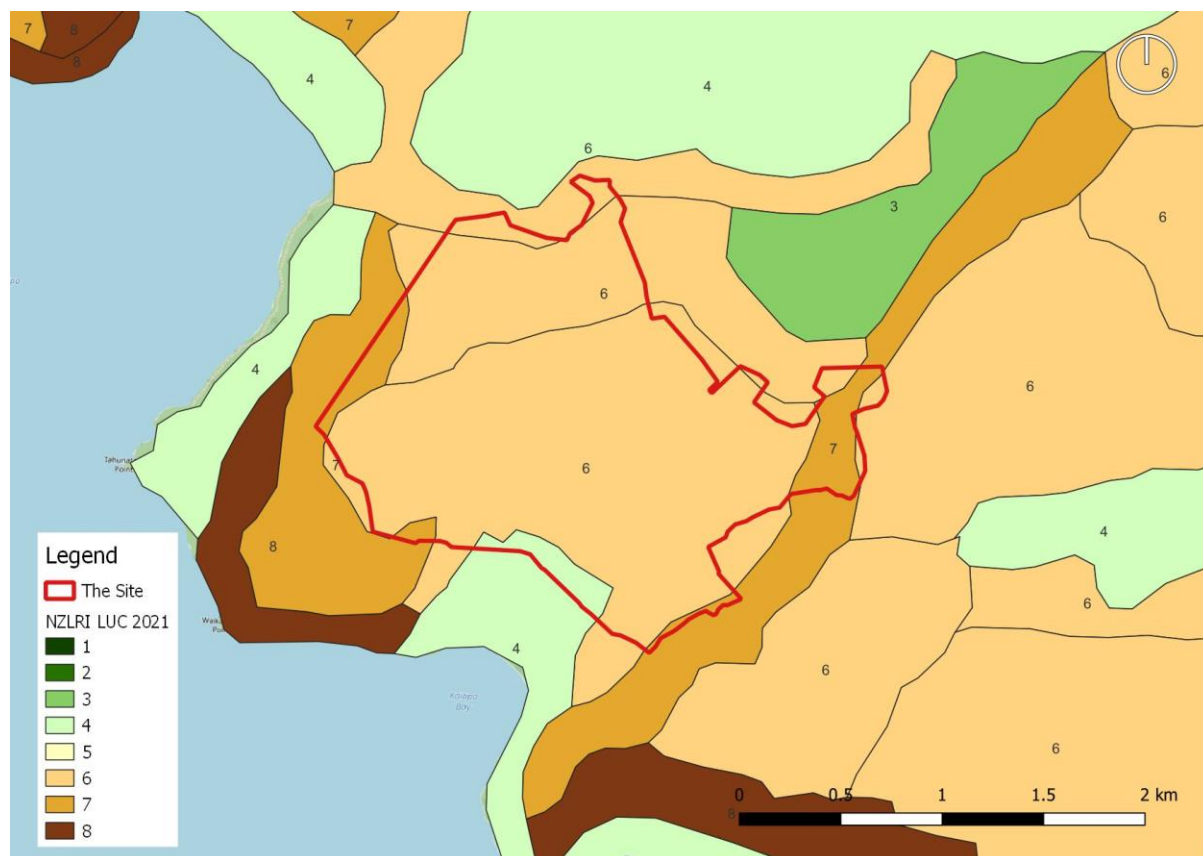
⁹ Taupō District Council (2021) Changes to Taupō District Plan Carparking Requirements – Public Notice.

¹⁰ Taupō District Council (2025) Taupō District Future Development Strategy.

¹¹ NPS-UD defines short term as within the next three years, medium term as three to ten years and long term as between 10 and 30 years.

on the Site are identified in a narrow band of about 100m wide along the southern boundary of the Site that is LUC class 4. Because no HPL is identified on the Site, no further assessment is provided, although the LUC classes present do have implications for the rural productive capacity of the Site, which is assessed in section 7.1.

Figure 3.1: LUC on the Site¹²



3.3 Taupō Future Development Strategy 2025

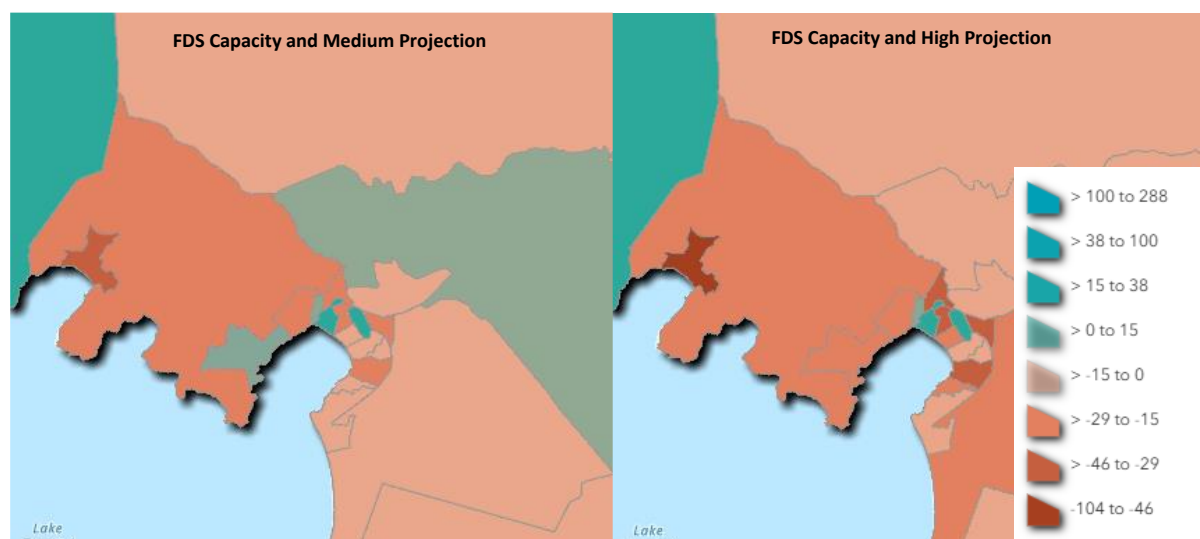
Taupō 2050 was adopted in 2025 to meet the requirements of the NPS-UD. The FDS included growth projects and capacity, along with indications of future growth areas and a range of actions required to ensure that the plan framework meets the growing needs of the community.

The District growth projections in the FDS suggest that population would grow to over 60,300 by 2050 under the medium projection. This would mean a need for around 11,600 new dwellings in the long term. The capacity assessment showed that there is sufficient capacity in Taupō district to meet the medium projection. However under the high projection there will be a shortfall of several thousand dwellings.

¹² New Zealand Land Resource Inventory Land Use Capability 2021

Importantly, there are expected to be shortfalls in many locations around the district, including the area which Kaiapo Bay is located. Figure 3.2 shows sufficiency outcome for the areas around Kaiapo Bay and Taupō City for both the medium (left panel) and high (right panel) projection. The red areas indicated in the maps show where there is a shortfall, while blue indicates areas with remaining capacity. Clearly, most areas around Taupō and Kaiapo Bay are expected to experience a shortfall under the current projections. Under the medium projection, most areas face shortfalls, with only a few areas showing positive capacity (Acacia Bay, Nukuhau, Taupō Central West, and Mountview). If the high projections are adopted, there are even fewer areas with remaining capacity.

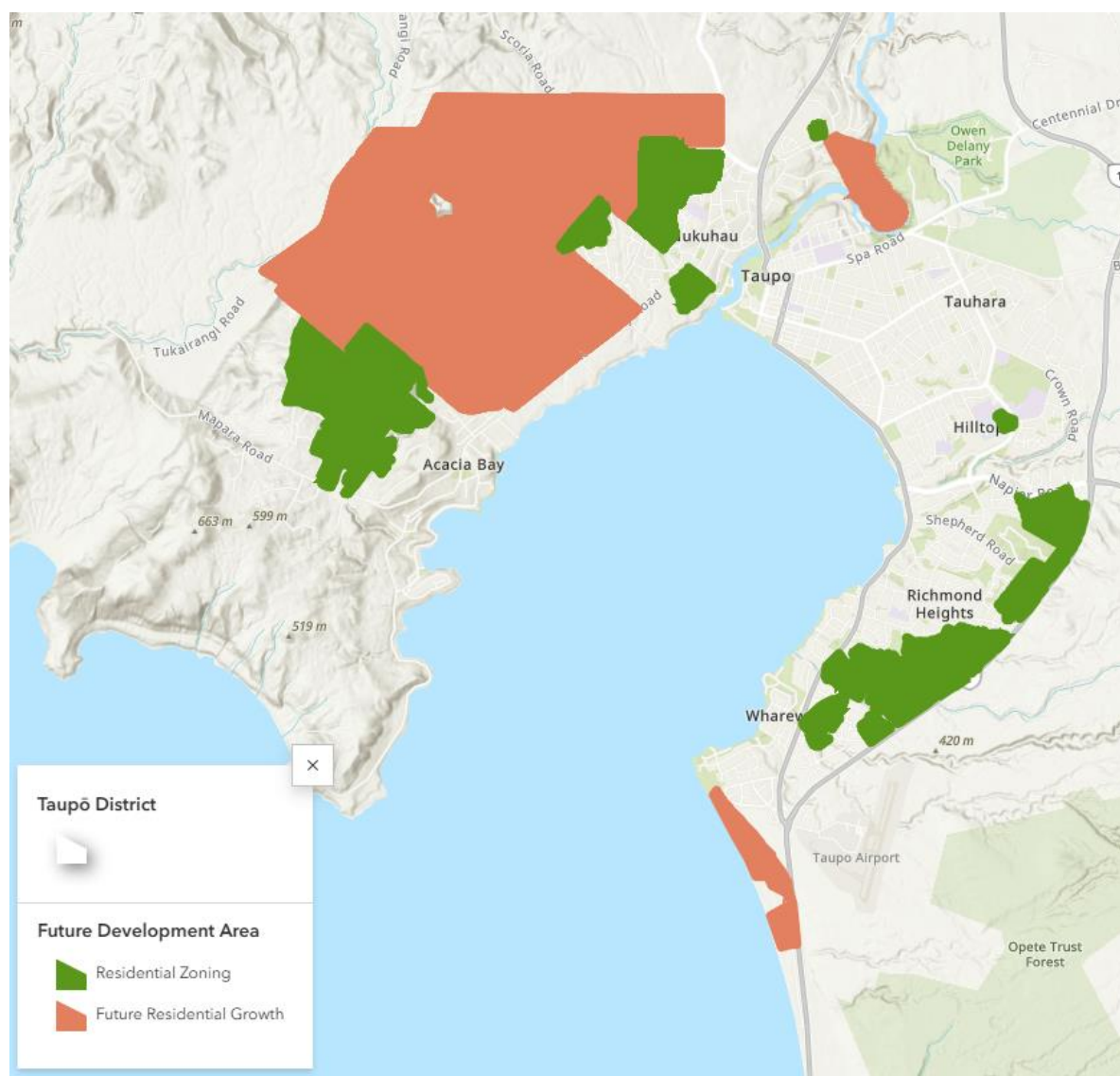
Figure 3.2: Taupō FDS Sufficiency - Capacity vs Projected demand (Medium and High)



Moreover, the FDS notes that “greenfield developments are expected to account for 80-85% of future residential housing of growth”. Therefore, there will be a need for more new zoned development potential and reliance in intensification will not be sufficient to meet the demand. The FDS indicated future residential growth in three areas - Rangatira E the Māori land between Acacia Bay and Taupo, Five Mile Bay and Huka Falls 8A16 (orange in Figure 3.3). A key action of the FDS is “*Identify additional residential growth areas for inclusion in the next FDS*” because council needs to think about the fact that “*If population projections continue on a similar trajectory, we will need additional growth areas to cater for residential growth beyond 2060. Identifying additional growth areas will require comprehensive investigations.*”.

Also most importantly for Kaiapo Bay is the action to “*Work with landowners to ensure there is adequate low density residential land available.*” and that council needs to undertake a “*Comprehensive assessments will to need to be undertaken to determine demand.*”

Figure 3.3: Taupō FDS Future Residential Growth Areas



We consider that the recent strong growth is now expected to continue, and new dwelling demand is expected to be towards the higher end of the range, in the FDS. Also, within the NPS-UD context much of the theoretical¹³ capacity enabled will not be developable in practice, and should be subject to filters about how much capacity is market feasible¹⁴, and reasonably expected to be realised.¹⁵

3.4 District Plan

TDC's planning framework has been reviewed over the last decade, with several plan changes relevant to this assessment having been adopted in recent years. The following changes are particularly

¹³ The capacity that is theoretically developable within the context of the District Plan rules.

¹⁴ An assessment of whether it is commercially viable for a developer to develop a dwelling, given the costs and revenues associated with the development.

¹⁵ An assessment of the intensity of development that is reasonably achievable.

relevant to this submission and the potential zoning of Kaiapo Bay: Plan Change 38 (Strategic Directions), Plan Change 42 (General Rural and Rural Lifestyle Environments), and, of course, Plan Change 44. The key aspects of these plan changes, and their relationship to PC44, are outlined below.

3.4.1 Strategic Directions

Plan Change 38 Strategic Directions (“PC38”) is a relevant revision of the District Plan because it outlines the key strategic and significant resource management matters for the Taupō district that will be relevant for any future changes to the Plan.

Matters of Strategic Direction 6 Urban Form and Development (6.8) is the most relevant section of the District Plan. This section provides a framework for ensuring that urban development, subdivision and land use changes occur in a planned and efficient manner and are adequately serviced by infrastructure. Relevant objectives include:

- ❖ Objective UDF-01: the District develops in a cohesive, compact and structured way that contributes to well-functioning and compact urban form, enables greater wellbeing, and ensures efficient integration with infrastructure, contribute to emissions reduction, meeting the demand of the community housing needs and protect productive rural land.
- ❖ Objective UDF-02: subdivision, use and development of land will be protect the effective functioning of the Rural Zones and serviced urban land and is co-ordinated with the provision of cost effective infrastructure.
- ❖ Objective UDF-03: subdivision, use and development of land which will have demonstrable social and cultural benefits to the District’s community will be supported, but should not detract from effective functioning of the urban environment.

Matters of Strategic Direction 6 Land Development (6.3) is also an important section of the District Plan. This section directly references Taupō 2050, which applies as a guideline for where Urban Growth Areas are intended. While not stated in the District Plan, the capacity provided for in Taupō 2050 will not be sufficient to meet all demands that are now expected.¹⁶ The latest TDC research in the FDS shows that the demand is now much greater than what was predicted in Taupō 2050, which means that the planned growth areas in Taupō 2050 will not be sufficient to meet the demands of the community.¹⁷

Broadly, if growth was only encouraged in the areas noted in the Taupō 2050 then there would be significant shortages of future residential dwelling capacity, and the TDC would not meet its obligations under the NPS-UD, as described in section 3.1. This is recognised in Change 1 to the RPS which is proposing to remove Taupō 2050 because it is out of date and inconsistent with the NPS-UD.

¹⁶ Taupō District Council (2022) Section 32 Evaluation Report Plan Change 38: Strategic Directions.

¹⁷ Property Economics (2021) Taupō Dwelling Demand Addendum Report.

This means that enabling growth in other locations will be critical, as is suggested as a key task in the FDS.

3.4.2 General Rural and Rural Lifestyle

Plan Change 42 General Rural and Rural Lifestyle Environments (“PC42”) provided a full review of the existing Rural Chapters within the District Plan.¹⁸ Most relevant to the submission and Kaiapo Bay development is the creation of a new Rural Lifestyle zone, and associated objectives, policies and rules that distinguished this area from General Rural Zone.

PC42 maintained the previous maximum density of one dwelling per 10ha in the General Rural Zone (which includes the Kaiapo Bay Site) and introduced a maximum density of one dwelling per 2ha in the Rural Lifestyle Zone. The plan change included nine areas that could be zoned Rural Lifestyle, which was mostly located to the north of Taupō, and none are close to the lake edge, with the closest being the southern parts of the proposed Tukairangi Road area (Figure 3.4). PC42 also removed the Mapara Valley zone which would have provided significant additional housing in the Mapara Valley.¹⁹

The operative District Plan is also shown in Figure 3.4, which illustrates that a smaller extent of Rural Lifestyle zoned land was adopted, with less land included in the zone:

- ❖ Orunau Road: much of the red area that was proposed to be Rural Lifestyle Zone.
- ❖ Tukairangi Road: reduction of the white area that was proposed to be Rural Lifestyle Zone.
- ❖ Broadland Road: reduction of the grey area that was proposed to be Rural Lifestyle Zone.
- ❖ SH1 and SH5 Concept areas where not adopted as Rural Lifestyle.

The 2019 rural lifestyle economic assessment²⁰, noted at the “district already has more than sufficient capacity to accommodate housing growth over the next 30 years”.²¹ However, the authors of that economic assessment have since revised their opinions on how much demand is expected (by +180%) and their opinion on the sufficiency of supply.²² Also now that the operative plan has adopted much less Rural Lifestyle zoned land than was proposed, it is likely that there is even greater shortage of capacity within the operative plan to accommodate the demand for larger lots.

Moreover, it is highly unlikely that all of the theoretical capacity enabled in the Rural Lifestyle zone would result in new dwellings being constructed, because landowners must be motivated to develop

¹⁸ Taupō District Council (2022) Plan Change 42 to the Taupō District Plan General Rural and Rural Lifestyle Environments September 2022.

¹⁹ Mapara Valley Structure Plan proposed as 2700 lots.

²⁰ Property Economics (2019) Taupō Rural Lifestyle Economic Assessment

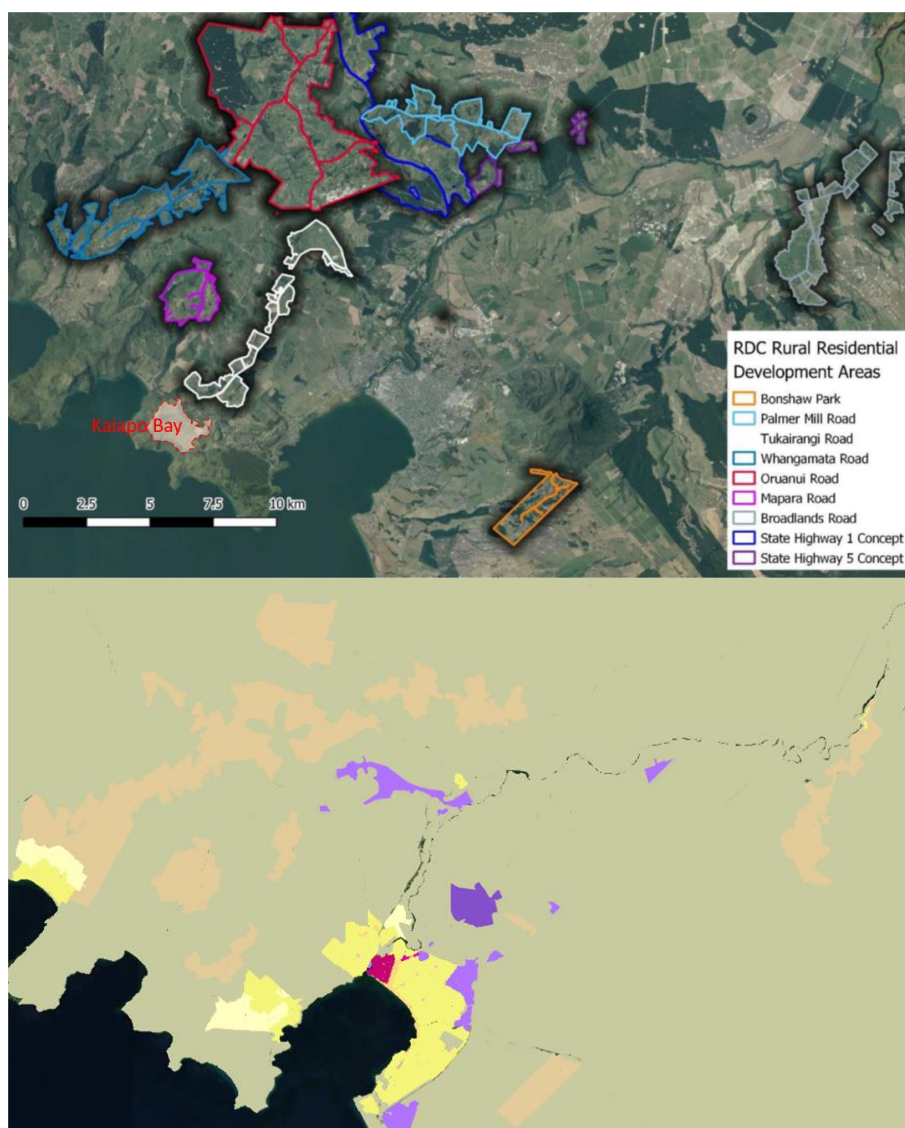
²¹ Taupō District Council (2022) Section 32 Evaluation Report: Plan Change 42 Rural Chapter – General Rural Environment and Rural Lifestyle Environment

²² Property Economics (2021) Taupō District Dwelling Demand Addendum Report.

or subdivide their land, have the financial capacity to do so, have appropriate legal access, have enough nitrogen allocation (within the Lake Taupō catchment) and have land that is suitable to accommodate a dwelling in order for capacity to be converted from theoretical to practical. We understand that there may be other constraints that impact whether this theoretical capacity can be subdivided, including legal title (Māori land), hazards (geothermal), etc.

We have had communication with TDC officers, and Council has not assessed the change in capacity within the Rural Lifestyle Zone since PC42. Officers have advised that the extent of the adopted Rural Lifestyle Zone is smaller than previously assessed, with associated capacity likely to be lower than identified in the PC42 economic assessment. TDC does not expect to undertake an updated capacity assessment until late 2026.

Figure 3.4: PC42 Rural Lifestyle Areas²³ vs Operative District Plan



²³ Property Economics (2019) Taupō Rural Lifestyle Economic Assessment.

3.4.3 Plan Change 44 Residential Zones

Plan Change 44 replaces the previous residential zones (Residential, Medium-Density Residential, and High-Density Residential) with zones aligned with the National Planning Standards (Medium Density Residential Zone, General Residential Zone, and Low Density Residential Zone). The section 32 report notes that the FDS signalled a review of the Residential chapters of the ODP to specifically consider how effectively the planning provisions enable a range of housing typologies and the intensification of existing urban areas. The provisions have been developed on the premise that the District will continue to grow, and that the role of the District Plan is to support and manage that growth in a logical and coordinated manner, while promoting the sustainable management of natural and physical resources.

A key finding in the report is that, “based on population projections and market demand, there is an identified shortage of land zoned LDZ”. The Council is relying on submitters to propose options for providing additional land for development.

Broadly, the approach adopted in PC44 is to focus on higher density urban residential zones and providing additional capacity by relaxing or removing standards in the MRZ and GRZ. It also proposes to rezone a small number of areas from the LDR and General Rural zones to GRZ. Importantly, the report notes a need for 13,000 homes over the next 35 years, of which approximately 20% may be delivered through infill redevelopment. This implies a need for around 10,400 new greenfield lots, however no assessment is provided of where or when this demand will be accommodated.

In terms of the LDR, a short (5-page) memo has been included as being evidence of the demand situation in the district.²⁴ This memo has provided two scenarios of demand, which focuses on building consents by lot size and an assumption that intensification will increase. The authors notes “that these scenarios should not be interpreted as definitive”. The section 32 report relies on this indicative assessment to establish a demand for 14 dwellings per annum in LDR.

We consider that the FDS clearly identifies a need for additional LDR-zoned land and notes that “comprehensive assessments will need to be undertaken to determine demand.” While the LDR memo provided in PC44 is not comprehensive, and the authors themselves acknowledge that it should not be interpreted as such.

In summary, in my opinion it would not be appropriate to rely on intensification potential in the GRZ or MRZ to meet the identified shortfall in LDR. The difference in lot sizes and housing typologies is such that it is unlikely that a purchaser seeking an LDR lot would view a much smaller GRZ or MRZ lot as a viable substitute. More likely, demand would instead shift to Rural Lifestyle lots, which would in

²⁴ Property Economics (2025) Memo Taupō Low Density Residential Demand Forecast Economic.

turn risk a more fragmented urban form and loss of productive rural land if LDR supply is insufficient. However, as discussed above there may be a significant shortfall in the Rural Lifestyle zone land in the future.

We consider that Council should consider demand in terms of both LDR and Rural Lifestyle lots, rather than narrowly focussing on past subdivision data as was applied in the PC44 economic memo.

In my view, it would be preferable for a greater share of demand to be accommodated within the LDR zone than through Rural Lifestyle development. This approach would contribute to a well-functioning urban environment, as required under the NPS-UD, and would support the compact urban form objectives of the District Plan. Moreover, it would reduce the chance of highly productive land being lost via subdivision of additional rural land.

3.5 Findings – planning context

Overall, the growth projections for Taupō, Acacia Bay and the Site consistently point to strong and growing demand for residential development capacity. The NPS-UD, FDS, and District Plan review collectively highlight the need to ensure sufficient and realistically realisable development capacity across the Taupō District. While the District Plan provides for theoretical capacity, both the FDS and supporting analysis acknowledge that not all of this capacity will be commercially feasible or practically achievable, particularly given infrastructure, market, and land use constraints.

The evidence indicates a particular need for additional LDR and Rural Lifestyle capacity, with the FDS explicitly recognising likely shortfalls and the requirement for further comprehensive assessment of demand. The PC44 evidence base, however, relies on limited analysis and does not comprehensively assess demand or substitution effects between zones.

In our view, it is not appropriate to rely on intensification within higher-density zones (GRZ and MRZ) to meet LDR demand, as there is limited substitutability, with demand more likely to shift toward Rural Lifestyle development.

On this basis, I consider that Council should assess demand for both LDR and Rural Lifestyle lots, rather than relying on narrow assessment of historical consents. A planning response that better enables LDR development would more effectively support a well-functioning urban environment in accordance with the NPS-UD and the strategic direction of the District Plan. It would also help reduce pressure on rural productive land and avoid unnecessary rural subdivision.

4 Residential Demand context

Taupō is in the central North Island, and is an attractive tourism destination by virtue of its proximity to Lake Taupō, the central North Island mountains, the national parks that surround the lake. Taupō is located a similar distance from Auckland and Wellington, and its centrality makes it a popular destination for events, and an increasingly attractive place to live. Recent state highway upgrades such as the East Taupō Arterial, Waikato Expressway, and Transmission Gully, have decreased travel times from Auckland and Wellington, and combined with increasing ability to work remotely Taupō's attractiveness is likely to continue to increase.

This section summarises the current state of demand for residential property in Taupō generally, focussing in particular on demand for larger residential lots, both lifestyle property and low density residential.

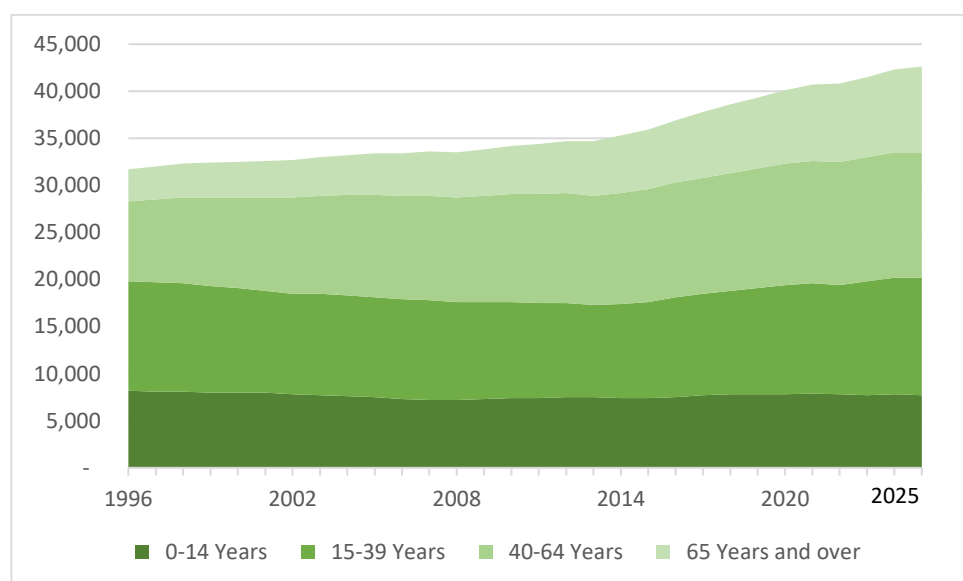
4.1 Residential demand situation

The general demand situation is important because households make decisions about where to live depending on their preferences and their ability to afford each potential option. These individual household decisions collectively combine across the local community and beyond, to produce a dynamically changing outcome in the market. It is important to understand the total quantum of demand, the character of that demand and market outcomes which result from that combined demand.

Taupō District's population in 1996 was 31,600, and that has grown by just over 1% per annum on average, to 42,700 in 2025 (Figure 4.1). Over most of that period the population grew slowly, or even stagnated, and 61% of the growth has occurred in the last decade, including nearly a quarter in the last five years.

While the population of all age cohorts has increased since 1996, there has been particularly strong growth in the 65+ age group, and that is projected to continue. Overall since 1996 the District's population has aged, household sizes have decreased and the share of the population that is children has decreased. Both natural population increase (births minus deaths) and net international migration have both decreased recently, with net internal migration increasing, and being the key driver of population growth.

Figure 4.1: Taupō District historic population age structure



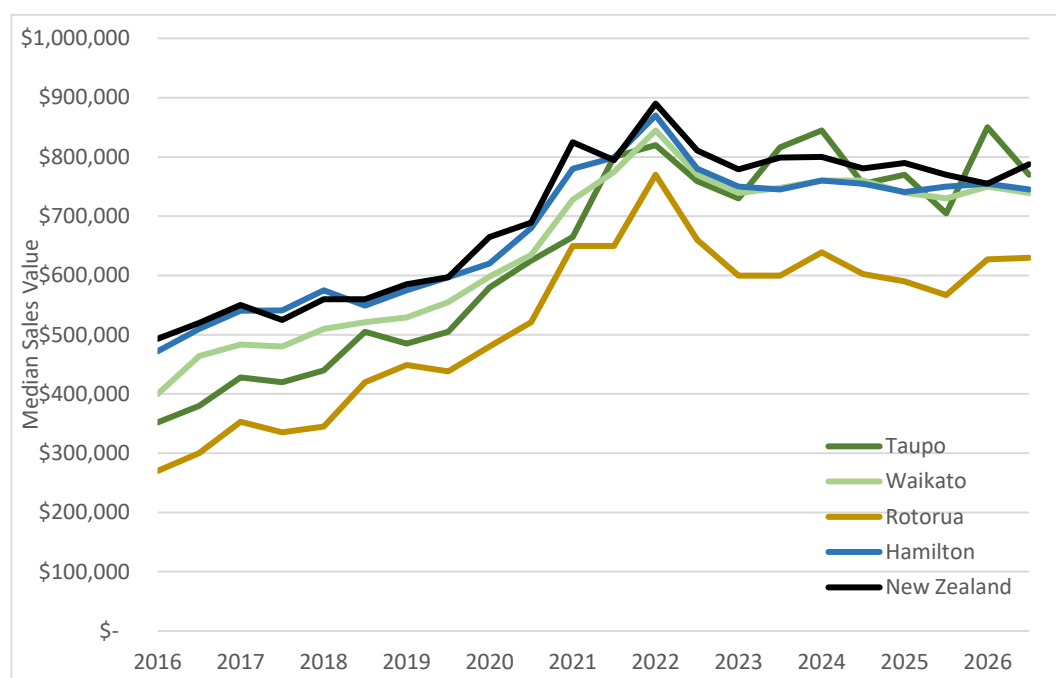
The recent rapid increase in demand has resulted in a considerable change in the residential market in Taupō District. House prices have increased significantly over the last seven years, rising from a median of \$380,000 in 2016 to \$770,000 in 2026, an increase of over 100%.²⁵ However, since 2022 the median house price has stagnated and decreased by 5.7%, driven by rising interest rates and an increasingly negative short term outlook cooling activity in the market (see Figure 4.2).

Over this period, Taupō's median house sales value has shown considerably stronger growth than the wider region and national growth rates. The Taupō District median price caught up to and overtook the Hamilton, Waikato, and New Zealand median price in late 2021 and remained consistently higher over most of the last five years.

That recent decline in Taupō median sales values reflects the national trend, where a period of significant growth saw prices peak at record highs in late 2021 to early 2022, before declining and stabilising over the five years. The market is beginning to reflect measures taken by the Reserve Bank to limit inflation through interest rate rises and other international factors.

²⁵ Real Estate Institute of New Zealand (2022) Monthly Property Report – Median Sales Value by Region and Territorial Area.

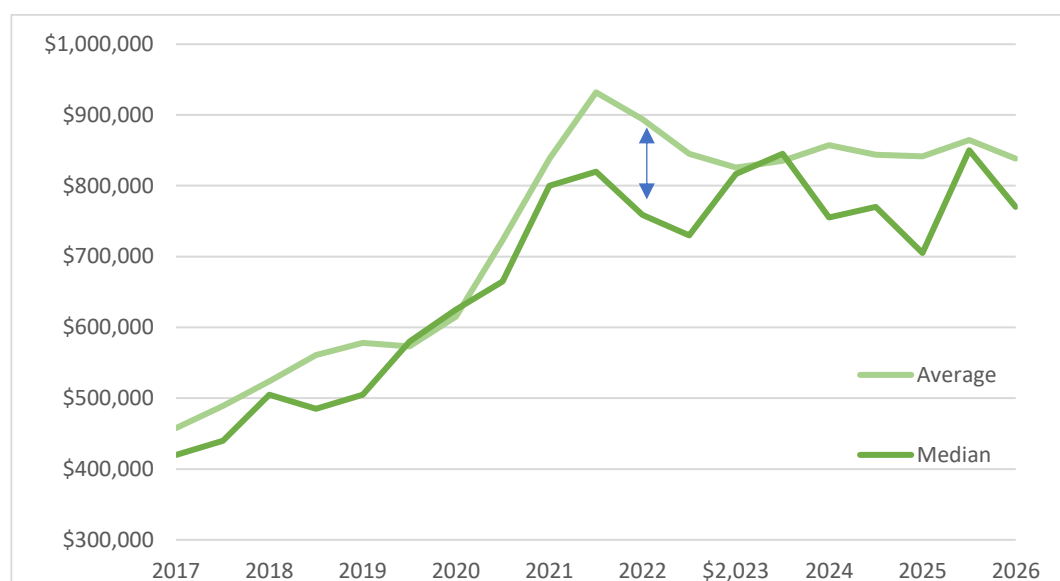
Figure 4.2: Median house price sales for Taupō, Waikato, Rotorua, Hamilton, and New Zealand



The median sales value is the traditional market metric, however there is some value in comparing the median to the averages. The difference between the two shows the structure of market, with divergences between the two metrics indicating that the market is becoming more skewed towards either high value dwellings or low value dwellings. Figure 4.3 shows that over the last five years the average house price²⁶ has increased faster than the median in Taupō. That shows that while the sale prices in the middle-lower parts of the market have increased, high-end residential property sales around Taupō have increased at a faster rate than the rest of the market, and have remained more buoyant over the last year.

²⁶ Quotable Value (2022) QV House Price Index - Average Sales Price by Region and Territorial Area.

Figure 4.3: Taupō average and median house price sales



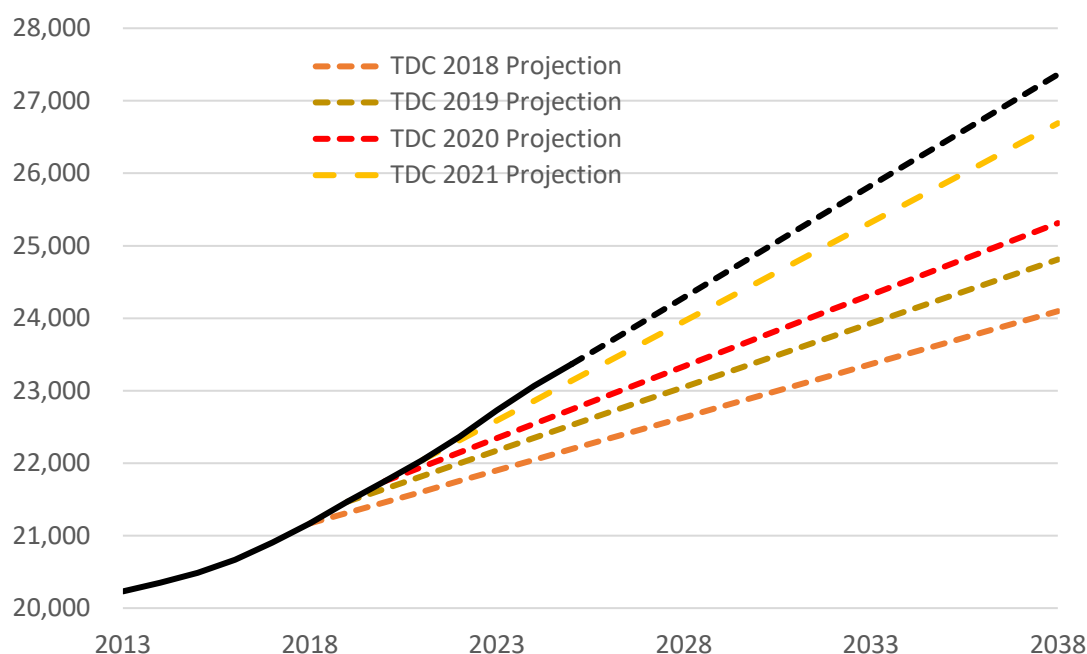
The general demand situation in Taupō has shifted considerably over the last decade. There is increased demand for both affordable and high value dwellings, with a reversal of historic domestic migration trends driving an influx of new residents to the District. That reversal and limited supply of housing has resulted in strong growth in house prices across the entire housing market in Taupō and has given rise to increasing affordability issues. Importantly, for PC44 is that there has been strong demand for high-value dwellings, such as would predominate in the low density zones, with prices of those dwellings less impacted by the recent downturn that dwellings at lower price points.

4.2 Residential demand projections

Both the Statistics New Zealand and TDC projections have proven to be significantly, and consistently, below actual development activity. This means that they may not be reliable guides as to the future demand for residential activity in Taupō District.

Importantly, the TDC previous assessments from 2018 to 2021 predicted slower rates of dwelling growth in the District than the level of development that has occurred. It is highly likely that the demand for new dwellings in Taupō District will continue to be higher than projected (Figure 4.4 compares past TDC projections to building activity that occurred). While that 2021 research showed a substantial shift in council projections, we note that even these were subsequently found to be overly pessimistic.

Figure 4.4: Taupō District dwellings – historic TDC projections and development scenario



TDC has recently released updated projections for the FDS, which are available on the council website. The TDC medium growth projection indicates demand for 2,888 new dwellings over the next ten years, equivalent to approximately 289 dwellings per annum. The high growth projection indicates demand for 4,282 new dwellings, equivalent to approximately 428 dwellings per annum. This compares with recent dwelling consent levels in the District, which have averaged approximately 333 dwellings per annum since 2021.

While it is beyond the scope of this report to prepare independent growth projections for the District, we consider that TDC should plan for growth to continue broadly in line with recent post-COVID-19 trends. Planning for more growth, rather than less, would ensure that there is a smaller chance of a future undersupply of residential land, which would help to alleviate increasing house prices and dwelling unaffordability. Planning for more growth is also consistent with the approach advanced in the NPS-UD, which requires there to be at least sufficient capacity to accommodate growth, and so sets minimum required supply, but not maximum. It would also be prudent to apply the NPS-UD competitiveness margin. Also the NPS-UD requires councils to include competitiveness margin, over and above the demand.

This would mean that TDC would need to plan for growth of approximately 4,000 new dwellings by 2035²⁷ and 11,655 new dwellings by 2055²⁸. This compares to the TDC projections that are used in the FDS which has demand for 9,000 new dwellings by 2055 (medium projection) and a target of 10,540 once competitiveness margin is included.

In summary, we acknowledge that the new TDC projections in the FDS are materially improved compared with the previous projections. However, we consider there remains a reasonable risk that future demand could exceed the medium projection.

Furthermore, the projections include all residential growth in the District, of which most will be directed to urban and higher density areas, although there is, and will continue to be demand for dwellings on larger lots, such as LDR or Rural Lifestyle zones. Assessment of that demand for LDR and Rural Lifestyle zones is provided below.

4.3 Low Density Residential

The Council has commissioned a memo which is included as part of PC44, titled “Taupō Low Density Residential Demand Forecasts”. As discussed in the previous section of this report, the memo provides only an indicative assessment of demand for LDR land. The assessment relies on building consent data for lots with between 0.5 to 2ha of land within Acacia Bay and Rangatira Park between 2019 and 2024, and assumes that this data can be used to project future demand for LDR lots. The memo projects a demand for 14 dwellings per annum in LDR.

We disagree with this approach because it assumes that LDR lots cannot be smaller than 0.5ha and that there is no demand for smaller lots. This effectively assumes a gap between LDR lots and much smaller urban residential lots (i.e. no demand for lots between 0.2ha and 0.5ha). We also disagree with the implied assumption in the memo that the supply of LDR-zoned land has been unconstrained and that demand has been freely accommodated across the district.

First, it is important to understand that the memo has only considered consents in lots between 0.5ha and 2ha of land. This narrow focus ignores the fact that LDR lots are mostly subdivided to a level lower than 0.5ha, and that there is a distribution demand for lot sizes between 0.2ha to 2ha that will be accommodated in this zone.

²⁷ Short-medium term demand of 3,330 dwellings in the ten year period 2025 to 2035, plus NPS-UD competitiveness margin of 20%.

²⁸ Long term demand of 7,659 dwellings in the 20 year period 2023 to 2055, plus NPS-UD competitiveness margin of 15%. And the including the short-medium term requirement.

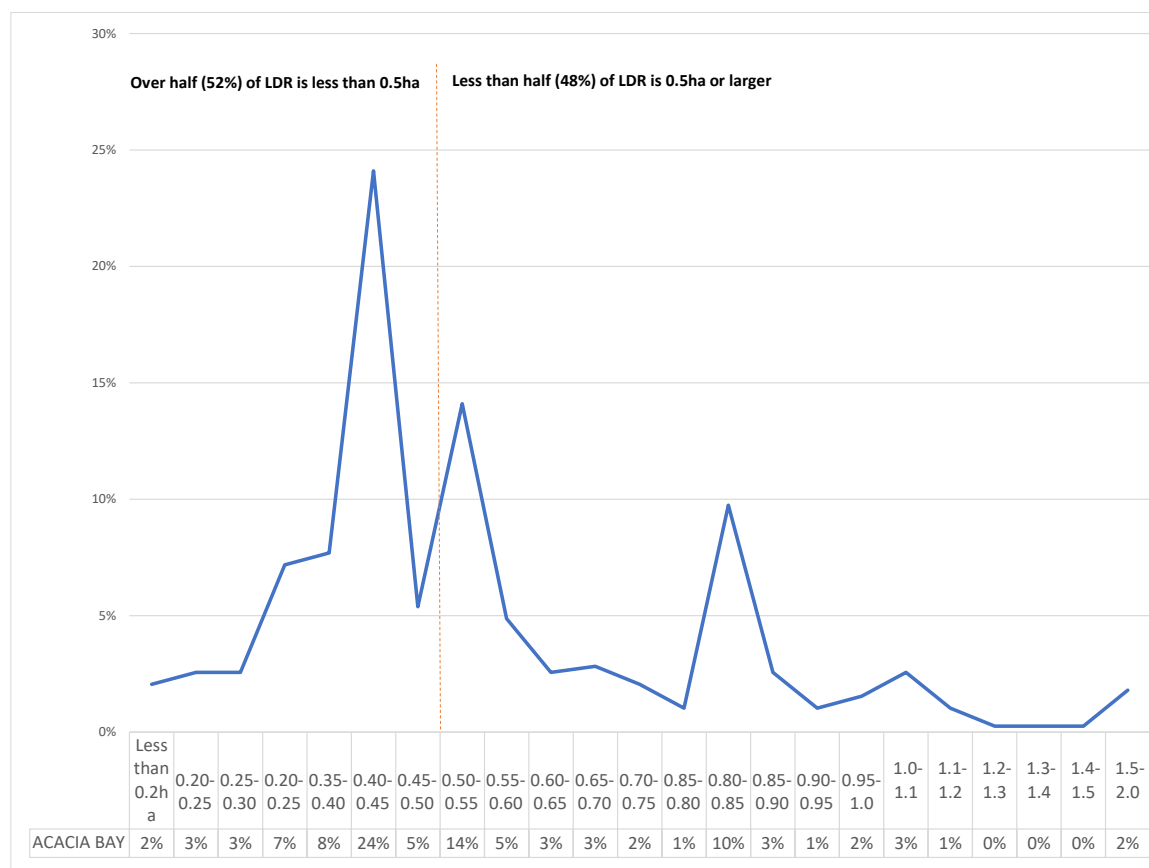
This narrow view is based on the wastewater rules in the Waikato Regional Plan which require a minimum site size of 0.5ha. Also, the operative District Plan rules has a maximum building footprint of 5% which would allowing a dwelling of 250m² on a 0.5ha lot.

Therefore, one may be forgiven for expecting that most lots in the LDR zone would be 0.5ha to 2ha, with only a few lots below 0.5ha. However, the opposite is the case with most lots in the LDR being lower than 0.5ha, which is likely because the historical parent allotment size of 0.8ha, and that landholders have applied resource consent and/or built dwellings smaller than 250m².

As an example, Figure 4.5 below shows the distribution of lot sizes within the LDR zone in Acacia Bay (Mapara Road).²⁹ This indicates that the most common site size is between 0.40ha and 0.45ha, accounting for nearly a quarter of all lots. Most relevantly, more than half of all lots (52%) are smaller than 0.5ha, yet this segment of the market has not been considered in the PC44 economic memo.

The implication is that the memo has only considered around half of the market and has overlooked the demand that exists for LDR lots in the 0.2ha to 0.5ha range. Therefore, the PC44 economic memo cannot be relied upon as accurately reflecting the total demand and need for LDR land.

Figure 4.5: Acacia Bay (Mapara Road) LDR lots size distribution



²⁹ Corelogic (2026) Property Guru – property data for LDR area.

Furthermore, PC44 now proposes increasing the maximum building footprint in the LDR zone to 10%. This would allow, for example, a 250m² dwelling on a 2,500m² lot, or a 150m² dwelling on a 1,500m² lot. This change in plan is intended to allow more activity in the LDR, and is likely in our opinion to generate greater demand for lots in the range of 0.2ha to 0.5ha. The Economic Memo has not considered the implications of this change, and has assumed that demand will remain the same, which is unlikely.

Second, the memo draws on data from a period during which the supply of LDR-sized lots was constrained. It is clear that most LDR land in Acacia Bay and Rangatira Park had already been developed prior to 2019, which is confirmed in the data within TDC capacity assessment. This meant that there was limited remaining supply after 2019 and, consequently, the share of district-wide demand accommodated within the LDR zone declined between 2019 and 2024.

Using this constrained market situation to project future demand effectively assumes that the Council will continue to constrain supply within the zone. Moreover, projecting demand on the basis of a constrained market share is inconsistent with the requirements of the NPS-UD. The memo itself acknowledges this issue, noting that the “reduction is likely partly due to a slower rate of supply.”

We consider that demand for LDR is higher than recent consent levels suggest, and that the share of district-wide demand would be closer to, if not higher than, the average of the consents observed between 2019 and 2022 (which was 6%).

Therefore, in our opinion, demand is materially higher than indicated in the PC44 economic memo. The memo estimated demand at 14 lots per annum for the subset of the market comprising lots between 0.5ha and 2ha. Indicatively, if the full market is considered, LDR demand would be at least 29 lots per annum, including the 52% of the market not accounted for in the PC44 economic memo.

Furthermore, the limited availability of supply appears to have artificially constrained demand, and if additional supply were available, demand could be at least 38 lots per annum. While the results in Figure 4.6 is indicative, we consider that it provides a more complete understanding of likely demand than the PC44 economic memo.

Figure 4.6: LDR lots Demand

LDR Demand	Medium Term	Long Term	Per annum
PC44 Economic Memo 0.5-2ha	137	413	14
LDR Entire Market 0.2-2ha*	285	860	29
LDR Unconstrained Demand	374	1,131	38

*includes 0.2-0.5ha from the entire market, using 52% observed in Acacia Bay

**includes 0.2-0.5ha from the entire market, and uses 6% average from 2019 and 2022.

Adopting the LDR unconstrained demand of 38 lots per annum, this would mean a requirement in the short-medium term, once an appropriate competitiveness margin is included, of approximately 45 lots per annum.³⁰

Additional, in our view, the memo should at minimum, have included an assessment of the latent demand arising from the limited supply of LDR land in the period. It should also have considered the extent to which demand from the wider large-lot market could be accommodated within the LDR zone, including demand that might otherwise be directed toward large lot rural lifestyle development. This aspect is covered in the following section.

4.4 Rural Lifestyle Demand

Rural Lifestyle (over 2ha) and LDR (0.5-2ha) lots bridge the gap between traditional urban residential lots (less than 1,000m² in GRZ and MRZ) and rural properties (over 10 ha). Typically, rural lifestyle and LDR properties broadly follow urban/residential market trends, but are their own clear sector and different selling points.

Rural Lifestyle and LDR properties attract a wide range of residents, including professionals looking to relocate from urban locations, local families wanting to upgrade and gain more outdoor space, farmers looking to downsize but still stay connected to a semi-rural lifestyle, and retirees seeking their dream home out of the city.

TDC has commissioned research on this market in 2019, “Taupō Rural Lifestyle Economic Assessment”³¹. This report calculated potential demand for large lot lots around Taupō.³² While that study provides a starting point from which to estimate of demand for larger lots, there are several points to note:

- ❖ First, the assessment was based on the now out of date TDC 2018 district wide demand projections, which expected a small amount of growth. As discussed there have been several newer iterations (by the same researcher), and the most recent projection now predicts much higher demand. While made with the best data available at the time, those projections have been shown to have significantly underestimated growth, leaving their estimate of current population far too low, and also likely indicating much slower growth than is now considered likely. This is important because the assessment assumed for the

³⁰ NPS-UD requires councils to include 20% margin over the coming 10 years.

³¹ Property Economics (2019) Taupō Rural Lifestyle Economic Assessment.

³² This research was conducted before the Rural Lifestyle or LDR zones had been adopted in Taupō. It assessed demand across a range of lot sizes, including lots comparable to those enabled within the Rural Lifestyle and LDR zones.

base line demand that the proportion of large lots would remain at the constant proportion of existing households in Taupō.

- ❖ Second, the report was produced before the Covid-19 pandemic which has significantly impacted demand preferences, for both lifestyle blocks and living within regional locations. It would not have been possible for the researchers to fully appreciate the scale of the impacts from the pandemic and how these impacted preferences for living within rural and regional areas of New Zealand. Importantly, the assessment considered that making more lifestyle properties available in Taupō, would attract purchasers from outside the region who previously would have lived in a different district. We agree with this premises, which is also likely to have increased somewhat as a result of preference changes since the pandemic.

Notwithstanding these issues, we consider that the assessment provides a starting point from which to estimate of demand for larger lots. The assessment found that if TDC adopted the new Rural Lifestyle zone then there would be demand for 687 new lifestyle lots in the District between 2018 and 2033, which is equivalent to nearly 50 per annum.

We acknowledge that the authors of the 2019 report have recognised that the demand projections have been “outstripped” in subsequent research and, it is likely that if they now revised that report they would conclude much more demand for rural lifestyle lots.

In the absence of more recent large lot demand projections which appropriately recognise recent growth trends and upward increase in the projections, we have developed the following update. In this assessment we have updated the “District demand” element applying the new TDC 2025 projections³³ and have maintained all other elements of the assessment. This means that the District demand increases from around 10 dwellings per annum in the 2019 report to 29 dwellings per annum. Including all elements of the demand means a demand for over 60 dwellings per annum. In the short-medium term, once an appropriate competitiveness margin is included, this would increase the required capacity to approximately 73 lots per annum.³⁴

4.5 Findings – demand context

Taupō is an attractive destination by virtue of its central location with the North Island, and the attractive surrounding natural environment. Recent population growth in Taupō has substantially exceeded TDC previous projections. The latest 2025 projections in the FDS are materially higher, but there is still a risk that demand will exceed the projections.

³³ We have adopted the method applied in the 2019 assessment, which estimated the District demand directly from the total district demand projection assuming that the share of demand in large lot remains constant.

³⁴ NPS-UD requires councils to include 20% margin over the coming 10 years.

The general demand situation in Taupō has shifted considerably over the last decade. There is increased demand for both affordable and high value dwellings, and has been a reversal of historic domestic migration trends driving an influx of new residents to the District.

That reversal, and limited supply of housing, has resulted in strong growth in house prices across the entire housing market in Taupō, and has given rise to increasing affordability issues. Importantly, for the submitters request there has been strong demand for high-value dwellings, such as would predominate in the Kaiapo Bay area, with prices of those dwellings less impacted by the recent downturn than dwellings at lower price points. The Site would enable new, premium residential options to non-locals, and also attract some existing Taupō residents to move to the Site, freeing up their current property to the market.

We consider that the growth in demand for LDR and Rural Lifestyle living will continue to be important over the coming years. However, unlike urban residential property, the market for this type of property is much broader than the specific location where the development occurs.

Residential properties within the Site would likely have broad geographic appeal, and we consider that the development enabled by the submitters request would attract buyers from a large part of the North Island, given Taupō's good, and improving accessibility from both Auckland and Wellington, and improved technology supporting work from home options.

Our updated assessment of demand for LDR and Rural Lifestyle, suggest that there would be combined demand of 731 Large Lot (both rural lifestyle and LDR combined) by 2035 and a total of 2,131 lots by 2055. This suggests that there is demand for around 71 large lots per annum, which compares to the TDC 2019 demand projection of less than 50 per annum.

The specific demand for LDR of 449 lots by 2035 and a total of 1,320 lots by 2055. This suggests that there is demand for around 44 LDR lots per annum, which compares to the TDC 2025 demand projection of 14 per annum.

Figure 4.7: Update Demand Projection - Taupō District rural lifestyle and low density lots

Demand Projections *	2025-2035	2025-2055	Per annum
Large Lot	731	2,131	71
Low Density	449	1,320	44

*including competitiveness margin

We consider it would be prudent to provide sufficient capacity to accommodate at least the demand for LDR (i.e. 44 per annum), and potentially some of the demand currently directed to the wider Large Lot market (i.e. a share of the 71 per annum). This approach would be more efficient, as it would encourage households to opt for smaller LDR lots in closer proximity to the urban area, rather than

subdividing more remote rural land for Rural Lifestyle lots. In turn, this would support a well-functioning urban environment and help reduce the loss of productive agricultural land.

5 Residential Supply context

In this section we provide an estimate of the potential residential development capacity enabled in the Taupō District Plan. That capacity is then compared to the demand assessed in the previous section, to provide an understanding of the likely future demand-supply balance in the District.

There have been several assessments of Taupō residential land supply undertaken in recent years, which is perhaps a reflection of the dynamic nature of the Taupō market, and the challenge of keeping up with reasonably rapid recent growth. In this section we refer to:

- ❖ Taupō District Council: the council has completed its own assessment of capacity to inform Taupō FDS, and to support other planning.
- ❖ PC42 economic research of Property Economics, which reviewed options for providing for rural lifestyle lots in Taupō.

5.1 Residential capacity

TDC has completed an estimation of the potential capacity in the residential land within District to inform both the Taupō FDS and the ongoing Proposed District Plan review processes.

TDC's assessment was completed for the year 2024 and evaluated both plan-enabled and infrastructure-ready capacity. Based on this assessment, the existing operative District Plan zoned land, together with the proposed growth areas, would be sufficient to meet medium growth demand, but not high growth demand. However, when considered spatially across the district, most locations would experience a shortfall in capacity (as shown in Figure 3.2 above).

Further, the capacity identified is plan enabled and infrastructure-ready, and has not been assessed to meet all of the standard requirements of the NPS-UD. The capacity in the TDC assessment is theoretical in nature i.e. in theory the maximum that can be developed within the planning framework. It is very likely that a large share of the capacity will not be readily developable to meet the demands of the community.

This situation is acknowledged in the NPS-UD, which requires councils to assess capacity in terms of being market feasible and reasonably realisable. Councils should not simply rely on theoretical capacity metrics when assessing sufficiency for the NPS-UD. We have conducted capacity assessments for other councils in New Zealand to meet the requirements of the NPS-UD and have also reviewed assessments undertaken by other economists. All of that research shows that a large share of the theoretical (plan enabled capacity) will not be developable.

We acknowledge that subdivision density has been increasing, both in greenfield and urban infill which may mean more of the theoretical plan enabled capacity may be developable in the future. While it is beyond the scope of this report to estimate capacity, we consider that it is likely that 50-70% of the capacity suggested in the TDC assessment will not be realisable. Therefore, we consider that it may be debatable whether there is sufficient capacity across the district when assessed as a whole. However, it is clear that there is insufficient capacity within certain locations and market segments (as shown in Figure 3.2 and the following discussion).

Finally, FDS notes that 15-20% of future demand is expected to be met through intensification, with the remaining 80-85% requiring greenfield development. Accordingly, we consider that the provision of development capacity should broadly reflect this same distribution and that provision for intensification within existing urban-zoned land should not be relied upon to meet demand for greenfield or lower-density housing.

5.2 Low Density residential capacity

TDC capacity assessment provides some detail on the nature of the remaining available capacity in the LDR. We have extracted the data from the areas that are zoned LDR and have established that Council's assessment shows limited supply of capacity.

In 2024, according to council capacity model estimates there was a supply for 16 lots within the zoned areas of Taupō (Tui Uno and Mapara Estate). There are also 25 lots in Kinloch (Oakdale Downs and The Poplars). This means a total supply of less 41 lots in the existing zoned LDR land.

Figure 5.1: Taupō vacant remaining LDR capacity (2025 – TDC Capacity Model)

LDR Theoretical capacity (Plan Enabled and Infrastructure-Ready)		TDC Expectation
Taupo		
Clearwater	Completed	1990
Acacia Bay	Completed	2010
Tui Uno	5	2020
Mapara Estate	11	2020
Taupo Short-Medium Term	16	
Kinloch		
Oakdale Downs	13	2020
The Poplars	12	2020
Kinloch Short-Medium Term	25	
Total Short-Medium Term	41	
Taupo		
Huka Falls 8A16	60	2030
Taupo Long Term	76	
Kinloch		
The Terraces	56	2030
Kinloch Long Term	81	
Total Long Term	157	

There is potential for longer term supply if zoning was changed, of 60 lots in Taupō (Huka Falls 8A16) and 56 lots in Kinloch (The Terraces), which is a total of 116 lots. This means a supply in the long term of 76 lots in Taupō (i.e. 56+16) and 81 in Kinloch (i.e. 56+25), and a total in the District of 157. We understand that there are constraints on the development and zoning of this longer term supply, which suggests that this capacity may not be readily developable.

We also understand that the Brodie Block in Acacia Bay, which is currently zoned GRZ (PREC1 NEWRZ), future subdivision might include a portion of lots at a density more comparable to the LDR zone due to infrastructure constraints in the area.³⁵ However, this possibility is not addressed in the PC44 Section 32 report.

Finally, we acknowledge that there may be other potential for infill in the LDR if PC44 building footprint of 10% is adopted. However, no data has been provided by TDC in the capacity assessment on this aspect of the proposed.

While it is beyond the scope of our research to undertake a detailed capacity assessment, we have extracted parcel data for the LDR-zoned areas in the district³⁶ and, based purely on land area, estimate that there could be capacity for around 30 additional lots through further subdivision. However, we acknowledge that the location of existing dwellings and other real-world site characteristics may make further subdivision impractical in some cases. In the absence of detailed capacity data from TDC, the following assessment conservatively adopts a notional infill capacity of 30 lots.

We note that this capacity represents theoretical capacity, and that a proportion of it will likely not be developable. Furthermore, some of the capacity identified in the TDC assessment will already have been taken up, given the number of consents issued in recent years. Therefore, this capacity should be viewed as an upper limit of potential supply, with achievable supply likely to be lower.

Figure 5.2 shows the demand projections drawn directly from the TDC PC44 assessment, which indicate 137 lots in the medium term and 413 lots in the long term. Consistent with FDS, we have applied a competitiveness margin of 20% in the medium term and 15% in the long term to derive a baseline minimum requirement of 164 lots in the medium term and 482 lots in the long term. Next the TDC theoretical capacity for the currently zoned land is 71 lots in the medium term (i.e. 41 vacant live zoned and 30 infill) and 187 lots in the long term (i.e. 41 vacant live zoned, 30 infill, and 116 planned to be zoned in future). This assumes all current supply, future growth areas are zoned and all infill occurs, which is optimistic and unlikely to occur. This indicates a shortfall of 93 lots in the medium term and 295 lots in the long term. It also shows that, even if the lower demand assumptions in the

³⁵ Potentially providing 20 to 50 LDR sized lots.

³⁶ Corelogic (2026) Property Guru - LDR parcels.

PC44 economic memo are adopted there is only enough supply for 4 years and there would be a shortfall by 2029 at the latest.

Figure 5.2: Taupō LDR Situation – TDC demand (Constrained) and Supply (Theoretical)

Taupō LDR Situation	Medium Term	Long Term
Demand (PC44)	137	413
plus Competitiveness Margin	164	482
Supply (Theoretical)	71	187
Shortfall	-93	-295

However, we consider it very likely that demand for LDR is higher, due to wider market for this zone, latent demand and the constrained supply in Taupō which has artificially suppressed activity in this segment of the market. In addition, some of the identified theoretical capacity is unlikely to be developable in practice, and therefore reliance on full realisation of this capacity would be overly optimistic. Therefore, the shortfall is likely to be much higher than reported in Figure 5.2.

Figure 5.3 provides an understanding of the situation if demand was not artificially constrained and if a portion of theoretical capacity was not developable. It shows demand for LDR lots of 449 in the medium term and 1,131 lots in the long term. Including the competitiveness margin, the baseline minimum requirement is 449 lots in the medium term and 1,320 lots in the long term. Assuming, conservatively, that 70% of theoretical capacity is market-realizable, currently zoned capacity equates to 50 lots in the medium term and 131 lots in the long term. This indicates a shortfall of 399 lots in the medium term and 1,189 lots in the long term. It also shows that there is only enough supply for just over 1 year and there would be a shortfall by 2027 at the latest.

Figure 5.3: Taupō LDR Situation – Demand (Unconstrained) and Supply (Realisable)

Taupō LDR Situation	Medium Term	Long Term
Demand (Unconstrained)	374	1,131
plus Competitiveness Margin	449	1320
Supply (Realisable)	50	131
Shortfall	-399	-1,189

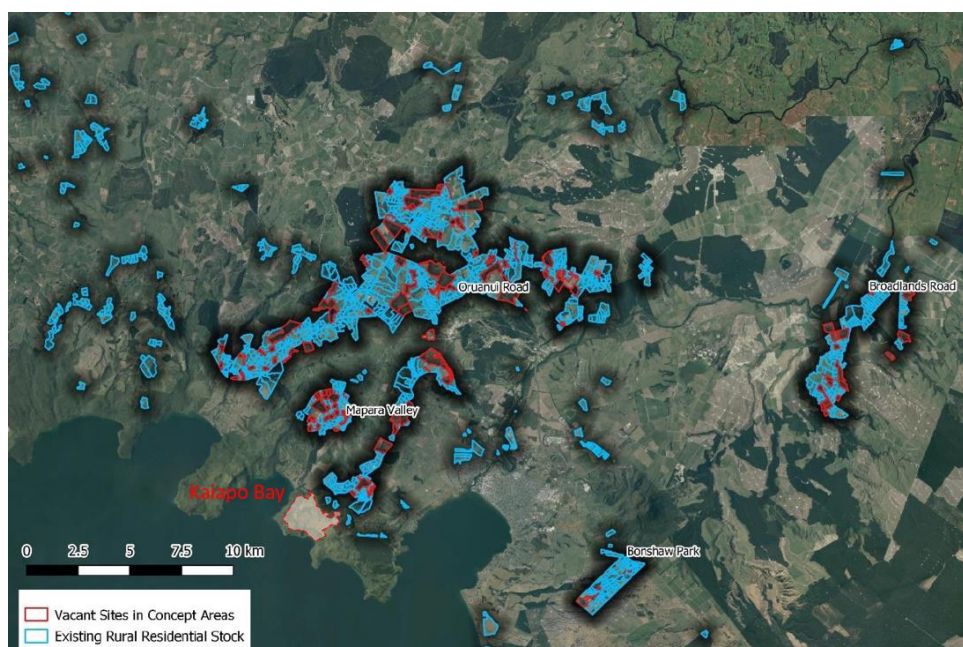
We consider there is likely to be a shortfall in LDR land, and that the current planning framework will constrain demand and push more households toward Rural Lifestyle lots. This is an inefficient outcome, resulting in greater loss of productive rural land and poorer urban form outcomes that do not support a well-functioning urban environment.

5.3 Rural Lifestyle capacity

In 2019 TDC commissioned a study of rural lifestyle demand and supply, which was presented in support of the PC42.³⁷ That assessment shows that six years ago that there was less than 90 vacant lots remaining and most of these were to the north of Taupō around Oruanui Road (Figure 5.4).

The assessment shows that most of the available rural lifestyle land that is close to Taupō has already been subdivided and there is a need to provide for more capacity to meet the demand. In 2019, even based on the old demand projections, there was a real risk of rural lifestyle demand being accommodated in rural areas via larger lot subdivisions. The research found that there would be benefits associated with focusing rural subdivision into smaller lots, which would minimise the loss of rural productive land and generate a range of other benefits.

Figure 5.4: Rural Lifestyle Areas Capacity Assessment 2019



The assessment considered two options, Scenario A and Scenario B. Our understanding is that the second scenario has been adopted as the preferred option in PC42. This option would allow landholders to subdivide down to 2ha per lot within the six proposed Rural Lifestyle zones. The 2019 assessment estimated that there would be capacity for 1,596 lots if all of the land were to be subdivided to the maximum.

The assessment does acknowledge that there can be constraints and suitability issues which mean that some locations will be preferable than others. The implications of that are that it is expected that much of the supply may not be developable. Moreover, some of the land proposed for zoning was not

³⁷ Property Economics (2019) Taupō Rural Lifestyle Economic Assessment

identified as Rural Lifestyle zoned land at the time PC42 was adopted. In addition, since the completion of that report, part of the identified capacity is likely to have been developed and may no longer be available. Given the level of demand and consents, it is likely that at least 10% of the lots would have been developed.

Furthermore as shown in Figure 3.4, the adopted extent of Rural Lifestyle zone is smaller than was assessed in the PC42 capacity assessment. Visually, it appears that around a third of the proposed land area was not adopted as Rural Lifestyle zone.

While there is no new capacity research from TDC for the Rural Lifestyle zone, we consider that the combination of the development since the 2019 assessment and the reduction in zoning extent would suggest that capacity is 40% lower than previously assessed. Therefore, indicatively there may be a capacity of around 1,000 lots remaining in the Rural Lifestyle zone.

Figure 5.5 shows the demand from PC42 updated for the new FDS projections, which indicate 609 lots in the medium term and 1,826 lots in the long term.³⁸ Next the modified theoretical capacity from PC42 of 1,000. This indicates sufficient capacity in the medium term and shortfall of 826 lots in the long term.

Figure 5.5: Taupō Rural Lifestyle Situation – Demand (Updated to FDS) and Supply (Theoretical)

Taupo Rural Lifestyle Situation	Medium Term	Long Term
Demand (PC42 Updated to FDS)	609	1,826
Supply (Theoretical)	1,000	1,000
Shortfall	391	-826

However, some of the identified theoretical capacity is unlikely to be developable in practice, and therefore reliance on full realisation of this capacity would be overly optimistic. Therefore, the shortfall is likely to be much higher than reported in Figure 5.5.

We consider there is likely to be a shortfall in Rural Lifestyle capacity, resulting in pressure for additional LDR capacity or further subdivision of productive rural land. From an economic perspective, it would be more efficient to limit rural lifestyle subdivision, as this would help protect productive rural land and encourage households to locate closer to the urban edge, contributing to a more well-functioning urban environment.

5.4 Findings – potential supply

Overall, the available evidence indicates that Taupō is likely to face a significant shortfall in both LDR and Rural Lifestyle capacity. The analysis suggests that the current planning framework is constraining

³⁸ No competitiveness margin is included, as this is rural zone and not subject to the NPS-UD.

the supply of LDR, which is likely suppressing demand within the LDR market and potential redirecting households toward Rural Lifestyle subdivision. This would represent an inefficient outcome from both an economic and urban development perspective, as it would increase pressure for the subdivision of productive rural land and encourage more dispersed settlement patterns further from the urban area.

In our view, there is a strong economic and strategic rationale for providing additional LDR capacity within locations that are well connected to the existing urban area. This would provide greater housing choice, improve the responsiveness and competitiveness of the land market, and support a more efficient and well-functioning urban environment. It would also help reduce pressure for further fragmentation of productive rural land through Rural Lifestyle subdivision.

6 Economic activity enabled by Kaiapo Bay

In this section we assess the economic impact associated with the development that would be enabled by the development of the site, as detailed in section 2. The economic activity associated with development on the Site will change throughout the development phases, with different levels of activity supported during consenting, land development, build development and then residents spend once the development is completed.

The economic contribution is measured in terms of the direct economic activity associated with the development, the potential demands of the households that will live on the Site, and the wider role in terms of indirect and induced activities. The assessment was undertaken using a subnational Economic Linkages Model (“ELM”, see Appendix 1).³⁹

6.1 Approach

The first step in assessing the economic contribution of development that would be enabled by the Kaiapo Bay development was to estimate the direct expenditure that will occur in each phase of the development. The following data has been used for each phase to estimate the likely direct expenditure:

- ❖ Consenting and land development: We have estimated the consenting and land development costs based on industry knowledge from similar developments, and the potential developers of the Site.
- ❖ Build development: Build cost data based on the size and specification of the expected housing typologies has been used to estimate the likely construction expenditure that could occur during the build development phase. For this assessment we have conservatively assumed that the average dwelling size is 250m², built to the lower end of a high specification house, costing \$5,000/m². If houses are bigger or built to a higher specification the associated economic activity will be increase.
- ❖ Resident demands: We have detailed retail expenditure data which has been developed into a retail demand model.⁴⁰ This model provides an estimate of the quantum of demand from the new households that would live with the Kaiapo Bay area after each stage of the development is completed.

³⁹ Formative (2025) Economic Linkages Model.

⁴⁰ Formative (2025) Retail Demand Model.

Once identified, the direct expenditure impact was run through the ELM which allows the calculation of all flow-on effects associated with development on the Site. The ELM calculates three types of economic impact:

- ❖ Direct impacts are the initial changes in the economy due to an economic shock (often new expenditure). The direct GDP effect is calculated based on the value of the shock and the direct employment effect is the number of jobs created by the shock itself.
- ❖ Indirect impacts arise as the firms that initially change their output as a result of an economic shock (i.e. the direct effects), purchase required inputs from their supply chain. These business-to-business transaction changes are known as the indirect impacts.
- ❖ Induced impacts flow from the direct and indirect impacts which generate wages, salaries, and profits for the households. The changed household incomes will generate more spending on goods and services. This household-to-business interaction is called induced activity.

6.2 Economic role findings

The direct impacts associated with the development were estimated for each year, and for 65 types of spending (Figure 6.1 provides a summary). The consenting phase is estimated to cost \$500,000 and occur in 2026, which includes the developer's internal management time, expert research and planning costs. The development of the land is estimated to cost \$80 million in total and occur over a 10 year timeframe, starting in 2027.

The direct spend associated with the building activity can be expected to exceed \$400 million, which would be spread relatively evenly over a 10 year period, starting in 2028. Based on the modelled land development and build development costs it is expected that the average lot and dwelling would cost a total of \$1.8 million, which is at the upper end of Taupō new builds, but comparable to the price point of similar sized properties in Taupō.⁴¹ Applying a market based (rather than a higher premium price estimate) sale price makes the impacts assessed here conservative.

Finally, the direct impacts associated with the households that will live in the new dwellings are expected to spend a total of \$57 million in the local economy by 2038, with retail spending reach almost \$9 million per annum by 2038.

⁴¹ CoreLogic (2025) Property Guru - House Price Data.

Figure 6.1: Direct expenditure arising from development of the Site (\$m)

Development phase	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Consenting	\$0.5												
Land Development		\$8.2	\$8.2	\$8.0	\$8.0	\$8.0	\$8.0	\$8.0	\$8.0	\$8.0	\$8.0		
Build Development			\$41.3	\$41.3	\$40.0	\$40.0	\$40.0	\$40.0	\$40.0	\$40.0	\$40.0	\$40.0	
Residents			\$0.84	\$1.70	\$2.55	\$3.42	\$4.30	\$5.20	\$6.12	\$7.05	\$8.01	\$8.98	\$9.07
Total	\$0.5	\$8.2	\$50.3	\$50.9	\$50.5	\$51.4	\$52.2	\$53.2	\$54.1	\$55.0	\$56.0	\$49.0	\$9.1

The direct expenditure that is generated by development of the Site will flow through the economy, resulting in additional economic activity, including employment, in supporting industries. These are the indirect and induced impacts. The direct, indirect and induced economic impact of the development of the Site would support:

- ❖ \$262 million in GDP and approximately 3,638 employment years⁴² over the development period in Taupō District economy.⁴³ The peak of activity will be in 2036, with \$66.6 million in GDP in Taupō District and employment of 392 for that year.
- ❖ As the development is completed the impact will stabilise at around \$12.6 million in GDP per annum and approximately 121 jobs in Taupō District.

Figure 6.2: Economic impact arising from development of the Site

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Value Added (GDP, \$m)													
Taupo District	\$0.4	\$4.8	\$22.8	\$23.4	\$23.5	\$24.2	\$24.9	\$25.6	\$26.3	\$27.1	\$27.8	\$24.0	\$7.2
Rest of NZ	\$0.3	\$4.9	\$35.3	\$35.7	\$35.2	\$35.8	\$36.3	\$36.8	\$37.3	\$37.9	\$38.4	\$34.2	\$5.3
Total	\$0.7	\$9.7	\$58.1	\$59.0	\$58.8	\$59.9	\$61.2	\$62.4	\$63.6	\$64.9	\$66.2	\$58.2	\$12.6
Employment													
Taupo District	4	58	306	315	319	331	343	355	367	379	392	348	121
Rest of NZ	2	42	322	325	321	325	329	333	338	342	346	310	43
Total	7	100	628	641	640	656	672	688	704	721	738	659	164

The development of the Site that would be enabled by the submitters request would produce positive benefits for the local community, by providing additional housing supply, attracting new residents, investment and skills from outside of Taupō and the generation of employment and economic benefits for the local community. Notwithstanding some potential transfer effects, the Taupō community and economy will benefit from additional economic activity that development of Kaiapo Bay will generate in the local area.

⁴² Total Employment Count, which is equal to Count of employment and working proprietors.

⁴³ The employment recorded in this assessment is measured in terms of Total Employment Count (TEC), which includes part-time, casual, and full-time positions. While this type of measure of employment is the standard used in New Zealand for economic data and economic modelling, there are some instances where Full-Time-Equivalent (FTE) metric is used. For the purposes of this assessment we have estimated that the development will generate approximately 3,401 FTEs between 2022 and 2035 in the Taupō District economy.

7 Wider economic benefits

There is likely to be other economic benefits associated with the development of the Site that will contribute to the community and economy. In this section we provide a brief qualitative discussion of these benefits.

7.1 Rural production

A key issue associated with the development of any rural land for residential activity is the impacts on the productive use of that rural land, whether it be highly productive land (in NPS-HPL terms) or not. Any such development is likely to some, or in this case all, of the land will be lost to productive agricultural uses, which will mean that rural economic activity, GDP and jobs will be negatively impacted.

All district councils in New Zealand include policies and rules in their District Plans to manage the subdivision of land in rural areas, as a core matter of economic and environmental concern. That inclusion is even more important because the NPS-HPL now requires Councils to consider a range of outcomes from the subdivision of highly productive rural land.

The economic rationale that underpins the need for policies about rural subdivision is undisputed. In the absence of policies managing rural subdivision it would be very likely that decisions by individual landholders to subdivide in the rural area would result in a “market failure”. Broadly, the market is likely to choose a subdivision pattern (and quantum) which would result in a sub-optimal outcome for the community, and the rural environment.

Councils generally pair the management of large lot rural subdivision with rules that enable subdivision of smaller lots (like LDR). These smaller lots tend to be in locations where the negative impacts are smaller (i.e. they avoid highly productive soils, are located where infrastructure is available) and in close proximity to urban areas (i.e. peri-urban).

This pairing of the policy acknowledges that there are also benefits from allowing more residents to live within the District, especially if they are located near other existing development areas. There are benefits from sharing the costs of community services among more people (i.e. council services) and the community will benefit from having people living in proximity to these services. This means lower social costs in terms of lost rural production and better outcomes in terms of sharing the costs of servicing the community over a large group.

For this report we provide an indicative quantification of the potential values that would be lost if the Site is allowed to develop as requested, which can then be used to understand the maximum potential impact of the development. We make three important points before we present our results:

- ❖ The Site's soils are not highly productive (Figure 3.1), with most of the land having moderate to severe limitations to use for pasture or forests (LUC class 6 or worse)⁴⁴. We understand that previous owners of the land used the land (unprofitably) for cattle grazing, and since the current owners purchased the Site production has been minimal. Also the current owner notes that the top soil has shallow depth, low quality, and holds little moisture, which means that it has limited productive uses.
- ❖ The agricultural industry is an important, but small part of the overall economy in Taupō. In 2020, rural production industries generated \$250 million in GDP⁴⁵ and 2,840 jobs⁴⁶, which is around 10% of the Taupō economy.
- ❖ Some of the residential demand that would establish on the Site if the submission request is successful would have been accommodated elsewhere in the District in the absence of the development enabled by the request. Based on the LDR zoning requested, demand transferred to the Site would have been accommodated in similar (i.e. rural lifestyle) lots, with potentially a larger average lot size, and on better quality soils than the Site. Therefore, without development of the Site there would have been a greater loss of rural land and rural production that is likely to occur as a result of the submission request. In this context, enablement of residential activity on the Site as requested may result in a net gain in rural production, as compared to the alternative.

For this assessment we have examined the Sheep and Beef Farm Survey for Northland-Waikato-Bay of Plenty. That survey shows that the average stock farming of Class 3 has a stocking rate of 8 units/ha, which generates \$772/ha of gross revenue and less than \$61 in farm surplus.⁴⁷

If this type of productive stock farming occurred on the Site, which the soil quality indicates is unlikely, then at average carrying rates the Site would generate annual revenue of under \$260,000, supporting 1.5 workers. Once on-farm costs were covered, the land would generate a surplus of less than \$20,000, which is less than the TDC rates (\$21,200 per annum⁴⁸). That indicates that the profit from undertaking productive stock farming could be negative, or at best very small. When compared to the value of the land the profit would represent a return of less than 0.3% which is not a commercially viable return.⁴⁹

Even if this land was used as a farm and productivity was achievable on the Site, it would provide negligible economic benefit for either the owner or the local economy. In practice that level of

⁴⁴ Landcare Research New Zealand (2021) NZLRI Land Use Capability.

⁴⁵ Ministry of Business Innovation and Employment (2021) Modelled Territorial Authority Gross Domestic Product.

⁴⁶ Formative (2021) Business and Employment Database – Total Employment Count which includes both working proprietors and employees.

⁴⁷ Beef and Lamb New Zealand (2022) Economic Service Sheep & Beef Farm Survey Northland/Waikato/Bay of Plenty 2022-23 Forecast and Quintile Analysis of Final 2020-21 Survey data.

⁴⁸ Taupō District Council (2022) Property Rates Information 2022/23 – 15, 37 and 40 Kaiapo Road.

⁴⁹ Taupō District Council (2022) Property Current Rating Valuation – 15, 37 and 40 Kaiapo Road.

productivity would not be achievable, given the Site's soils, and likely operational constraints arising from reverse sensitivity concerns.

Given the existing and historic non-productive use of the land, we conclude that residential use of the Site is a more appropriate and efficient use of the Site than a farm, particularly given the good locational attributes of the Site for residential activity. Moreover, we consider that providing an equivalent number of 330 lots in either the Rural Lifestyle zone or Rural Environment elsewhere would potentially require the use of at least twice as much land, and that land would be likely to have a better soil quality and productive use than the Site. For example the much of the land in the proposed Rural Lifestyle zone immediately east of Taupō (Tukairangi Road) is predominantly LUC classes 3 and 4, which has more potential for agricultural productive use than the Site.

Therefore, not only is there limited loss of productive agricultural activity by enabling residential development on the Site, but it can be expected that the development would reduce the need for subdivision of other more productive land elsewhere in the District. Also we note that there are a range of potential constraints to subdivision of rural lifestyle in the rest of the District, which is covered in the planning assessment, such as geothermal fields, Māori land, access requirements, highly productive land, etc. The overall outcome is likely to be positive, with higher rural production in the District if subdivision is focussed on the Site.

Also, the change of land use may have positive environmental benefits from a reduction in the release of nitrogen from the area and improvement in ecology from planting of native trees.

7.2 Infrastructure

While we have not assessed the relative infrastructure costs associated with servicing development on the Site we consider that it is likely that there will be economic benefits from the fact that the Site is adjacent to the existing Acacia Bay settlement, making infrastructure provision easier and cheaper than to more remote developments. This outcome would improve the productivity of the economy, by reducing the amount of resources needed to accommodate new growth.

7.3 Transport

Because the Site is close to both Acacia Bay and urban Taupō, the wide range of services and retail provided in those locations would be more easily accessed from the Site, than from more remote developments, reducing transport costs and emissions. Enabling housing supply on the Site would result in better transport outcomes and associated economic benefits relative to other rural locations. We acknowledge that there is limited public transport to the area and there is congestion during peak times on the main bridge between Taupo and the bays. However, allowing more growth in this location could stimulate the provision of public transport and potential improvements to the local roading network.

While we have not assessed the emissions outcomes, it may be that allowing lifestyle living in this location as compared to the other locations which are further from Taupō would result in lower greenhouse gas emissions.

7.4 Well-functioning Urban Environment

We consider that development of the Site would contribute to a well-functioning urban environment. The Site is an appropriate place in which to enable low density residential growth because it has low productive use and is close to existing urban boundary. This location is an ideal place for a neighbourhood with a range of lot sizes, including low density and lifestyle activity, to establish.

Development of the Site can be expected to positively impact local businesses in Acacia Bay and Taupō and contribute to the vibrancy and efficient functioning of the Acacia Bay and Taupō centres, albeit to a minor degree given the small size of the development relative to the Taupō population. The additional households that will live within the Site can be expected to shop and visit services within the local area, which will improve the viability of existing business and also potentially attract more businesses and community services to the area. This additional activity can be expected to improve the level of amenity in Acacia Bay, which will positively contribute to a well-functioning urban environment.

7.5 Taupō competitive advantage

As noted in research for TDC,⁵⁰ there is potential for Taupō to generate a comparative advantage relative to other districts by providing an attractive rural lifestyle product that encourages people to move to Taupō. This comparative advantage can be attained through lower prices for rural lifestyle and LDR land (by avoiding a shortage of supply), providing high quality product with unique selling points, and providing the type of rural lifestyle property that there is demand for.

The submitters request would, in our opinion, be consistent with all of those actions. As discussed above the Site and residential lots it is envisaged to accommodate, is relatively unique within Taupō, being large lots in close proximity to central Taupō and the edge of the lake, with good views. There is a high likelihood that the Site will be very attractive to non-Taupō residents, and potentially more affluent buyers, and the relocation of such people to Taupō will have positive effects on the Taupō economy.

⁵⁰ Property Economics (2019) Taupō Rural Lifestyle Economic Assessment, page 23

7.6 Local Convenience needs and Commercial Centres

Taking the resident population in Kaiapo Bay, the existing centres in the wider urban environment into consideration and similar small centres, our assessment indicates that there is limited potential or need for a commercial presence at Kaiapo Bay.

A small store might be viable, although may struggle for viability as a standalone entity, particularly in the long off-peak periods. Alternatively a small retail presence could be provided within a predominantly non-retail business, such as a café, with the benefit of that being a more multi-dimensional offer that has broader appeal than for example a single dairy.

There are several examples of businesses such as this (either as multiple or single businesses) that serve small catchments, but are supplemented by seasonal tourist populations, and are the only commercial presence in the town. Examples of these include:

- ❖ Hāwea Store and Kitchen, Hāwea:⁵¹ a small retail presence focussing on fresh local produce, and a café. The local catchment is around 800 households.
- ❖ Sand Dunz Beach Café, Muriwai⁵²: a café/takeaways/food and drink outlet servicing a town of 550 households, but a large day visitor market associated with the beach.
- ❖ Mcleod Bay Café and Takeaways, Whangārei Heads: servicing a town of around 500 households, and a popular tourist destination including campground.
- ❖ Waikuku Beach General Store: a small dairy and takeaways outlet at Waikuku Beach, in Waimakariri District, home to 550 households.
- ❖ Kaiteriteri: On the Spot store, two restaurants, servicing 150 resident households but a large campground and holiday home market. Restaurants are subject to seasonal opening times and have links to hotels and the campground.
- ❖ Puhoi: a general store and historic pub which functions as a destination for day trips from Auckland and people travelling north from Auckland. Puhoi is home to only around 150 households, but is well established as a destination just off State Highway 1.

A commercial entity at Kaiapo Bay could become popular as a destination trip from Taupō, and would likely depend to a large degree on such custom for its viability, due to the limited size and seasonality of the local population in the area west of Acacia Bay. It is difficult to predict the actual commercial viability of any such establishment, and that is not an objective of this assessment. The success of a retail and/or hospitality business at Kaiapo Bay would be heavily influenced by its design, branding,

⁵¹ <https://www.haweastoreandkitchen.nz/>

⁵² <https://www.facebook.com/sanddunzbeachcafe/>

marketing and becoming known as a destination to people living or staying outside of the local catchment, as well as by exactly what format is pursued.

Co-location with any other non-residential activity that attracts regular custom, such as a childcare/ECE or school would be of benefit to a Kaiapo Bay commercial activity, but would be unlikely to materially increase the scale of the commercial opportunity at Kaiapo Bay, which is inherently limited by the relatively small local population and need to attract an inflow of custom from outside the catchment. Ultimately any commercial presence pursued at Kaiapo Bay would be at the risk of the developer/operator.

Notwithstanding that destination potential, the average neighbourhood centre provides a good basis to use to understand how much floorspace might be sustainable in a commercial entity at Kaiapo Bay. The catchment households indicate that by 2038 a neighbourhood commercial node at Kaiapo Bay might indicatively sustain somewhere around 170-300m² of commercial GFA (Figure 7.1), or the equivalent of about one small dairy.

Figure 7.1: Commercial floorspace sustainable at Kaiapo Bay

	GFA per household	Households	GFA supported
Low	0.23	745	170
High	0.40	745	300

The proposal of a new commercial node usually raises concerns as to the potential for retail distribution effects on existing centres in the vicinity of the new node. The assessment above has sought to establish the sustainable floorspace at Kaiapo Bay such as would be sustained by the local population, and has concluded that some net inflow of spending would likely be required to support even a small business. That inflow would naturally be diverted away from comparable existing businesses in other locations, and so would generate some retail distribution effects on the centres that trade competitors are in.

However, if the Kaiapo Bay development accommodates only a single small business (e.g. hospitality with a general store function), it is highly unlikely that it would generate any more than minor effects on any other centre in Taupō. Instead, trade directed to Kaiapo Bay would be diverted from multiple locations across Taupō, and therefore adverse effects would be widely spread, and therefore would fall far short of a level of concern in RMA terms.

The only possible exception to that is the potential effects on the Acacia Bay shops, which, as the nearest commercial presence, and with some similarity to what might be pursued at Kaiapo Bay (including being something of a destination rather than relying on local patronage), would be likely to experience some trade competition effects.

Nevertheless, the scale of any activity proposed at Kaiapo Bay should be limited and the type of activity distinguished from Acacia Bay's dairy and brasserie in order to minimise the likelihood of trade competition effects. Finally, a core concern in the District Plan is potential effects on the Taupō Town Centre Environment, and those by any measure would be negligible, for a small development such as we have recommended in this assessment.

7.7 Findings – Wider Economic Benefits

In summary, we consider that there are likely to be economic benefits associated with this development, such minimising loss of rural production, promoting efficient use of infrastructure, mitigating transport costs associated with residential development, and contribute to a well-functioning urban environment. These benefits should be considered when evaluating the merits of the submitters request.

8 Outcomes

Residential development within the Kaiapo Bay area would produce a number of positive benefits for the local community. Kaiapo Bay would enable new residents to come and live in the District, and would enable for a residential product (larger lots) that is undersupplied in Taupō but gaining popularity in both Taupō and New Zealand. The development enabled would support local jobs during the construction phase, but also on an ongoing basis in Taupō's shops and commercial businesses.

Under the existing planning framework, even with the additional supply proposed to be enabled by the District Plan review, there is a very high possibility of a shortage of larger residential lots in the coming decade in Taupō, especially for LDR. To avoid that risk, there is a need for more residential land to be zoned to meet demand. We consider that at a minimum that there is a need for a further 399 lots in the coming ten years (medium term) and 1,189 in the coming 30 years (long term).

Taupo LDR Situation	Medium Term	Long Term
Demand (Unconstrained)	374	1,131
plus Competitiveness Margin	449	1320
Supply (Realisable)	50	131
Shortfall	-399	-1,189

We would support providing more capacity in the LDR than shown in the table above, as this would encourage some households that may have chosen Rural Lifestyle lots to instead live in LDR lots. This would be more efficient than the alternative of zoning more rural land for Rural Lifestyle lots, both in terms of mainlining rural production and contributing to well-functioning urban environment. Furthermore, the evidence suggests there is also likely to be a shortfall in Rural Lifestyle lots, which will increase pressure for further rural subdivision if additional action is not taken by Council.

The Kaiapo Site is an appropriate location to enable low density residential growth because it is close to Taupō town, is adjacent to recently established low-density residential properties and is the last undeveloped/non-urban, lakefront land with a view in close proximity to Taupō Town. The location of the Site, and the proposal assessed in this report, therefore contributes to a well-functioning urban environment by providing residential properties in a location that is well connected to the town centre, which will also have positive effects in reducing greenhouse gas emissions compared to alternative low-density sites further way.

We have assessed a development scenario for the Site that would provide for around 320 low-density residential lots and dwellings on the Site. That development yield is realistic and consistent with the landowners current development intentions, and suggests that development of the Site would generate approximately \$540 million in direct expenditure by 2038. This would support total economic activity of \$262 million in GDP between 2026 and 2038 in the Taupō District economy, and

approximately 3,600 jobs over the 12 years. Of these jobs nearly 60% would be related to land development and construction, with the rest employed by other businesses to support the development activity enabled. Notwithstanding the likely transfer effects, the Taupō community and economy will benefit from additional economic activity that Kaiapo Bay will generate in the local area.

The proposal would support efficient use of infrastructure, particularly relative to alternative, smaller and less accessible greenfields locations which require new networks to be constructed. Further, agricultural productivity on the Site is and will remain very limited, with poor quality soils yielding low (or negative) commercial returns, and being of little value for agriculture, it also reduces potential development occurring in locations with constraints (geothermal, highly productive land, etc). Residential use of the Site would also reduce agricultural-runoff into the lake, benefiting water quality in Lake Taupō and the Waikato River. These benefits should all be considered when assessing the merits of the submitters request.

Appendix 1 Economic-Linkages-Model

The Economic Linkages Model (ELM) is a proprietary model that has been developed to quantify and measure the economic activity and relationships within the New Zealand economy. In summary, the ELM measures the flows of money and goods through the economy, at a sector and sub-national level.

The model records the interactions and relationships between actors in the economy, including businesses, households, government, exporters, and importers. At its essence, the interactions in the model describe how each industry responds to changes in the economy, which ripples out to influence a range of other outcomes (e.g. household decisions).

The ELM measures the economy using a range of standard economic metrics, which includes gross output⁵³, GDP⁵⁴, value-added, employment⁵⁵, incomes⁵⁶, consumption⁵⁷, tax⁵⁸, and trade. The model uses a subnational Input-Output Table that has been regionalised by Formative. This appendix outlines the nature of the Input-Output table, the underlying assumptions within the ELM and the key modelling steps.

A1.1 Input-Output Table

The Subnational Input-Output Table (SIOT) has been developed by Formative to provide detail on the economic linkages between sectors and geographies within New Zealand. The table has been defined to include 65 economic sectors and 39 geographies.

The 65 ‘sectors’ have been defined using standard industry classification (ANZSIC06), with each sector being defined by a grouping of industries based on cluster analysis of their supply chains and economic rationale. The 39 ‘geographies’ have been defined according to either territorial or regional authority boundaries, with more disaggregation provided where there is more economic activity (e.g. upper North Island) and aggregation where there is less economic activity (e.g. West Coast of the South Island).

The SIOT has a base year of 2019. All transactions in the table are in 2019 dollars, and all economic impacts (for instance GDP, gross output, consumption, taxes) are also in 2019 dollars. The SIOT is

⁵³ Similar to company revenue.

⁵⁴ There is a key difference between GDP and value added. The value added of a sector is measured net of taxes (for instance GST) and subsidies on products. In the GDP in the national accounts for New Zealand product taxes (minus subsidies) are recorded for the economy as a whole and includes as part of the value added.

⁵⁵ Formative uses BED measure of Total Employment Count (TEC) which includes both employment count and working proprietors.

⁵⁶ Includes salaries, wages and profits.

⁵⁷ Including household and government.

⁵⁸ Including income taxes, GST, government transfers and subsidies.

based on a national level 2013 Input-Output table released by Statistics New Zealand which has been converted to 2019 based on Statistics New Zealand national account data for 2019⁵⁹

The national level table has been regionalised using a hybrid approach. The hybrid approach of combining survey and non-survey (i.e. modelled) methods to regionalise an IO table which is considered the gold standard when an official SIOT is not available. The survey data sources used in generation of the SIOT include a range of customised datasets that Formative have purchased and developed:

- ❖ **Total Employment:** Formative maintains a detailed database of employment, by geographies and industry (Business Employment Database - BED), which records the total employment in each of 506 ANZISC06 industry classes and for Statistics New Zealand's Statistical Areas, including both employees and working proprietors.⁶⁰
- ❖ **Electronic Card Transactions:** Formative has purchased detailed electronic card transaction data from Marketview, which records the origin and destination of four retail and services spend types by the 39 geographies.⁶¹
- ❖ **Subnational Economic Data:** a range of information that provides valuable insight into the scale of economic activity that is located within each geography. This includes regional GDP, Gross Output and household income.

The above datasets have been combined along with non-survey regionalisation techniques to allocate the national economic activity into each of the geographies. The key method used to accomplish this is the Industry-Specific Flegg's Location Quotient (SFLQ)⁶². This method employs location quotients (LQ) to understand the specialisations and structure of regional economies compared to the national economy. The use of LQ's has been known to understate the amount of regional trade, however the SFLQ approach combats this by allowing for industry specific rates of cross hauling (where regions both import and export a product or service).

This approach has been shown to create accurate estimations of regional multipliers and outperform other non-survey approaches⁶³. The SFLQ method was supplemented by a gravity model to help inform regional flows. The SIOT has been calibrated to better match the relationships in the national Input-Output table and has been balanced using an iterative proportional fitting procedure to ensure that the table reflects regional gross out and input. The resulting SIOT table provides a modelled

⁵⁹ This includes gross output by sector, and national subsidies, exports, imports, change in inventories, gross fixed capital formation, consumption spending (includes households, local and central government and non-profit expenditure), compensation of employees, taxes, consumption of fixed capital and operating surplus.

⁶⁰ Formative (2021) Business and Employment Database – Employment Count, Working Proprietors, Total Employment.

⁶¹ Marketview (2021) Card transaction data – four spend types and 39 geographies for the 2019 calendar year.

⁶² Julia Kowalewski (2015) Regionalization of National Input-Output Tables: Empirical Evidence on the Use of the FLQ Formula, *Regional Studies*, 49:2, 240-250.

⁶³ Anthony T. Flegg, Leonardo J. Mastronardi & Carlos A. Romero (2016) Evaluating the FLQ and AFLQ formulae for estimating regional input coefficients: empirical evidence for the province of Córdoba, Argentina, *Economic Systems Research*, 28:1, 21-37.; Zhao, X., Choi, SG. On the regionalization of input-output tables with an industry-specific location quotient. *Ann Reg Sci* 54, 901–926 (2015).

estimate of the relationships within the economy. This means that the economic linkages between sector-geography combinations as of 2019 are captured in the SIOT.

The ELM uses the SIOT to estimate the potential economic activity that can be expected from changes in the economy. All economic models apply assumptions because an economy and community is too complex to replicate exactly in a mathematical system. The structure of the ELM utilises the following assumptions:

- ❖ Leontief production function, which assume linear relationships between the production and inputs. This means change in the output for an industry will translate into a proportional change in demands for inputs.
- ❖ No supply constraints, which assumes that businesses can source sufficient resources (labour, capital, land, etc) to meet new demands.
- ❖ Constant returns to scale, which means that there are no economics of scale or diminishing returns in the model.
- ❖ Static prices, which assumes that prices remain at 2019 values. The model does not account for substitution effect or dynamic feedback from changes in demand and prices.

A1.2 Key Modelling Steps

The first step in the ELM is to establish the direct economic activity that will be generated or influenced by the proposed policy, investment, or activity. This estimation of the direct economic activity is generally conducted using financial information or developed via a first principles understanding of how businesses or households may change their behaviour or be impacted as a result of the proposed policy, investment or activity.

The next step is to map this activity into the 65 economic sectors and 39 geographies. In most cases the direct economic activity will occur across a range of economic sectors, commonly this can be drawn from either operational or capital budgets. Similarly, in most cases the direct economic activity will accrue across multiple geographies. Therefore, the activity must be mapped into to each geography to ensure that the modelling reflects likely pattern of activity.

Finally, the mapped activity is then fed into the ELM which measures the additional economic activity that can be expected to occur within the economy as a result of the new activity. In summary, other businesses and households in the community will respond to the changes in the economy.

There are three types of economic impact the ELM calculates, direct, indirect, and induced:

- ❖ Direct impacts are the initial changes in the economy due to an economic shock (often new expenditure). The direct GDP effect is calculated based on the value of the shock and the direct employment effect is the number of jobs created by the shock itself.
- ❖ Indirect impacts arise as the firms that initially change their output as a result of an economic shock (i.e. the direct effects), purchase required inputs from their supply chain. These business-to-business transaction changes are known as the indirect impacts.
- ❖ Induced impacts flow from the direct and indirect impacts which generate wages, salaries, and profits for the households. The changed household incomes will generate more spending on goods and services. This household-to-business interaction is called induced activity.

The ELM quantifies the economic activity in each geography and sector, which includes the direct, indirect, and induced activity. The associated employment impacts are calculated assuming constant productivity – that is, each sector-geography combination produces the same amount of output per employee.

ARCHAEOLOGICAL ASSESSMENT
PROPOSED RESIDENTIAL SUBDIVISION
DEVELOPMENT
WITHIN
LOT 1 DP 410435 & LOT 2 DP 337255
37, 40 KAIAPO ROAD, TAUPO

Prepared by

KEN PHILLIPS (MA HONS)

FEBRUARY 2025

ARCHAEOLOGY B.O.P.

HERITAGE CONSULTANTS

P O Box 13228

TAURANGA 3141

Mobile: 027 276 9919

Email: KJS.Phillips@xtra.co.nz

INTRODUCTION

This archaeological survey and report were commissioned by Cheal Consultants, on behalf of the land owner, in order to determine if archaeological sites are affected by the proposed low density residential subdivision development of a 324 hectare property located at 37 & 40 Kaiapo Road, Taupo (Lot 1 DP 410435, Lot 2 DP 337255). The development will involve earthwork including, but not limited to, the construction of internal roading, installation of utilities and the establishment of approximately 300 house sites and associated landscaping. The proposed development will be completed in stages over an extended period of 10 years or more.

There are two recorded archaeological sites (T18/86 & 116 pits) within the property and a further 12 recorded sites within neighboring reserve land to the south, east and west of the property. Contouring of the property for cropping has likely destroyed the two recorded sites, and significantly reduced the likelihood of unrecorded subsurface archaeological sites surviving within land affected by the proposed development.

This report has been prepared as part of the required assessment of effects accompanying a resource consent application under the Resource Management Act 1991 (RMA) and to identify any requirements under the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA). Recommendations are made in accordance with statutory requirements.



Figure 1. Topographic map showing the approximate location of the property.



Figure 2. Recent aerial photo showing the location, extent and current land use within the property (outlined yellow).

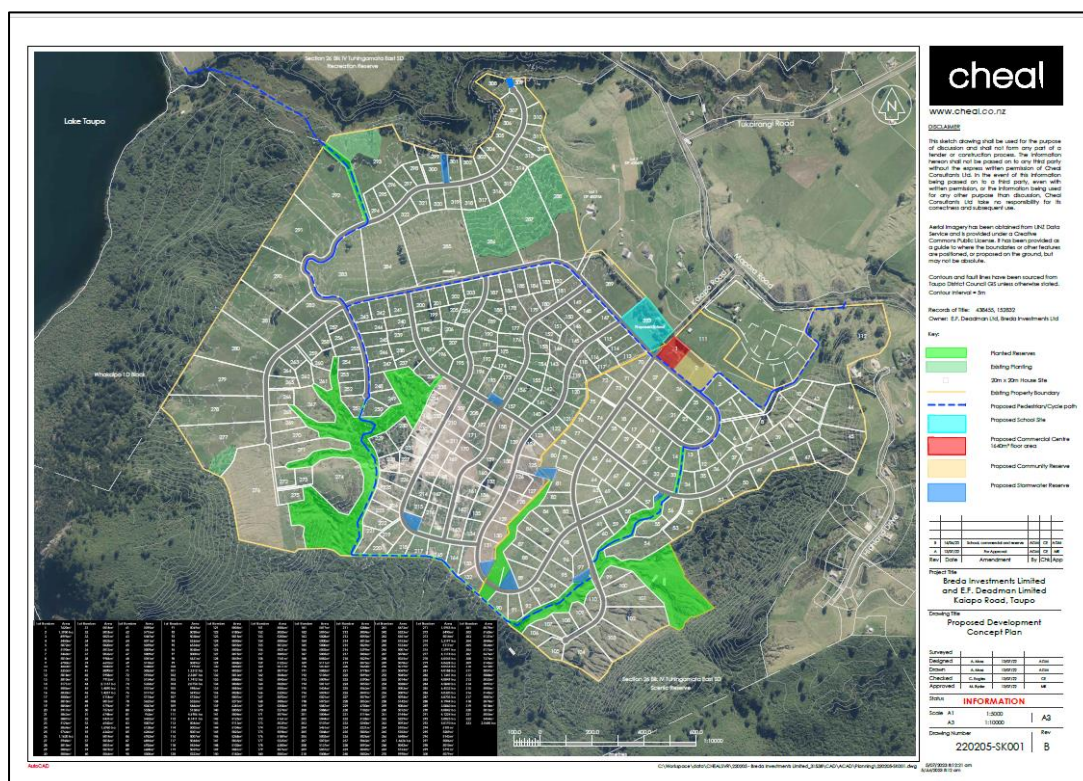


Figure 3. Subdivision scheme plan for the property – Cheal Drawing No. 220205-SK001

RELEVANT LEGISLATION

Heritage New Zealand Pouhere Taonga Act (2014)

An archaeological site, as defined by the Heritage New Zealand Pouhere Taonga Act 2014 6(a), is any place in New Zealand, including any building or structure (or part of a building or structure), that (i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900 and (ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand.

Archaeological sites cannot be modified or destroyed unless an authority is granted under section 48, 56(1)(b), or 62 in respect of an archaeological site, no person may modify or destroy, or cause to be modified or destroyed, the whole or any part of that site if that person knows, or ought reasonably to have suspected, that the site is an archaeological site.

Resource Management Act (1991)

The RMA 1991 recognizes as matters of national importance: ‘the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, wahi tapu, and other taonga’ (S6(e); and ‘the protection of historic heritage from inappropriate subdivision, use, and development’ (S6(f).

Territorial authorities are required under Section 6 of the RMA to recognise and provide for these matters of national importance when ‘managing the use, development and protection of natural and physical resources’.

Historic heritage is defined as ‘those natural and physical resources that contribute to an understanding and appreciation of New Zealand’s history and cultures, deriving from any of the following qualities: (i) archaeological; (ii) architectural; (iii) cultural; (iv) historic; (v) scientific; (vi) technological’. Historic heritage includes: ‘(i) historic sites, structures, places, and areas; (ii) archaeological sites; (iii) sites of significance to Māori, including wahi tapu; (iv) surroundings associated with the natural and physical resources’.

Constraints and Limitations

This is an assessment of archaeological values and does not include an assessment of Māori values. Consultation with tangata whenua is being carried out independently of this report. An assessment of the cultural significance of an area can only be competently made by the affected tangata whenua. It should be noted that an assessment of cultural significance might not necessarily correlate with an assessment of archaeological significance.

Methodology

This assessment involved the examination of the records of the New Zealand Archaeological Association (NZAA) in order to determine whether any archaeological sites had previously been recorded on or in the immediate vicinity of land affected by

the project. Early survey plans, aerial photos and archaeological reports relating to the area were also reviewed. A field survey of the property was carried out in January 2025. The location of the two recorded sites within the property was inspected in detail and the wider area was inspected for evidence of possible unrecorded archaeological features indicative of pre 1900 activity. Surface visibility was excellent in all areas of land affected by the proposed development.

PHYSICAL LANDSCAPE

The property is located on elevated land at the northern end of Lake Taupo, adjacent to the Kaiapo Bay and the Kaiapo Bay Scenic Reserve and Whakaipo Bay to the west. The property is accessed from Kaiapo Road and is primarily used for pastoral grazing and cropping with one existing dwelling, outbuildings and exotic planting near the northern entrance. The topography of the property is dominated by a prominent ridgeline that extends in a north westerly direction from the Waikarariki Point headland forming a watershed between the Kaiapo Bay catchment and the Whakaipo Bay catchment.

ARCHAEOLOGICAL LANDSCAPE

Site recording in the Taupo Region has been limited to specific areas such as Department of Conservation land and areas affected by road and residential projects. Consequently, the archaeological site inventory may not accurately convey the full extent of the archaeological resource. The site inventory does indicate widespread settlement however many of the site's date to the post European period. Only seven radiocarbon dates have been obtained for the district all of which come from just two sites on the northern lake shore. The dates were recovered from two settlement sites, one at Whakaipo Bay (T18/25) 2km to the west of the property and one at Whakamoenga (U18/4) 4km to the south east of the property. The two dates from Whakaipo Bay indicate 19th century occupation while the five from Whakamoenga provided questionable results but the site likely dates to the 19th century.

There have been very few studies of the archaeological landscape of the Taupo region. Williams and Walton provided an overview of the known archaeological resource and an interpretation of the archaeological landscape in 2003. Only one significant archaeological investigation has occurred in the region since they completed their study (Prince 2010). The archaeological investigation carried out by Prince at Acacia Bay revealed numerous large house floors and associated features primarily dating to the early to mid-1800s. There has been limited archaeological monitoring of large-scale earthworks projects in the general area that could help in determining the prevalence of unrecorded subsurface archaeology. To date investigations have focused on known sites such as rock shelters (Whakamoenga U18/4) and settlements (Acacia Bay U18/21) while little or no archaeological data has been recovered from larger subdivision developments.

Perhaps the least understood aspect of the archaeological record in the Taupo District is the nature of pre-European and early contact subsistence and in particular whether the cultivation of traditional cultigens such as kumara was viable. Numerous archaeological features interpreted as crop storage pits have been recorded however conclusive evidence of pre-European cultivations in the form of modified or augmented

soils have not been identified. Williams and Walton (2003), among others, surmise that cultivation of kumara was generally not possible in the region with the possible exception of microclimates afforded on natural terraces adjacent to water courses and along or just within the retreating forest edge that may have remained frost free during the growing season.

Many of the recorded archaeological sites in the Taupo District were recorded by Perry Fletcher over the past 40 years. Fletcher surveyed the lake margins west of the Waikato River outlet in the 1970s including the Kaiapo Bay Reserve adjacent to the property in 1978 and again in 1984 during which many significant archaeological sites were recorded including numerous rock shelters exhibiting artwork produced by the application of ochre to the walls of the shelters. He also recorded two sites within the property (T18/86 & 116). The coordinates for sites recorded by Fletcher have not been updated since they were visited in the 1970s consequently, they retain a potential inbuilt error margin of 100m or more. This potential error is evident with sites in the general vicinity of the property and is discussed in more detail below.

The records of the New Zealand Archaeological Association (NZAA) were consulted in order to determine the location of recorded archaeological sites in the immediate vicinity of the proposed development. The records indicate that there are two recorded sites within the property and a further 12 sites in the general vicinity including three defended pa and evidence of settlements around the lake margins. No previously unrecorded archaeological sites have been identified within the property since the survey by Perry Fletcher in 1978 and 1984.

Table 1. Recorded archaeological sites within 500m of the property. Sites recorded within the property are highlighted red.

Site Number	Site Type	Easting	Northing	Date Recorded
T18/23	Pa	1857612	5711698	1977
T18/33	Stone Rows	1857011	5711998	1978
T18/34	Pits	1857111	5712098	1978
T18/35	Pa	1857311	5712298	1978
T18/36	Stone Rows	1857711	5712999	1978
T18/86	Pits	1859213	5711800	1978
T18/103	Pits / Stone Rows	1857411	5712498	1984
T18/112	Karaka Grove	1858914	5710899	1984
T18/113	Terraces / Hearths	1858914	5710799	1984
T18/114	Pa / Pits (rua)	1858713	5710999	1984
T18/115	Pa / Pits / Terraces	1858613	5711099	1984
T18/116	Pits (Borrow?)	1859013	5711399	1984
T18/135	Karaka Grove	1857512	5711097	1984
T18/136	Cave	1857512	5711097	1984

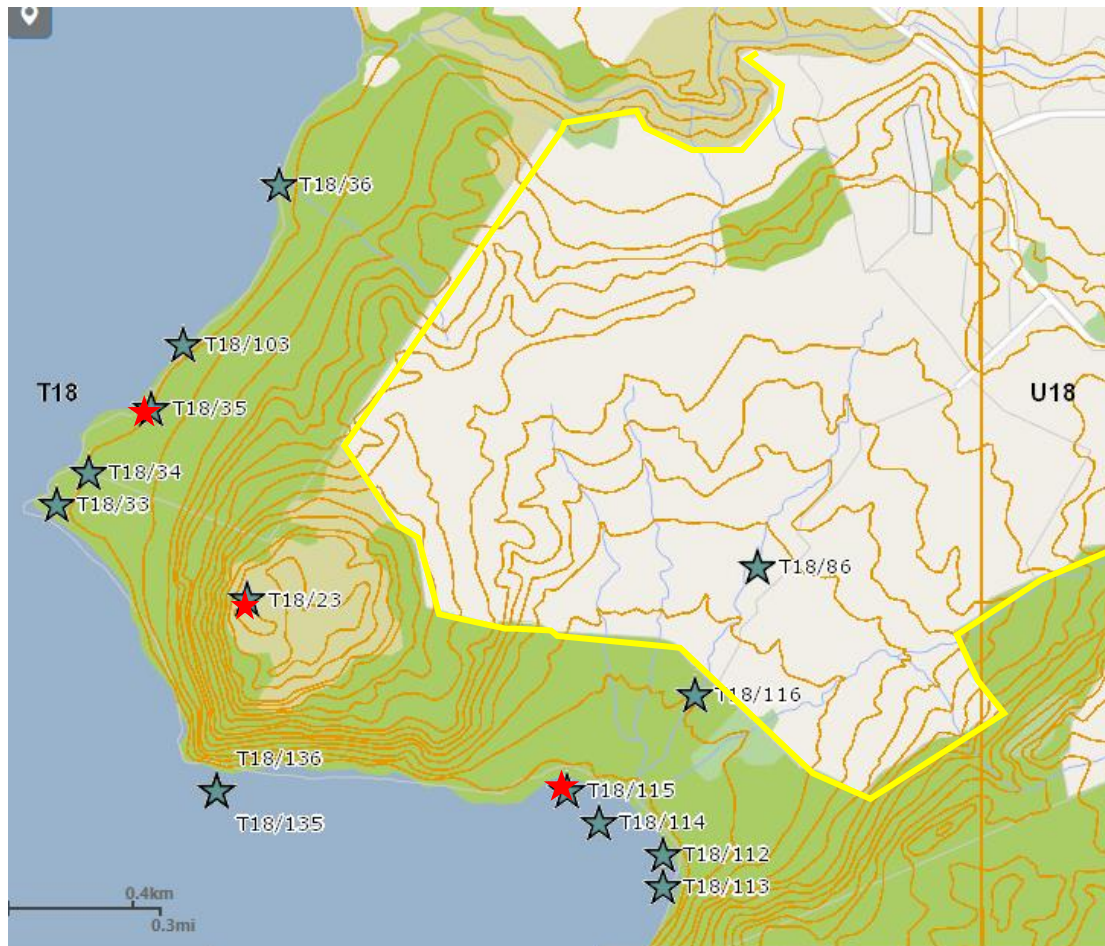


Figure 4. Plan showing the location of recorded archaeological sites within and in the general vicinity of the property (outlined yellow). Red stars indicate the location of Pa.

T18/86 Pits

This site was recorded by Perry Fletcher during his 1978 survey of the wider area. He describes the site as ‘a row of open pits of medium type on top of a 10m rise.’ The number, dimensions and function of the pits is not provided. No subsurface investigation of the features was carried out to verify archaeological status of the features.

Fletcher writes that it was located near a small shed housing a water pump. A concrete pad with machine mounting bolts survives between a principal farm track and a fence at the specified location. The site was not relocated during the 2025 archaeological survey of the property. The location of this site was extensively modified in 2017 during contouring of the rilled slopes to accommodate cropping. It is therefore probable that this site has been destroyed.



Figure 5. View looking south showing possible location of T18/86 within paddock contoured ca. 2017.



Figure 6. Concrete pad with mounting bolts inspected during the 2025 survey indicating location of water pump noted by Fletcher in 1978.

T18/116 Borrow Pits

This site was recorded by Perry Fletcher during his 1984 visit to the area. While the 1984 coordinates place this site within a bush covered slope the location details provided by Fletcher suggest it was in fact further north within farmland. He describes the pit features as borrow pits. Archaeological features described as borrow pits typically refer to locations where favorable soils or aggregates were quarried and relocated to augment garden soils for the cultivation of traditional cultigens such as kumara. It is unclear what resource the borrow pits were targeting as the substrate below shallow topsoil in this area is pumice lapilli.

The specified location of this site was extensively modified in 2017 during contouring of rilled slopes to accommodate cropping. The pits features were not relocated during the 2025 archaeological survey. It is therefore possible that this site is obscured by bush or has been destroyed during contouring of the property.



Figure 7. View looking south east showing the contoured landscape in the vicinity of coordinates provide for T18/116 (circled in red).



Figure 8. Soil profile in the immediate vicinity of recorded archaeological site T18/86 showing limited organic topsoil development over Taupo pumice lapilli substrate.



Figure 9. Aerial photo showing the location of coordinates for recorded archaeological sites T18/86 and 116. Note that Fletcher's location descriptions suggest site T18/116 was in pastoral land possibly in the location indicated by the red arrow.

ASSESSMENT OF EFFECTS

There are two recorded archaeological sites within the property identified by Fletcher in 1978 and 1984. The two sites could not be relocated during the 2025 archaeological survey and are thought to have been destroyed during contouring within the property in 2017. The two sites were described as pit features and no subsurface investigation was carried out to determine if they were archaeological (relating to pre-European Māori activity) or formed by natural processes or 20th century farm activity.

No evidence of previously unrecorded archaeological sites was identified within the property during the 2025 archaeological survey. Our understanding of the unrecorded archaeological resource within the Taupo region is limited however current patterns of recorded sites suggest settlements were primarily focused on waterways and lake margins. Given the extent of modification to the natural topography within the property during recent contouring the likelihood of encountering unrecorded subsurface archaeological sites during earthworks associated with the proposed development is considered low.

It is therefore recommended that earthwork associated with the proposed development proceed without archaeological constraints however in the unlikely event that suspected archaeological site/s are encountered all work must stop in the immediate area until the findings can be assessed by a suitably qualified archaeologist. If the discovery is confirmed as an archaeological site consultation with tangata whenua and Heritage New Zealand will be required in order to determine an appropriate strategy for the mitigation of effects. This may include applying for an authority from Heritage New Zealand Pouhere Taonga to allow for the investigation sampling and recording of the site.

GENERAL CONSIDERATIONS

This report is an assessment of impact on archaeological values and does not include an assessment of Māori values. Such an assessment can only be made by the tangata whenua. It should be noted that archaeological survey techniques based on visual inspection and minor subsurface testing cannot necessarily detect all possible subsurface archaeological features, nor identify wahi tapu and other sites of traditional significance to Māori, especially where these have no physical remains.

RECOMMENDATIONS

The following recommendations for avoidance or mitigation are provided as points of discussion between the applicant, statutory agencies and tangata whenua.

1. That there are no known archaeological constraints affecting the proposed residential subdivision development of Lot 1 DP 410435 & Lot 2 DP 337255 located at 37 and 40 Kaiapo Road, Taupo.
2. That in the event that unrecorded archaeological sites are encountered during ground disturbance associated with the development all work must stop in the immediate area until the project archaeologist has assessed the finds and an appropriate mitigation strategy agreed to between affected parties including tangata whenua, the land owner and Heritage New Zealand Pouhere Taonga.
3. Archaeological survey cannot always detect sites of traditional value to Māori, such as wahi tapu. Tangata whenua should be consulted regarding the possible existence of such sites and informed of the recommendations of this report.

References

- Moore, P. R.
 2011 The Taupo obsidian source, central North Island, New Zealand. *Journal of the Royal Society of New Zealand*. Vol. 41, No. 2, pp 205-215.
- Prince, D., Phillips. K, Turner. M, Judge. C, Wallace. R, and Ussher. E.
 2010 Report on Archaeological Investigations of the Parawera Development, Acacia Bay, Taupo. NZHPT Authority 2005/131 Unpublished report prepared for Hiruharama Ponui Inc and Symphony Holdings Ltd.
- Williams, A & T. Walton.
 2003 Early Land use patterns in the Lake Taupo area. Department of Conservation Monograph 222.

APPENDIX A: NZAA SITE RECORD FORMS T18/86 (N94/24) AND T18/116 (N94/74)

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION SITE RECORD FORM		AM BC AC BB AA HA	
Map number	N 94	SITE NUMBER	N94/24
Map name	TAUPO	SITE NAME: MAORI	Not Known.
Map edition	1st.	SITE NAME: OTHER	
Grid Reference	458.356	SITE TYPE	PITS.
1. Aids to relocation of site		E345800 N435600	
A row of open pits of medium type on top of a 10 metre rise affording a unbroken view of the surrounding countryside, this being above a well defined contour (431 metres or 1400 feet). Facing Kaiapo Bay, a gully to the right. A small shed housing a water pump is at the site.			
2. State of site; possibility of damage or destruction Stock damage likely. This is on and has been affected by farm development and the only source of water (underground) has resulted in a track and pump house there.			
3. Description of site (NOTE: This section is to be completed ONLY if no separate Site Description Form is to be prepared.)			
4. Owner	J.A. Johnson	Tenant/Manager	None
Address	Kaiapo Road, R D 1. (Owner Title: Sect. 9 Blk IV Tuhingamata SD. Lot 1 DPS 21225.)	Address	
Attitude	Co-operative.	Attitude	
5. Methods and equipment used One person examined this site.			
Photographs taken: Yes/No (Describe on Photograph Record Form)			
Date recorded 13. 2. 78.			
6. Aerial photograph or mosaic No.		Site shows: Clearly/badly/not at all	
7. Reported by	P.T. Fletcher	Filekeeper	Kenneth W Moore
Address	19 Waipahihi Avenue, TAUPO.		
Date	Mar 31 1978	Date	April 1978

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION SITE RECORD FORM (NZMS1)		NZAA NZMS 1 SITE NUMBER N94/74													
NZMS 1 map number N94 NZMS 1 map name TAUPO NZMS 1 map edition 1st, 1969.		DATE VISITED 1984 SITE TYPE PITS (Borrow)? SITE NAME: MAORI - OTHER -													
Grid Reference		Easting 3 4 5 6 0 0	Northing 4 3 5 2 0 0												
1. Aids to relocation of site (attach a sketch map) A wide gully links up with the farm boundary and an access track to Kaiapo Bay. The banks and higher rising ground on the east side some 100 metres north east of the fenceline in which two very large open round pit features are located.															
2. State of site and possible future damage Farm development has modified the pits and surrounding area to some extent. Banks on three sides and a wide shallow erosion? ditch rear indicate a wider site context than the pits themselves. Grass cover and stock.															
3. Description of site (Supply full details, history, local environment, references, sketches, etc. If extra sheets are attached, include a summary here)															
4. Owner Address J.A. Johnson Kaiapo Road, R.D.1.		Tenant/Manager Address													
5. Nature of information (hearsay, brief or extended visit, etc.) Brief Visit Photographs (reference numbers, and where they are held) Aerial photographs (reference numbers, and clarity of site)															
6. Reported by Address P.T. Fletcher 19 Waipahihi Avenue, TAUPO.		Filekeeper Date Perry T. Fletcher 30 AUG 1984													
7. Key words PITS, LARGE OPEN, BORROW TYPE, FARMLAND, DEFENSIVE ASPECT.															
8. New Zealand Register of Archaeological Sites (for office use) NZHPT Site Field Code															
<table border="1" style="display: inline-table; vertical-align: top;"> <tr><td>C</td><td>Z</td></tr> <tr><td>A</td><td>G</td></tr> <tr><td>A</td><td>E</td></tr> </table> Type of site Local environment today Land classification		C	Z	A	G	A	E	<table border="1" style="display: inline-table; vertical-align: top;"> <tr><td>B</td><td>B</td></tr> <tr><td>A</td><td>A</td></tr> <tr><td>H</td><td>A</td></tr> </table> Present condition and future danger of destruction Security code Local body		B	B	A	A	H	A
C	Z														
A	G														
A	E														
B	B														
A	A														
H	A														

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 29/05/2026

First name: Catriona

Last name: Eagles

Organisation:

Wairarapa Moana ki Pouakani Incorporation

Preferred method of contact Email

Postal address: PO Box 165, Taupo, New Zealand, 3351

Email: catrionae@cheal.co.nz

Daytime Phone: 073786405

Would you like to present your submission in person at a hearing? *

Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: GRZ-R5 Standards > 1. Maximum Combined Coverage

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain the proposed provision

The reason for my submission is::

This change improves flexibility in housing design and aids increased provision of housing

2. Provision: GRZ-R5 Standards > 2. Maximum Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Support the deletion of this rule

The reason for my submission is::

This change improves flexibility in housing design and aids increased provision of housing

3. Provision: PC44 General

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

The following relief is sought:

1. Proposed Plan Change 44 be amended to:
 - a. rezone Lot 2 DP 43655 & Lot 1 DPS 24879 (35 Lake Road) to unserviced General Residential Zone with a Height Restriction and Natural Hazard Overlay
 - b. rezone Lot 3 DP 563013 (3 Karamû Street) to unserviced General Residential Zone, and
2. Insert a new Development Area 14.8 DEV8 Mangakino as detailed in Image 1 & Appendix 1.
3. Insert new Rules as detailed in Table 1.
4. That any further or consequential amendments to the planning maps and provisions be made as necessary to give effect to this rezoning and the intent of this submission.

Table 1: Proposed Rules

SUB-R1 CON activities GRZ, MRZ, LRZ, NCZ	Subject to
x. Subdivision in accordance with the DEV8-Mangakino Development Area Plan	<u>Compliance with the 5m building height limit from ground level in the height restriction area.</u> <u>Matters of Control</u> a. SUB-R2 b. SUB-R14

SUB-R8 RDIS activities GRZ, MRZ, LRZ	Subject to
x. Subdivision within the Natural Hazard Area in accordance with the DEV8-Mangakino Development Area Plan	<u>Design and construction must be in accordance with a geotechnical report addressing land stability</u> <u>Matters of Control</u> a. SUB-R2 b. SUB-R14

SUB-R13 DIS activities GRZ, MRZ, LRZ, NCZ	Subject to
x. Subdivision not in accordance with the DEV8-Managkino Development Area Plan	

The reason for my submission is::

This submission has been prepared on behalf of Wairarapa Moana ki Pouakani Incorporation in support of amending Proposed Plan Change 44 to rezone 35 Lake Road and 3 Kāramu Street, Mangakino from General Rural Zone to General Residential Zone, together with the inclusion of a Development Area Plan and associated subdivision provisions.

The proposal seeks to provide additional residential land in Mangakino to provide for Mangakino's economic, social, cultural wellbeing through the sustainable use of land resource to provide for the reasonably foreseeable needs of future generations. Given Mangakino's anticipated future growth, it is necessary for Mangakino's residents (permanent and holiday homes) that a variety of residential land is available as infill development alone is not sufficient to meet the future demand, nor provides a diversity in housing.

The proposal to rezone two sites represents a logical, efficient and planned extension of the Mangakino urban area. Both sites adjoin existing residential development, have a history of urban or urban-related use, and are no longer well suited to productive rural use. Rezoning the land will provide additional residential capacity in a location that is consistent with Mangakino's established settlement pattern and will assist in avoiding more dispersed and inefficient rural residential development.

The evidence supporting this submission demonstrates that additional residential land is required in Mangakino to meet anticipated demand. Existing residential capacity is limited, and the Future Development Strategy recognises the need for both infill and greenfield residential growth in Mangakino. The proposed rezoning will provide a staged and proportionate supply of residential lots, supporting housing choice, affordability, community wellbeing, and the ongoing vitality of Mangakino.

The proposal is consistent with the relevant higher-order planning framework, including the National Policy Statements on Urban Development, Electricity Networks, Highly Productive Land, Freshwater Management, Natural Hazards and Infrastructure, the Waikato Regional Policy Statement, Taupō District Council's Future Development Strategy, and the relevant objectives and policies of the Taupō District Plan. The proposal also aligns with Council's strategic direction for urban form, infrastructure integration, climate resilience, housing supply, and tangata whenua outcomes.

The assessments undertaken confirm that the environmental effects of the rezoning and subsequent development can be appropriately avoided, remedied or mitigated. The sites can be serviced by existing or planned infrastructure, including water, wastewater, stormwater, transport, and electricity networks. Site-specific matters relating to geotechnical constraints, stormwater design, contamination, access, and ecological enhancement can be appropriately addressed through the proposed Development Area Plan, existing District Plan assessment criteria, the subdivision consent processes, and existing regulatory mechanisms.

The proposal will deliver positive social, cultural, economic and environmental outcomes. It will support the aspirations of WMI as mana whakahaere and landowner, provide for the wellbeing of current and future residents, generate local construction and employment activity, support local businesses and services, and enable residential growth in a manner that is coordinated with infrastructure and responsive to environmental constraints.

The Section 32 assessment (in section 7 of this submission) demonstrates that the proposed rezoning is the most appropriate, efficient and effective method to achieve the relevant objectives of the District Plan and Proposed Plan Change 44. The status quo would not adequately respond to Mangakino's identified housing demand, while a separate private plan change would duplicate process, cost and time.

Incorporating the rezoning into Plan Change 44 provides a practical and efficient planning pathway.

For these reasons, the submitter respectfully requests that Taupō District Council accept the relief sought and amend Proposed Plan Change 44 to rezone the identified WMI land at 35 Lake Road and 3 Karamū Street to General Residential Zone, insert the DEV8 Mangakino Development Area Plan and associated subdivision provisions, and make any consequential amendments necessary to give effect to the rezoning.

4. Provision: Planning Maps

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

The following relief is sought:

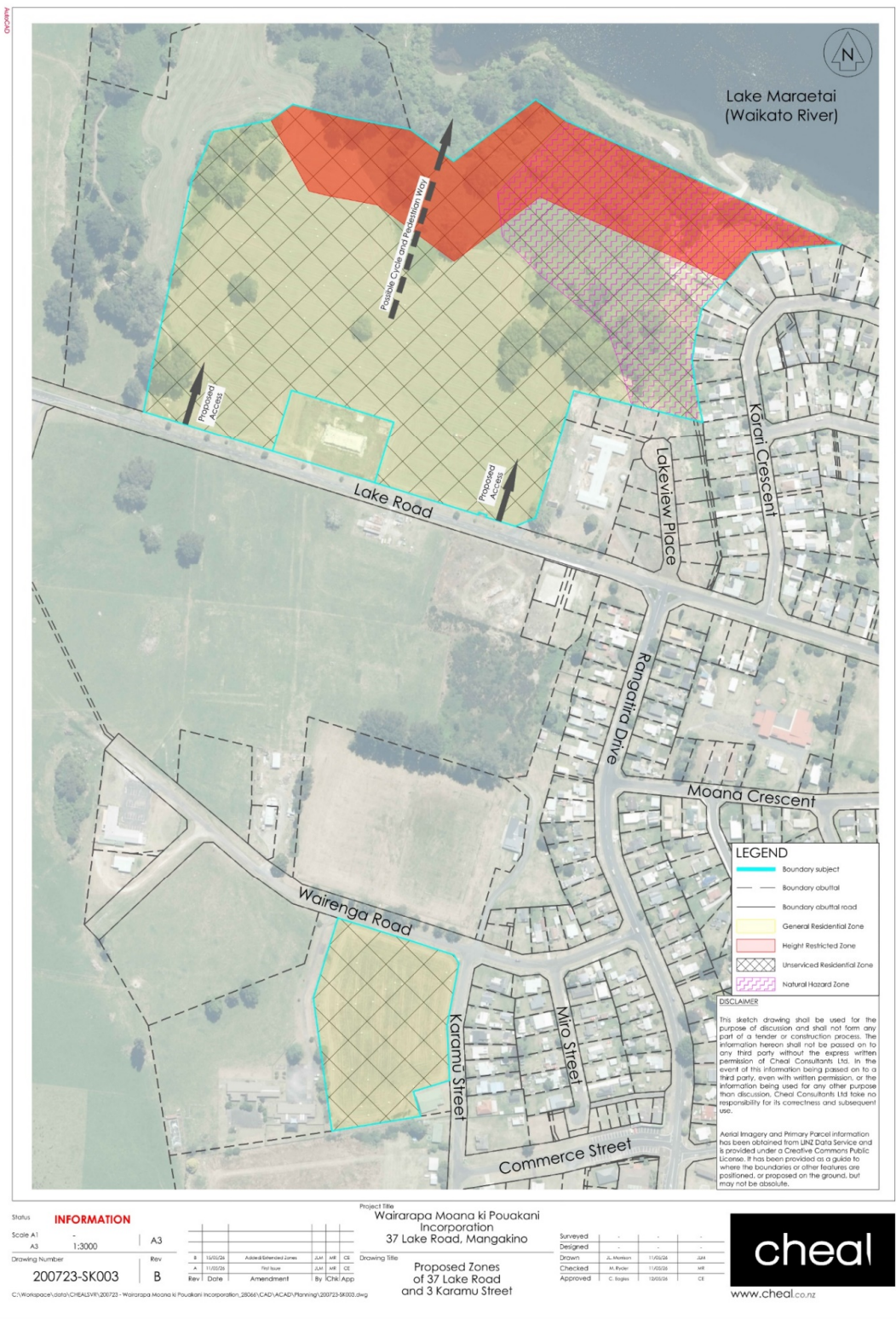
1. Proposed Plan Change 44 be amended to:
 - a. rezone Lot 2 DP 43655 & Lot 1 DPS 24879 (35 Lake Road) to unserviced General Residential Zone with a Height Restriction and Natural Hazard Overlay
 - b. rezone Lot 3 DP 563013 (3 Karamū Street) to unserviced General Residential Zone, and
2. Insert a new Development Area 14.8 DEV8 Mangakino as detailed in Image 1 & Appendix 1.
3. Insert new Rules as detailed in Table 1.
4. That any further or consequential amendments to the planning maps and provisions be made as necessary to give effect to this rezoning and the intent of this submission.

The reason for my submission is::

Additional Housing demand is sought in Mangakino on Lot 2 DP 43655 & Lot 1 DPS 24879 (35 Lake Road) and Lot 3 DP 563013 (3 Karamū Street)

Appendix 1

Development Area 14.8 DEV8 Mangakino



Development Plan

Overview

The Mangakino Outline Development Plan Areas are identified on the Planning Maps and within this Section. The Outline Development Plan Areas comprise 17.603ha being Lot 3 DPS 43655, Lot 1 DPS 24879, and Lot 3 DP 563.13. The intent of the Mangakino Development Plan is reflected in the Development Plan map which shows General Residential Zones with a Hazard Overlay and Height Restriction Overlay.

DEV8.1 Subdivision Design

Subdivision Design should reflect General Residential zone design similar in character to that of Mangakino. Consideration of Geotechnical Hazards within the Natural Hazard Overlay is required. Integration of built form with landscape characteristics along the northern boundary is intended (Lake Maraetai edge).

DEV8.2 Key Outcome

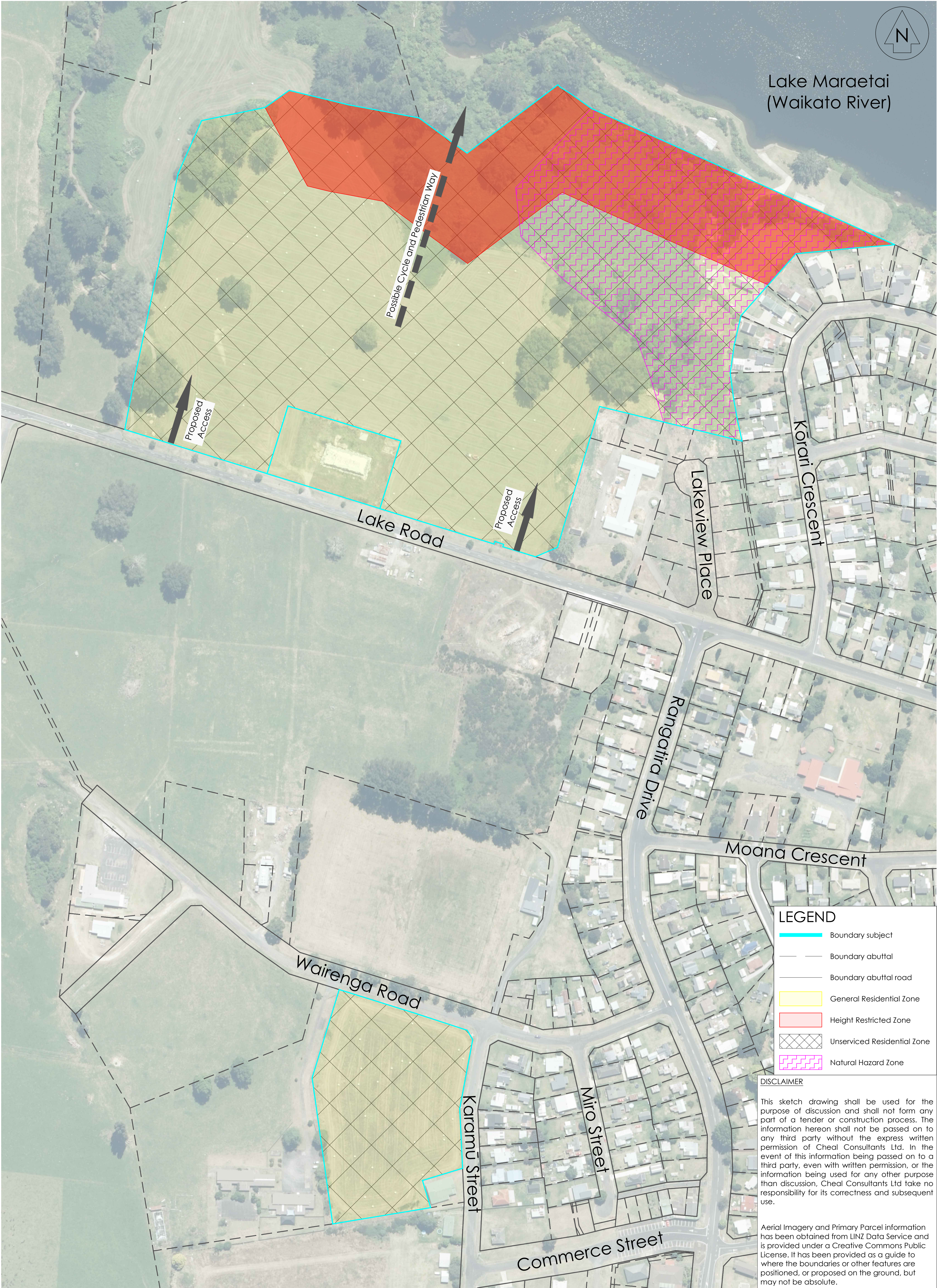
- a. Assessment criteria SUB-R2
- b. Assessment criteria SUB-R14 as relevant

Lake Road

- c. Application of the 5m Height Restricted Area (northern edge of lots at the Lake Rd site) 75m from the northern boundary
- d. Demonstration that earthworked batters can be revegetated with indigenous species
- e. Addresses fencing typology and height to maintain a high level of amenity at the site perimeter (potentially including permeable fencing where lots front the lake)
- f. Indicate a potential pedestrian/cycle connection to the Lake foreshore;
- g. Allow for the provision of stormwater treatment throughout the site (e.g. consider utilising stormwater to enhance an ecological corridor at the Lake Road site) and
- h. Identify how the site development acknowledges the historic land use (e.g. configuration/naming)
- i. Where possible, i2 (include native planting along the lake edge where stability issues have been identified by the Geotechnical Engineer

Natural Hazard Overlay

- j. A minimum offset to future residential buildings of 6.5m from crest of the steep northern escarpments on Lake Road Site
- k. Removal of uncontrolled fill and replacement with engineered fill or identify locations where only pile foundations can be utilised
- l. Identification of appropriate stormwater methodologies aligning with geotechnical advice specifically identifying minimum setbacks from slopes in which deep soakholes may be considered suitable
- m. Compliance with NESCS



Status **INFORMATION**

Scale A1 -
A3 1:3000

Drawing Number
200723-SK003

A3

Rev

B

B	15/05/26	Added/Extended Zones	JLM	MR	CE
A	11/05/26	First Issue	JLM	MR	CE
Rev	Date	Amendment	By	Chk	App

Project Title
**Wairarapa Moana ki Pouakani
Incorporation
37 Lake Road, Mangakino**

Drawing Title
**Proposed Zones
of 37 Lake Road
and 3 Karamu Street**

Surveyed	-	-	-
Designed	-	-	-
Drawn	JL Morrison	11/05/26	JLM
Checked	M. Ryder	11/05/26	MR
Approved	C. Eagles	12/05/26	CE



www.cheal.co.nz



PO Box 1347, TAUPO 3351
 Level 1, 14 Ruapehu Street, TAUPO 3330
 Phone: 07 213 2275
 Email: taupoadmin@wairarapamoana.org.nz

NZBN: 9429048453813

Background to Wairarapa Moana ki Pouākani Incorporation ("WMI") holding land at Mangakino

WMI holds those lands around Mangakino as a direct result of the Crown taking lands around Lake Wairarapa (Wairarapa Moana) and then failing to honour its promises. Subsequently, the lands at Mangakino which are owned by the WMI were adversely affected by the Crown's unilateral efforts to establish the Lake Maraeai power station (and hydro lake).

The details of the taking and the Crown's breaches are set out in detail in Wai 863, The Wairarapa ki Tararua Report, in particular Volume 2, Chapter 7 "Wairarapa Moana and Pouākani". Suffice to say that at 7.11.1 the Waitangi Tribunal concluded:

The jurisdiction of the Tribunal directs us to consider Crown conduct in the context of the principles of the Treaty. In the Treaty, the Crown made solemn undertakings to Māori, but for much of our history those undertakings were simply ignored. Today, the application of the principles of the Treaty to past conduct of the Crown is sometimes criticised as ahistorical. It is said that it applies unrealistic standards to the assessment of actions in the past. The passage of events that saw the change of ownership of Lakes Wairarapa and Ōnoke and their surrounds from the tangata whenua to the Crown, and ownership by Wairarapa Māori instead of land at Pouākani, led to a century of loss. The tale that we have recounted here shows that this turn of events was entirely unfair – not just because the people affected were Māori with Treaty rights but because they were citizens with property rights. Colonisation imported a system of law, and Māori, like other citizens, are entitled to its benefits. The story of Wairarapa Moana and Pouākani is a story of Māori property rights being overridden, disregarded, and dishonoured. In Wairarapa, more weight was always given to the interests of settler farmers, even when those interests were lesser interests than those of tangata whenua and lacked a comparable basis in law. And, at Pouākani, the interests of the Crown came first. All of this brought conflict for the Māori of Wairarapa – decades of conflict. Conflict comes at a high cost, emotionally and spiritually. And people whose experience tells them that their rights do not matter feel ultimately that they are people who do not matter. Over time, this becomes a way of being that is erosive of self-esteem. It affects people's ability to succeed both privately and professionally. It is a condition from which the Treaty should have, but did not, protect them.

As a result, WMI holds its lands at Mangakino on trust for its beneficiaries as Maori Freehold Land under the Te Ture Whenua Maori Act 1993. The land was originally transferred from Crown ownership and vested in the 230 Owners of Lake Wairarapa by the Maori Land Court in April 1916 and comprised some 30,486 acres of the Pouakani Block surrounding Mangakino. In 2002 these lands were then vested in Wairarapa Moana ki Pouakani Incorporation on behalf of the Owners by the Maori Land Court and at the same time title to certain parts of these lands which are the subject of our **Submission for Change of Zone from Rural to Residential** were changed from Maori Freehold Title to General Title.

WMI are also inextricably linked to our local marae Tamarua Pokai Whenua by whakapapa including providing the land in 1972 and other ongoing community support. The land is held as a Maori Reservation pursuant to Te Ture Whenua Maori Act.

Relationship with the Lands at Mangakino

WMI maintain a special relationship with these lands as guaranteed by Te Tiriti o Waitangi and exercise ongoing authority of its tribal estates to ensure the continuity of association for its beneficiaries to their lands and resources.

It is important to WMI that they actively maintain the ahikaa obligations of the original occupants of the lands for present and future generations in accordance with obligations of Kaitiakitanga and Manaakitanga that guide their stewardship responsibilities. Some of the original Wairarapa families who were displaced by the Crown taking their Wairarapa lands moved up to Pouākani and now live there so it is important that these relationships are recognised in the management of the tribal estate.

The relationships that have been forged are inclusive of these historical events and build on the whakapapa relationships to the local lands and resources that have existed since prior to 1840. In the 100 years that WMI has been operating, the peoples of WMI which the land is managed for have maintained permanent relationships with the land and waters at Mangakino.

This exercise of authority or as it is described in Tikanga Maori as Mana Whakahaere is important to be recognised in any process of decision making that may impact on WMI's stewardship responsibilities (to its land to its people). Many of Taupo District Council consultation obligations relate to Maori interests and/or to Te Tiriti o Waitangi and these extend to WMI and its interests in its land at Mangakino.

Regarding the terms tangata whenua and mana whenua, it is necessary to recognise that the people of WMI have integrated with the Pouākani, Raukawa and Tuwharetoa over multiple generations and have been exercising Kaitiakitanga and Manaakitanga over their land over this time. This has created layers of relationships and multifaceted heritage for the members of WMI. Ultimately the tikanga of the people of Wairarapa Moana followed them when they moved north to Mangakino and created new families with the people of Pouākani, Raukawa and Tuwharetoa.

The Pouākani Block, The Mangakino Township and Wairarapa Moana Ki Pouakani Incorporation

The information and dates below provide a brief summary of key dates relating to the Wairarapa Moana Ki Pouakani Lands in the Mangakino area. Prior to 1915 an area of land known as the Pouakani Block was owned by the crown.

In 1914 legislation was passed in the New Zealand Parliament to transfer 30,486 acres of the Pouakani Block **as substitution for the loss of ancestral lands around Lake Wairarapa and Lake Oneke**. The Native Land court was ordered to vest the land in appropriate new owners.

- 1915** In January 1915 Judge Michael Gilfedder of the Native Land Court ordered the land area of 30,486 acres be vested in Arete Tamahau and 229 others. That part of the Pouakani land block was transferred **as substitution for the loss of ancestral lands**. The land was Maori Freehold Land.
- 1916** On 14 April 1916 a proclamation was issued recording the transfer of the land. The land was generally referred to as 'Pouakani (Wairarapa Maoris) Block'.
- 1956** The 'Proprietors of the Mangakino Township Incorporated' (MTI) was appointed by the Maori Land Court in May 1956 to represent the collective interest of the owners, and sought to settle the terms of the township lease with the Crown.
- 1962** Mangakino Township Incorporated agreed to gift the towns existing sewerage, water reticulation and drainage services to Taupō County Council in return for Council upgrading stormwater, drainage, roading, and footpaths. The first freehold commercial sale was to the Waitomo Electric Power Board
- 1966** The Ministry of Works formally surrendered its lease over the town and Mangakino Township Incorporated took over control.
- 1969** The Maori Land Court ordered the block be known as Pouakani No 2.
- 1970** Department of Māori Affairs transferred 16,000 acres (6,477.73 Ha) to Mangakino Township Incorporated which in turn entered into a pine tree plantation joint venture with New Zealand Forest Products.
- 1983** In March, the Māori Land Court intervened on behalf of the owners and vested the land into the Pouākani 2 Trust, appointing the Committee of Management of the Proprietors of the Mangakino Township Incorporated (The Committee) as the Trustee of Pouakani 2.
- 1995** Agreement with Taupo District Council for 'Power Sharing' embracing the spiritual and lawful aspects of Maori culture.
- 2002** The two entities were amalgamated, with the establishment of Wairarapa Moana ki Pouākani Incorporation (WMI). All land was Maori Freehold Land.
- 2002** Property owned by WMI both on the perimeter and in the Mangakino Township land status was changed by Maori Land Court order to 'General Land' from Maori Freehold Land. This meant that WMI could sell and develop the land with this status.

MANGAKINO 2060: RESIDENTIAL REZONING

Landscape and Visual Effects Assessment

Prepared for
Wairarapa Moana ki Pouākani Incorporation

15 May 2026





Project Name: WMI Residential Rezoning – Plan Change 44 Submission

Report Title: Landscape and Visual Effects Assessment

Prepared for: Wairarapa Moana ki Pouākani Incorporation (WMI)

Prepared by: Narrative Landscape Ltd

Cover Photo: Aerial view of Mangakino, Waikato. 21/10/1953 taken by Whites Aviation.

Status: 2026 Update

Issue Date: 15 May 2026

Contents

EXECUTIVE SUMMARY	5
INTRODUCTION	6
METHODOLOGY	6
PROPOSAL	8
STATUTORY PROVISIONS	9
Resource Management Act (RMA) 1991	9
Taupō District Plan (TDP)	10
EXISTING LANDSCAPE DESCRIPTION	11
Wairarapa Moana - Mangakino Township and Pouākani Block	11
Mangakino Context	14
Site Description	21
ISSUES	22
LANDSCAPE EFFECTS ASSESSMENT	23
Summary of Landscape Values of the Receiving Environment	23
LANDSCAPE EFFECTS	24
Mangakino (Wider Scale)	25
Lake Road (Site Scale)	25
Karamū Street (Site Scale)	25
Outstanding Natural Feature and Landscape 56 – Waikato River	26
VISUAL EFFECTS	26
Lake Road	26
Karamū Street	27
Summary - Landscape and Visual Amenity Effects	27
MITIGATION DISCUSSION	28
CONCLUSION	29
APPENDIX 1: EFFECTS SCALE	30
APPENDIX 2: RELEVANT TAUPŌ DISTRICT PLAN	31
APPENDIX 3: CONDENSED TIMELINE OF THE POUĀKANI BLOCK AND MANGAKINO TOWNSHIP	34
REFERENCES	36

Figures

Figure 1: Effects rating scale	6
Figure 2: Mangakino Context Map 1	8
Figure 3: TDC Planning Map Extract	10
Figure 4: Maps of the Pouākani Block	12
Figure 5: Layout of Pouākani Block land	13
Figure 6: Mangakino Context Map 2	15
Figure 7: Aerial View of Mangakino	15
Figure 8: View north from on Lake Maraetai	17
Figure 9: View of Kōrari Crescent properties.	18
Figure 10: Mangakino Village - Blueprint for the Future	19
Figure 11: Aerial view of Mangakino, Waikato.....	19
Figure 12: Taupō County District Planning Map – Mangakino Urban Area (1985)	20
<i>Figure 13: Surrounding Context of the WMI Karamū St Site</i>	<i>21</i>
<i>Figure 14: Surrounding Context of the WMI Lake Rd Site</i>	<i>22</i>
<i>Figure 15: Graphic Depiction of 'Landscape' as a Concept</i>	<i>23</i>
<i>Figure 16: Height Restriction Overlay (suggested 75m setback)</i>	<i>29</i>

Executive Summary

Wairarapa Moana ki Pouākani Incorporation (WMI) have sought a landscape assessment of a rezoning proposal in Mangakino. This assessment has been undertaken by Narrative Landscape and is based on the NZ Landscape Assessment Guidelines. A site visit was undertaken on 24 January 2024, where the existing landscape character of Mangakino was observed and documented (land, water and air/drone), followed by attendance at a public hui at Pouākani Marae on 22 February 2024.

In the time period following initial involvement, Taupo District Council have been in the process of undertaking a District Plan Review, with Plan Change 44 (Residential Zones) having been notified on 24 April 2026. The strategy adopted by WMI is to provide a comprehensive submission on PC44 seeking the rezoning of two rural zone areas of their land to residential.

WMI initially investigated the rezoning of three sites within Mangakino from rural to residential zoning, all of which are located immediately adjacent to existing residential zoning. These sites included; Lake Road (15.6ha - northern Mangakino), Karamū Street (2ha - central Mangakino) and Taniwha Street (41.8ha - southern Mangakino). WMI have decided not to pursue the sizeable Taniwha Street site, primarily as the housing demand is not sufficient at this time, however photographs and mapping relating to all three sites remain in this landscape assessment for context. The key statutory provisions are found within the Resource Management Act and Taupō District Plan, and it is acknowledged that the Waikato River is recognised as an Natural Feature and Landscape.

The township of Mangakino is within the Pouākani Block land area, and was provided to Wairarapa Maori in 1915 as a substitution for the loss of ancestral lands in the Wairarapa. Since that time, WMI have acted a kaitiaki over this land. Mangakino was then taken by the Ministry of Works, to set up a temporary workers village for the construction of several dam projects along the Waikato River. Of direct relevance to this proposal, is that the sites were previously occupied by residential (Karamū St), or industrial (Lake Rd) activities. This results in sites which are relatively flat, have already undergone significant modification, and which are readily able to reaccommodate an urban landuse.

The key issues are identified as; potential adverse landscape and visual amenity effects on nearby residential properties, and ensuring that the treatment of perimeter development appropriately integrates with the receiving environment. This would most effectively be achieved through the detailed design at the subsequent subdivision application stage. It has been concluded that the level of landscape and visual amenity effect from does not exceed a **Low-Moderate** adverse effect for Lake Rd or exceed a **Low** adverse effect for Karamū St.

Introduction

Wairarapa Moana ki Pouākani Incorporation (WMI) are investigating rezoning a small portion of their existing General Rural Zone landholding, on the fringe of Mangakino Township, to the General Residential Zone. Narrative Landscape have been engaged to provide a landscape and visual effects assessment (LVA) which considers the potential effects and mitigation options of this proposed zone change to the Taupō District Plan. The report is intended to inform a submission from WMI to the Taupō District Council for the notified Plan Change 44 (Residential Zones).

The key purpose of the LVA is to address; integration with the existing Mangakino character, recognise the adjacent Outstanding Natural Feature and Landscape (Waikato River/Lake Maraetai), and to consider the boundary treatment with adjacent landowners and the water's edge. As the LVA will be considering a potential zone change, there isn't a specific activity status associated with the proposal, however consideration of both the existing and proposed zone provisions of the surrounding area, under the Taupō District Plan, will be a factor.

Methodology

This landscape and visual effects assessment has been prepared by Josh Hunt, a Registered Landscape Architect (NZILA), and is based on guidance from the NZ Landscape Assessment Guidelines¹, with the intention to determine the nature of effects and identify the degree of those effects, based on the following 7-point scale (Figure 1).

Very Low	Low	Low - Moderate	Moderate	Moderate - High	High	Very High
Less than minor	Minor		More than Minor		Significant	

Figure 1: Effects rating scale.

This report has been tailored to suit the nature of this proposed rezoning project and has considered the relevant statutory framework under the RMA. The table below outlines accepted NZILA rating scale (the upper row), with reference to the comparative scale for RMA s95 notification determination test (the lower row).

Prior to the site inspection, a preliminary desktop analysis² was undertaken to identify what locations in the vicinity of the proposal sites needed to be visited and included the preparation of a draft set of viewpoint locations throughout Mangakino, as well as identifying locations within the wider area which are representative of the character of the receiving environment.

¹ 'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines', Tuia Pita Ora NZILA, July 2022.

² Base information for this desktop analysis has been sourced from; Google Earth & Google Street View, Taupō e-Plan Maps, Land Information NZ (imagery and property titles), NZ Topo Map, and Retrolens (Historical Imagery Resource).

A site visit was undertaken on 24 January 2024 to document the landscape qualities of the applicant's sites and nearby vicinity on a clear day with excellent visibility. This included visiting the wider public road network of Mangakino, a walkover of the sites, an inspection of from Lake Maraetai (by boat) and capturing drone imagery of Mangakino for context.

Following a preliminary consideration of the WMI proposed Residential Rezoning, a public Hui was held at Pouākani Marae in Mangakino on 22 February 2024, where WMI, Cheal Consultants and Narrative Landscape presented the preliminary considerations to approximately 50 members of the Mangakino community.

The Graphics Package attached to this LVA (**Attachment 1**) includes context maps and imagery to assist with analysis and illustration of the site context and proposal. Included within **Attachment 1** is an interactive Viewpoint Location Map which allows quick reference of the photo locations.

The standard land-based photographs within this document are taken with a Canon 6D (Full Frame) camera with a wide-angle lens (24mm) to provide useful scene context, the water-based photographs are taken with the same Canon 6d (24mm lens) but have cropped the sky and water (top and bottom) of the image, while the aerial photographs were captured with a DJI Mini 3 Pro drone. The drone camera is equivalent to a 24mm lens, however drone images have been stitched together to give a wider field of view for context (noting that these are not locations that individuals will ever be able to observe from).

The methodology for this assessment includes:

- Preliminary desktop research and collation of relevant base information;
- Undertaking a site visit (January 2024) to collect photographs and develop an understanding of the surrounding site character;
- Attendance at a community consultation Hui;
- Description of the proposal;
- Consideration of the Relevant Statutory Planning Framework;
- Identification of the existing landscape context and values associated with Lake Maraetai (Waikato River);
- Undertaking an assessment of potential landscape and visual effects; and
- Identifying any mitigation measures if these are considered necessary.

Proposal

WMI is seeking to rezone some of their land in Mangakino from the General Rural Zone to the General Residential Zone. A key motivation behind this proposal is for WMI to provide additional residential housing supply/options within Mangakino, and the current rural zoning of formerly urban land is a barrier to future development.

As an initial stage, WMI are seeking to rezone some of the rural land on the fringe of the existing township. If this rezoning is successful then, as a subsequent stage, WMI will engage experts to assist with the detailed design and layout of any potential future subdivision.

The two sites being considered, under what WMI are promoting as their 'Mangakino 2060' vision, include (Figure 2);

- **Lake Road** - 15.6ha (Lot 1 DP24879 and Lot 3 DP43655)
- **Karamū Street** - 2ha (Lot 3 DP563013)

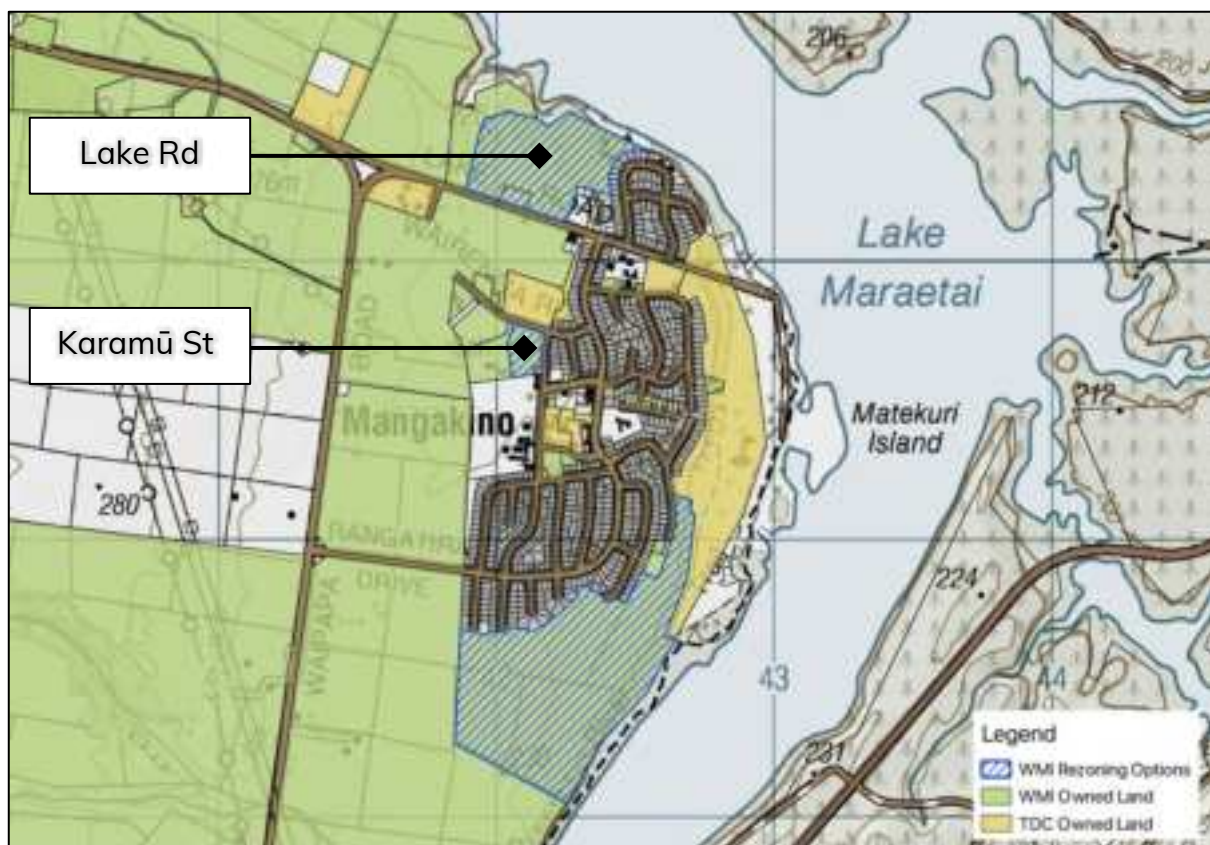


Figure 2: Mangakino Context Map 1

A key influence over the selection of these potential residential areas has been the historic urban land use, and the inherent serviceability of these locations. By considering the location (proximity to the existing urban form of Mangakino and also opportunity for enhancing amenity), serviceability (e.g. connection to Mangakino's drinking water, stormwater and wastewater systems), and suitability for residential housing (e.g. accessibility, slope, previous land use), WML are seeking to promote a well-integrated growth pattern.

A full description of the proposal is contained within the Planning Assessment (prepared by Cheal Consultants), but in essence WML are seeking to re-establish an urban land use in these areas by rezoning the land to General Residential Zone. The key landscape considerations relate to how this rezoning will:

- integrate with the existing Mangakino residential character;
- ensure that the values associated with the adjacent Outstanding Natural Feature and Landscape (Waikato River/Lake Maraetai) are maintained; and
- address the interface with the existing residential zone (adjacent landowners) and the water's edge.

Statutory Provisions

In relation to this proposal, there are two main statutory documents which have an influence on the landscape character and visual amenity, through provisions which control development. This includes the Resource Management Act (1991), and the Taupō District Plan (TDP). The purpose of identifying key provisions is to assist in framing this landscape assessment, so that relevant matters can then be addressed by the planning expert, with the most relevant landscape provisions contained within Appendix 2.

Resource Management Act (RMA) 1991

The RMA informs the planning processes and underpins the TDC District Plan. The purpose of the RMA is *"to promote the sustainable management of natural and physical resources...whilst enabling people and communities to provide for their social, cultural and economic well-being"*.³ Of relevance to this assessment are Sections 6a, 6b and 7c of the RMA, which provides for the *"preservation of the natural character of ... lakes and rivers and their margins"*, *"protection of outstanding natural features and landscapes"* and *"maintenance and enhancement of amenity values"*.

³ Resource Management Act 1991. Part 2 – Purpose and Principles, Section 5 Purpose.

Taupō District Plan (TDP)

At the beginning of this project, the proposed sites were located within the Rural Environment of the TDP, on land titles which are directly adjacent to the Residential Environment zoning within Mangakino. The other land zoning in Mangakino is a central hub of Town Centre Environment along Rangatira Drive. Subsequently, the Taupō District Plan has been updated to the National Planning Standards Format with the zoning now identified as 'General Rural Zone' and General Residential Zone (Figure 3). There are also three relevant overlays which include the; Height Restricted Area, Foreshore Protection Area and Outstanding Natural Feature and Landscape.

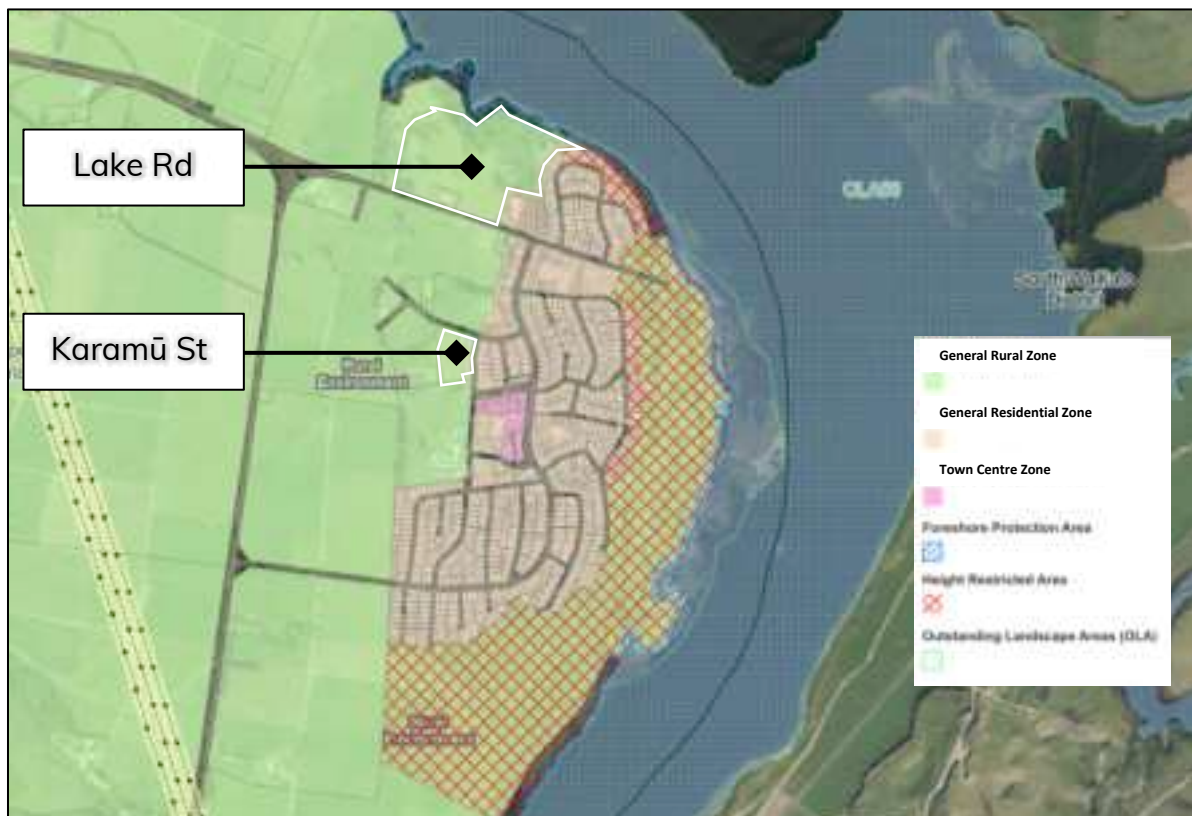


Figure 3: TDC Planning Map Extract

The key Objectives and Policies⁴ can be summarised as an intention to maintain and enhance the amenity and character of each respective zone (GRZ-O1 & GRUZ-O2), through controls over bulk and location, and compatible residential scale and density (GRZ-P1) of activities. A further benefit of the proposed General Residential Zone is that it provides an opportunity for activities beyond residential, by enabling a range of appropriate activities (GRZ-P4). Thus enabling for a wider range of development options, when compared to the options for development of the WMI land under the General Rural Zone.

⁴ Appendix 2

In relation to both the General Residential Zone and General Rural Zone, the District Plan includes policies which; protect the character of the lake and river margins through control of structures (GRUZ-R3.2 & GRZ-R5.7). The Land Development chapter primarily relates to identified Urban Growth areas, however it does seek to ensure that all land development does not detract from the amenity value of the local environment (LD-O5), to manage adverse effects of subdivision on identified cultural, historic, and landscape values (LD-P18).

In relation to additional overlays, there is a building height restriction (reduced to 5m from 8m) which applies to both Residential and Rural Environment land on the eastern edge of Mangakino (GRZ-R5.7), there is a discretionary activity status for all buildings within the Foreshore Protection overlay (GRUZ-R3), and the entire Waikato River (including Lake Maratai) is identified as an Outstanding Natural Feature and Landscape (Schedule 10.3 – ONFL56).

Existing Landscape Description

Wairarapa Moana - Mangakino Township and Pouākani Block

The following historic overview is not intended to be a detailed chronological account of this land and township, and those seeking a deeper knowledge of this topic should contact Wairarapa Moana Incorporation. However, having at least a small awareness of the historical context and continued ordeals that have plagued Wairarapa Moana over the past century is essential to understanding the Mangakino sense of place, and vision for the area held by WML. The bulk of information in this section was obtained from 'Wairarapa Moana: The Lake and its People'⁵, with key dates having been summarised in **Appendix 3**.

The Pouākani Block of land (Figure 4) was transferred to Wairarapa Māori ownership in 1915 as a substitution for the loss of ancestral lands in the Wairarapa, over 300km to the south. It was not an 'option', nor were any other locations offered by the Crown. Early Wairarapa settlers in the areas had minimal farming experience and were required to endure a difficult time clearing and establishing this farmland. These difficulties included; bush sickness in calves (cows offspring wouldn't grow), animal deaths through bloat (from eating clover), rampant ragwort and poor soil quality. It was recorded that over the course of the 1960's, which included two severe droughts, 17 of the original Wairarapa settlers surrendered their farms for a variety of reasons⁶ (health, age, declining productions, increased debt etc.).

⁵ **Wairarapa Moana: The Lake and its People**. Published by Wairarapa Archive in association with Fraser Books. Chapter 14: The Saga of the Pouākani Block (pp.221-238), & Chapter 15: The Mangakino Township: Problems and Solutions (pp.239-260).

⁶ **Wairarapa Moana: The Lake and its People**. Chapter 15: The Mangakino Township: Problems and Solutions (pp.232).

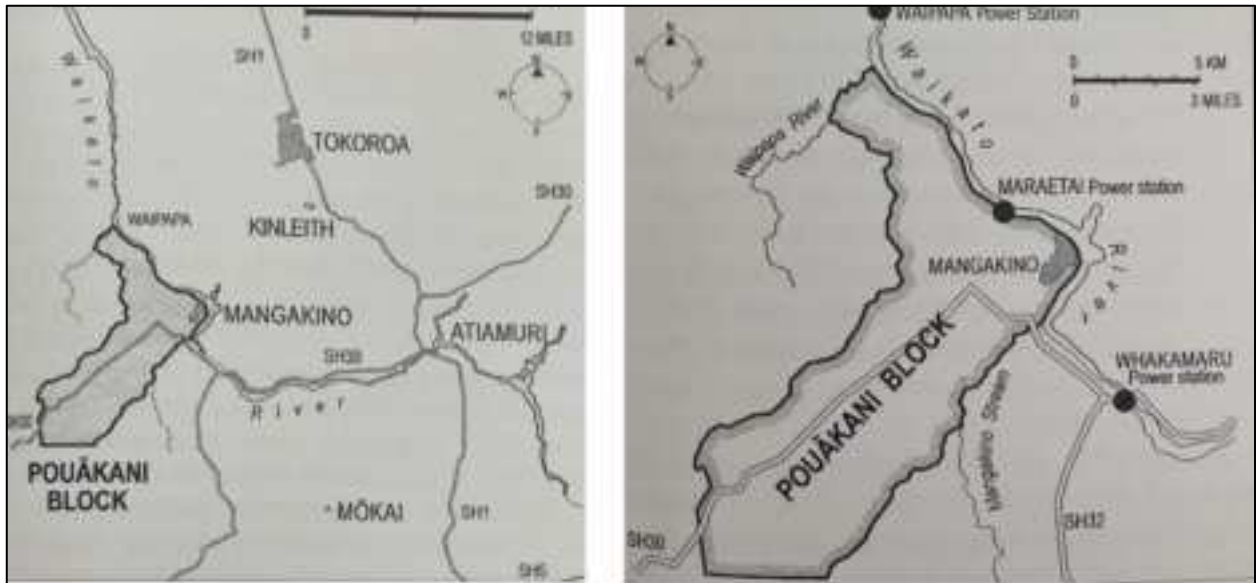


Figure 4: Maps of the Pouākani Block (pp223 – Wairarapa Moana – the Lake and its People)

As a further insult, following the Crown providing Wairarapa Māori with the Pouākani Block in the Waikato (1915), from 1942 "The Ministry of Works took the Pouākani Blocks flat, accessible land and left the Māori owners to develop the dry, hilly and more inaccessible surrounding area for forestry and farming."⁷

A difference in the treatment and assistance provided to Pākehā farmers at the nearby Whakamaru 'Rehab' farms (across the river), when compared to the Pouākani Block Wairarapa settlers is also documented⁸ (e.g. differences in financial support, interest rates for development loans, access to helicopters for spraying). Partly because of the Māori Land Development staff had incorrectly assumed that "the Government had given the land to Wairarapa Māori for free. So it was ungracious in the extreme of Wairarapa settlers to then begin complaining about how the land was being developed."⁹

It is understood that the Wairarapa owners voted to remove the Pouākani Block from the administration of the Department of Māori Affairs (DMA) in 1977, however it took until 1983 before a formal handover of the land to the Wairarapa Moana owners occurred (held at the Pouākani Marae). Despite this formal handover, it wasn't until a decade later (1993) that the DMA completed the process of obtaining legal Title for all of the land parcels. An indicative layout of the Pouākani Block rural land is included below (Figure 5).

⁷ Waitangi Tribunal Report – Waitangi ki Tararua Report, 2010 (Ref: pp241 of Wairarapa Moana: The Lake and its People.)

⁸ **Wairarapa Moana: The Lake and its People.** Published by Wairarapa Archive in association with Fraser Books. Chapter 14: The Saga of the Pouākani Block (pp.228).

⁹ **Wairarapa Moana: The Lake and its People.** Published by Wairarapa Archive in association with Fraser Books. Chapter 14: The Saga of the Pouākani Block (pp.227-228).

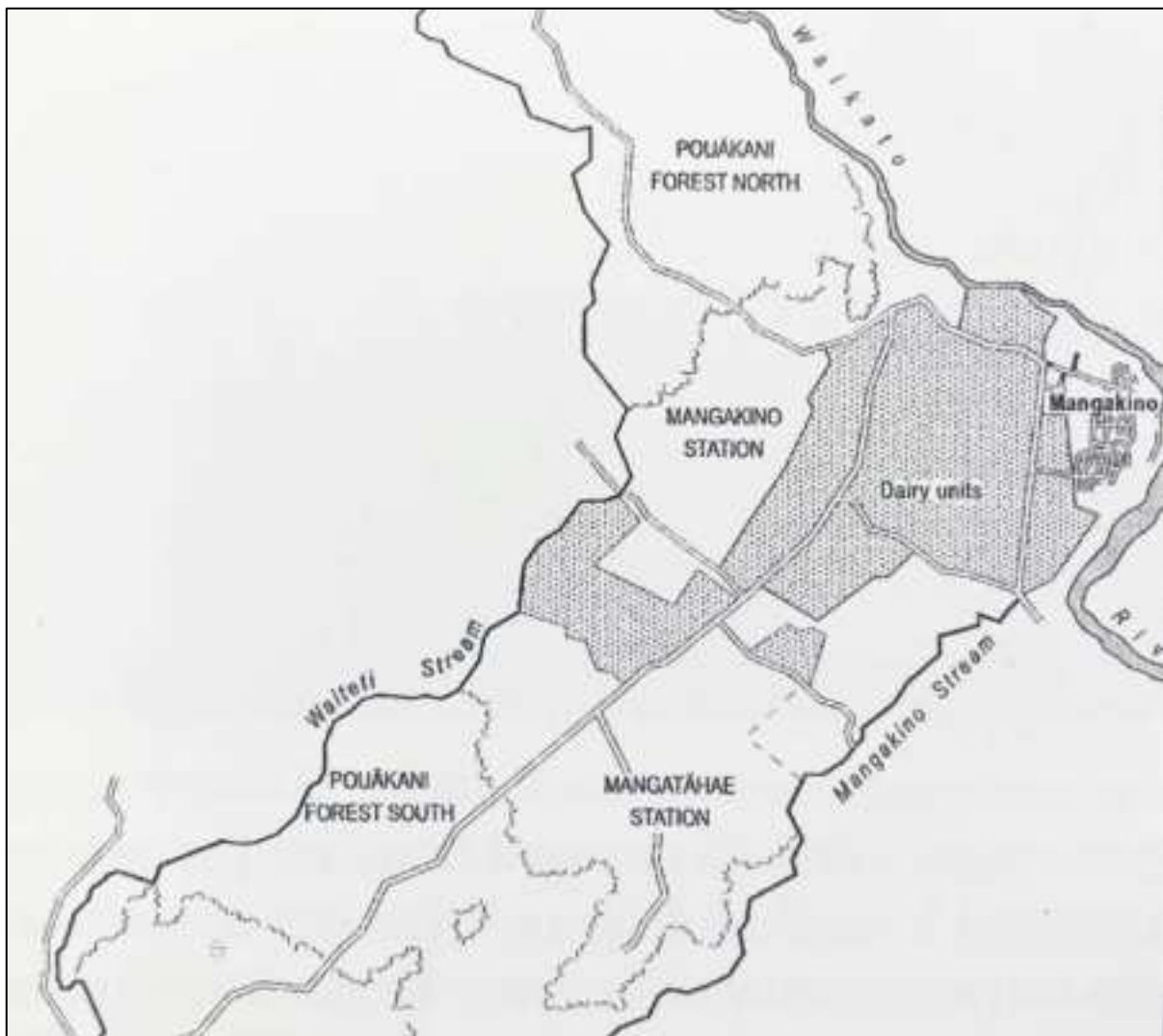


Figure 5: Layout of Pouākani Block land (pp241 – Wairarapa Moana – the Lake and its People)

From 1999, the owners began a significant period of new investment in the land and area (particularly dairy farming), starting with the appointment (by the Māori Land Court) of Kingi Smiler and Ron Mark as Trustees to oversee the amalgamation of the former two owner entities (being the 'Pouākani No.2 Trust' and the 'Proprietors of Mangakino Township Incorporation'). The amalgamation was complete in 2002 with the establishment of Wairarapa Moana ki Pouākani Incorporation (WMI) as the representative of original owners provided this land back in 1915.

Land has been released by the Māori landowners in three notable stages. Initially 12 Sections in Korari Crescent were sold between 1977 and 1981, followed by a further 100 residential sections (and the Tourist Lodge) between 1984 and 1986, then the majority of the town was sold by tender in 2002.

There has been a consistent mismanagement of WMI lands by Government entities over the past century, and it is noted that the Waitangi Tribunal recommendations and findings included compensation for; the burden of the administration of the Mangakino leases (approximately 40 years of nil return), taking land for the construction of the Maraetai Dam, and for the loss of productivity occasioned by the powerline corridors across WMI land.¹⁰ As noted in the Evidence of Murray Hemi, in the Matter of Proposed Waikato Regional Plan Change 1, “WMI hold and maintain a relationship to their lands of an equivalent nature to that of *tangata whenua*, upholding all the traditional functions of an *iwi* group including *kaitiakitanga*. ... WMI lands are *tangata whenua* ancestral lands.”¹¹

Lastly, while it is beyond the scope and understanding of this landscape assessment to make assertions on the cultural significance of this land, it is important to note that WMI have consulted with a local Hapu Kaimatua to obtain a cultural narrative of the area and the specific sites of this rezoning proposal. Based on this traditional knowledge of the area, which precedes the transfer of land to Wairarapa Māori, WMI have confirmed that there are no Wahi Tapu sites that exist on either of the potential development locations within the Mangakino Township.

Mangakino Context

Today Mangakino is a small Township (approx. 900 permanent residents) that is located on a set of river terraces on the western shore of Lake Maraetai (Waikato River). While originally established in the 1940s to accommodate workers involved in hydroelectric projects along the Waikato River, it has in recent times become a hub for tourists and outdoor enthusiasts seeking water-based activities (i.e. fishing, boating, water-skiing/wakeboarding, rowing and kayaking), although hiking/mountain biking in the nearby forests is also a popular activity.

The wider landscape context is considered to also include the broader WMI owned farmland that is located west of the township (Figure 6). Prior to 1915, this land was relatively undisturbed and was comprised of dense native bush, scrub, tussock and underground cavities¹². South of the township, the Mangakino Stream joins the Waikato River at about the beginning of what is now Lake Maraetai. The Mangakino stream originates much further south and essentially defines the south-eastern boundary of the Pouākani Block.

¹⁰ **Wairarapa Moana: The Lake and its People**. Published by Wairarapa Archive in association with Fraser Books. Chapter 14: The Saga of the Pouākani Block (pp.237).

¹¹ Evidence of Murray Hemi on Behalf of Wairarapa Moana ki Pouākani Incorporation (July 2019), In the Matter of the Proposed Waikato Regional Plan Change 1, Block 3 Hearings, Supplementary Evidence in response from Council Officers to questions from Hearing Panel: Question 18: Ancestral Lands.

¹² **Wairarapa Moana: The Lake and its People**. Published by Wairarapa Archive in association with Fraser Books. Chapter 14: The Saga of the Pouākani Block (pp.222).



Figure 6: Mangakino Context Map 2

Lake Maraetai is at its widest adjacent to the Mangakino Township near the lakefront boat access ramp, and then narrows as it flows around to the west toward the Maraetai PowerStation. A well vegetated lower lakeside terrace and escarpment (Figure 7) acts as an interface between the lake and town, including Lakefront Reserve/Playground, Golf Club, Disc Golf, Waikato River Trail, Rowing Club and Matekuri Island Camping Reserve.



Figure 7: Aerial View of Mangakino (Cover Page of Attachment 1 – Graphics Package)

Land Based Viewpoints (VP's A to Y)

Mangakino Township is accessed (Attachment 1: Sheet 01) from Waipapa Rd via two separate entrances. The southern entrance has an entry statement located at the Rangatira Drive intersection (Viewpoint A: Sheet 06), with open views across farmland (backdropped by the Kinleith Forest east of the Waikato River) continuing along Waipapa Rd (Viewpoints B, C & D: Sheets 07, 08 & 09) until you arrive at the northern entrance which is the Lake Road intersection (Viewpoint E: Sheet 10). This northern entrance is adjacent to the local cemetery (Viewpoint F: Sheet 11), however intervening landform screens views of the Lake Rd proposal site from Viewpoints E and F.

Lake Road then drops down as you approach the township and both arms of the Lake Road intersection (Viewpoint G: Sheet 12) obtain a view toward the Lake Road site frontage (with the onsite storage pile being an obvious point of reference).

You can also enter Mangakino from the north-west along the Waikato River Trail network (Viewpoint H: Sheet 13) which obtains expansive views across Lake Maraetai. The Waikato River Trail then turns inland and meanders up a gully before joining Lake Rd at the western corner of the WMI Lake Rd site (Viewpoint I: Sheet 14). Trail users then stay on Lake Rd and re-join the off-road network at the Mangakino Lakefront Reserve. Views from the front terrace edge (Viewpoint J: Sheet 15) of the WMI Lake Road site take in Lake Maraetai and glimpse a band of native bush that clothes the adjacent escarpment. The south-eastern corner of the Lake Road site (Viewpoint K: Sheet 16) doesn't obtain lake views, but the roadside tree planting creates a pleasant avenue of trees as you enter the Mangakino Township.

A key intersection within Mangakino is where Lake Rd and Rangitira Drive meet (Viewpoint L: Sheet 17), as this is the connection point for the primary town vehicle loop. In this view, Lake Maraetai Lodge (which neighbours the WMI Lake Road site), the recently developed Lakeview Place are prominent. The urban area east of the WMI Lake Rd Site includes the open frontage of Pouākani Marae (Viewpoint M: Sheet 18) as well as glimpses to the terrace edge that is part of the propose rezoning (Viewpoints N & O: Sheets 19 & 20).

From the end of Lake Rd, there is direct views and access out to Lake Maraetai (Viewpoint P: Sheet 21) and the lakefront reserve presents as a very high amenity recreation area. Dense vegetation exists along the escarpment where the lakefront terrace transitions to the nearest residential sections on Kārori Crescent and Waipoua Street, which notably limits the presence of buildings.

The town centre (Viewpoints Q, R & S: Sheets 22, 23 & 24) is essentially a single block along Rangitira Drive, positioned in the heart of the Mangakino urban footprint, approximately 300m from the WMI Karamū St rezoning option. This community hub includes, eateries/takeaways, Four Square, Health Centre, Fire Station, Library, Post Office, and Gym. West of the town centre, there are number of other community activities such as the Mangakino School and Community Pool, Rangiamokura Te Kohanga Reo, St Johns Ambulance Service, Gospel Chapel and Mangakino District Services & Citizens Club.

Heading toward the eastern edge of Mangakino along Rimu Street (Viewpoints T & U: Sheets 25 & 26), the WMI proposed is visible between the road and the lake. A key connection to this

southern rezoning option is along Taniwha Street, where access through the existing line of dwellings is possible across from Rotomanu Cres (Viewpoint V: Sheet 27), as well as by continuing along at the end of Taniwha Street (Viewpoint W: Sheet 28).

At the southern township entrance (Viewpoint X: Sheet 29), like most of the Mangakino perimeter, there is clear demarcation between the rural and urban characters. The retention of this abrupt change in density (i.e. no transitional space of lower density lifestyle sections) is a notable attribute of the Mangakino urban form. The final view is looking south across WMI farmland (Viewpoint Y: Sheet 30).

Lake Viewpoints (VP's 1-6)

The water-based views are organised from north to south, at an approximate distance of 150m out from the lakes edge. From directly north of the WMI Lake Road site (Viewpoints 1 & 2: Sheets 31), the densely vegetated escarpment adjacent to the lake promotes a very natural setting. Larger exotic tree species are evident on the top of the terrace (some within the proposed rezoning site), but the flatter nature of the terrace means that the farmland is not prominent when viewed from the lake. The Rowing Club main building (which straddles the WMI proposed Rezoning site) is the most prominent building and a wide concrete driveway provides access to the lake edge. The monoculture texture of the forestry on the other side of the river (as well as areas of harvested forestry) are also prominent features.

It is noted that, when positioned out on the lake in front of the WMI Lake Rd site, views north (rather than south toward the site) reveal a relatively low amenity forestry operation (Figure 8). From the open surface of the lake, views are readily available in every direction and so it is important to acknowledge that views are not specifically directed toward the Lake Road site.



Figure 8: View north from on Lake Maraetai

In lake views positioned offshore from Kōrari Crescent and Waipoua Street (Viewpoints 3 & 4: Sheets 32) the Rowing Club building and a string of residential properties become notable along the top of the lakeside escarpment. The inclusion of dwellings does not detract from the pleasantness of the lake setting, however they do represent a well-integrated and recessive visual component. When considering the Kōrari Cres lake edge properties (Figure 9), the escarpment vegetation acts as the primary visual buffer, while the height restriction and a further backdrop of taller vegetation, assists with ensuring that the built form does not dominant the naturalness of lake edge interface.



Figure 9: View of Kōrari Crescent properties.

Further around to the east of Mangakino (Viewpoints 5 & 6: Sheet 33) the WMI owned Taniwha Street site is visible behind low vegetation along the golf course lake edge. There is a less abrupt change in terrace elevation here (when compared to near the Lake Road site), and so the current farmland appears much more visually open when viewed from the water. However, it is noted that much of the site is out of view on the upper terrace.

Aerial Context Viewpoints (VP's 7-12)

A series of aerial views were also captured with a drone from above WMI owned land and the Lake (Viewpoints 7 to 12: Sheets 34 & 35). These are purely used as a contextual tool to assist with understanding the relative positioning of the proposed rezoning sites.

Historical Land Use

The proposed WMI locations have had a prior urban land use, and this is a key factor when considering the receiving landscape's ability to accommodate this residential rezoning. The original Mangakino Village layout was implemented by Waikato Hydro-Electric Development

and included (Figure 10); including an original 24 lots within Karamū St site (former 'Tapare Crescent'), and a suite of industrial operations centred around the Sawmill and Timberyard at the Lake Road site (including Bus Barn, Cement Shed, Coal Yard and accessory buildings).

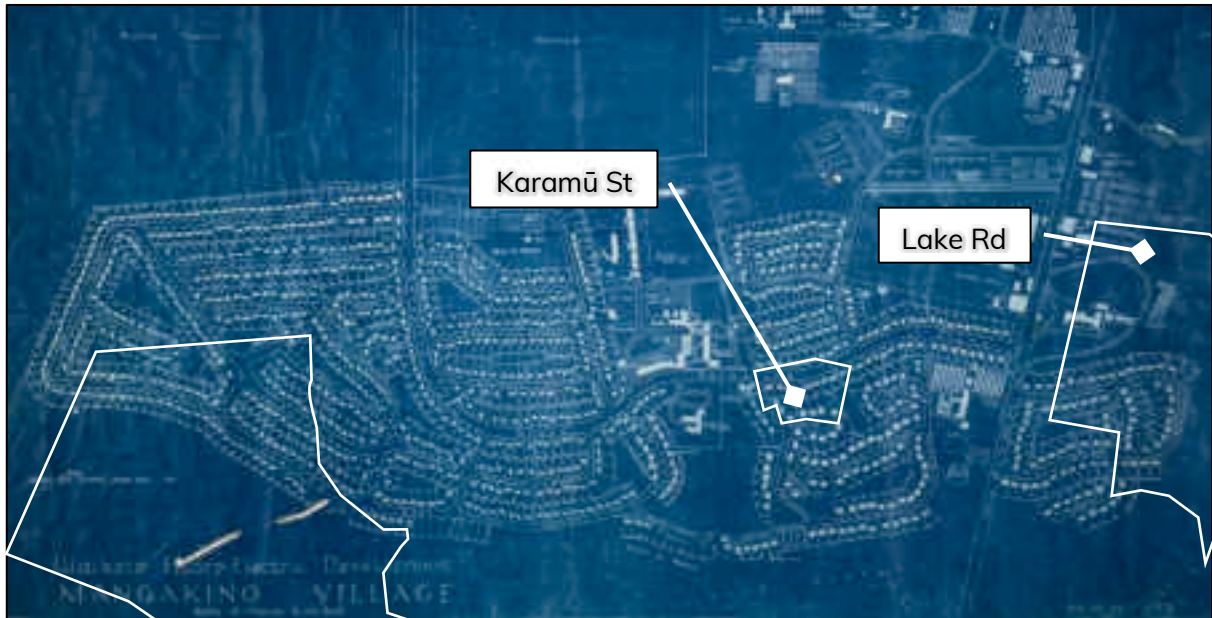


Figure 10: Mangakino Village - Blueprint for the Future (Source: Info board in Mangakino Town Centre)

This historic non-rural land use (Figure 11) highlights a difference between the WMI proposal and many other residential rezoning proposals throughout New Zealand, as this development promotes a return to a former urban utilisation on land that has previously been compromised by extensive land modification. Following the completion of the areas Dam construction projects, the population of Mangakino dropped, and by 1985, the Taupō County Planning Map (Figure 12) indicated that the Karamū Street site no longer had residential dwellings.



Figure 11: Aerial view of Mangakino, Waikato. Photograph taken 21 October 1953 by Whites Aviation.



Figure 12: Taupō County District Planning Map – Mangakino Urban Area (1985)

Outstanding Natural Feature and Landscape (ONFL)

The Waikato River is unique as New Zealand's longest river (covering some 425km), with the entirety of this River (within the Taupō District), being recognised as an ONFL¹³. While the Waikato River is undoubtedly an ONFL in relation to its values as a prominent formative landscape feature in the district (physical), the afforded scenic beauty (perceptual), recreational opportunities and cultural associations (associative), it is however important to also acknowledge the extensive modifications to this river that have taken place.

As identified in the ONFL schedule, the river has a number of hydroelectric power dams within the district which have significantly altered the river near these Dams. In relation to dammed Lake Maratāi, being the Waikato River interface with Mangakino and two of the potential WMI rezoning sites, the original alignment of the river was significantly narrower and set back a much greater distance from the current water's edge. The previous river alignment is displayed on 'Attachment 1: Sheet 03', having been extracted from Retrolens aerial imagery captured in 1946.

¹³ Extract from the District Plan Schedule identifying ONFL56 is included in Appendix 2.

The key attributes identified for the Waikato River ONFL, come from the Taupō District Landscape Assessment¹⁴, and includes:

- being a highly prominent feature;
- unique as NZ's largest river;
- presence of 5 hydroelectric PowerStation's.
- high level of amenity and recreational value; and
- very high historical significance (as a main access corridor through the North Island);

It is considered that a sympathetically implemented residential development (adjacent to existing areas of residential development) would not diminish the wider values of this river.

Site Description

Karamū Street Site

This 2ha site is centrally located, being approximately 300m from Mangakino Township hub. It is a relatively flat land parcel that is bordered by (Figure 13); the Gospel Chapel (south-east corner); Rangiamokura Te Kohanga Reo (western boundary); Mangakino School sports fields (southern boundary) and Mangakino Rugby League Club/grounds (across Wairenga Rd to the north. It was formerly part of Tapere Crescent and is not considered to have any notable landscape constraints.



Figure 13: Surrounding Context of the WMI Karamū St Site

Lake Road Site

This 15.6ha site (Attachment 1: Sheet 04) is positioned between Lake Rd (southern boundary) and Lake Maraetai (northern boundary), with Lakeview Place and Kōrari Crescent abutting the eastern boundary and additional WMI owned land to the west (which includes the Waikato River Trail pathway). The current site use is primarily lucerne cropping, with occasional grazing. The majority of the site (Figure 14) is situated on an upper terrace that has a relatively gentle rolling gradient and a few groupings of exotic trees. The lake escarpment has a well-established band of native bush species.

¹⁴ Isthmus Group. *The Outstanding and Amenity Landscapes of the Taupō District* (2006)



Figure 14: Surrounding Context of the WMI Lake Rd Site

Issues

Based on background context outlined throughout the earlier sections of this report, the proposed change from a Rural Environment zoning to a Residential Environment Zoning is surprisingly not considered to result in an issue relating to the loss of rural character or amenity.

The sites in question have already seen extensive modification and urban use during a previous employment 'boom' when the Waikato River dams were under construction. Utilising these areas for future urban (residential) growth, is considered to be an appropriate return to a previously established land use, with the receiving landscape having already demonstrated an ability to accommodate this type of development.

The key landscape concern in this instance, instead relates to the expectations around visual amenity afforded to the immediately adjacent properties, which have progressively been transferred to private ownership over the past few decades. While WMI have the vision and justification to explore opportunities for growth around the edge of the existing township, private land owners understandably have expectations around the degree of anticipated development on adjoining Rural Environment.

Therefore the main landscape issues are considered to be;

- Potential adverse landscape and visual amenity effects on nearby residential properties; and
- Ensuring that the treatment of perimeter development appropriately integrates with the receiving environment (be that neighbouring residential properties, roads, escarpments or the lake/river edge).

Landscape Effects Assessment

'Landscape', as a western term, is conceptualised as an overlap between; the natural/built components/processes (physical), meanings we associate with places (associative), and how we perceive/experience places (perceptual). The combination of these three dimensions, in conjunction with the statutory framework, forms the baseline of the following landscape assessment.

It is noted that in Te Ao Māori, the somewhat limited concept of 'Landscape' has an deeper mātauranga layer (Figure 15) which additionally recognises; genealogical connections to land and people (Whakapapa), direct interaction with the land and its people (Hikoī) and ancestral knowledge (Kōrero tuku iho). All of which have a holistic relationship to the whenua.

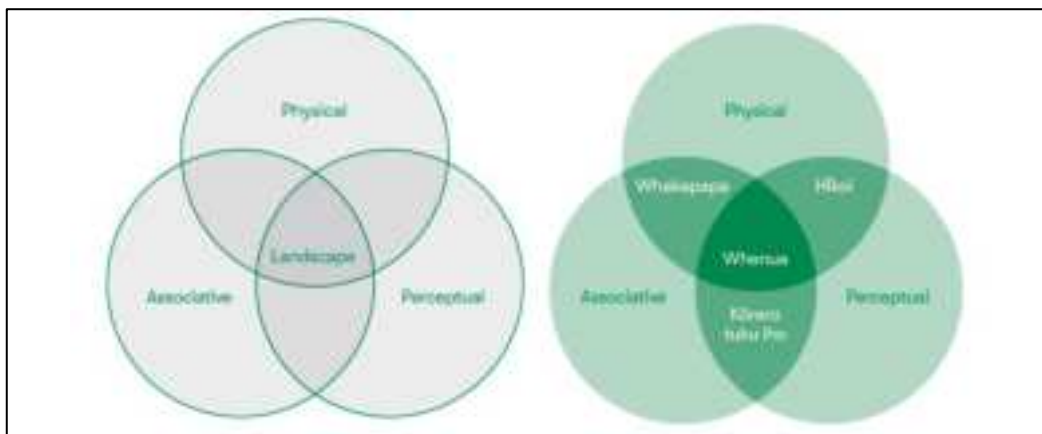


Figure 15: Graphic Depiction of 'Landscape' as a Concept (Te Tangi a te Manu- pp.72)

The receiving environment of the following effects assessment is considered at two key scales. Firstly, at the wider Mangakino scale, which considers the context of the existing urban township and its interaction with the lake and adjacent farmland. Secondly, at the site scale which relates to each of the three proposed WMI rezoning locations.

Summary of Landscape Values of the Receiving Environment

Based on the information contained in the 'Existing Landscape Description' section above, the following landscape values are considered to be relevant to this assessment;

Physical

Mangakino Township is a highly modified setting that is situated on a series of stepped river terraces adjacent to the south-eastern shore of dammed Lake Maraetai (Waikato River) flooded landscape. The expansiveness of the lakes surface is at odds to the historical river alignment which was a deeply incised and narrow river corridor (as evidenced along other parts of the Waikato River. However, the controlled water level of Lake Maraetai promotes an exceptional recreational water sports setting.

The town configuration and residential density is essential is a remnant of what was to be a 'temporary' village, erected to assist with the construction of the Waikato Hydroelectric Dams. A notable characteristic is the abrupt delineation between residential sections and open farmland, with essentially no transitional density. Both of the proposed WMI rezoning sites have been previously modified for either residential or industrial activities. Remnant river terraces escarpment features, to varied degrees, also (particularly at the River Road site).

Perceptual

The lake/river surface and its margins are appreciated for their scenic qualities, as well as for allowing more distant views to surrounding geological features or landscapes (e.g. backdrop of the Kinloch Forest or prominent peaks of Whakaahu and Kaahu). The Lake Rd site has a higher amenity presence due to proximity to Lake Maraetai, and development on this site will be visible from on the adjacent parts of the lake.

Associative

The area has a rich cultural history, with the Pouākani Block landowners (WMI) having acted as kaitiaki of this whenua for the past century. The river itself has very high historical significance as an access corridor through the North Island. At present, the recreational opportunities on offer for both water and land based activities are highly valued by both the community and visitors.

The corner of the Lake Rd site is where the Waikato River Trail transitions away from the lake edge. Also, neither of the sites have recorded areas of Wahi Tapu that would limit development opportunities.

Landscape Effects

"A landscape effect is an outcome for a landscape value. While effects are consequences of changes to the physical environment, they are the outcomes for a landscape's values that are derived from each of its physical, associative, and perceptual dimensions. Change itself is not an effect: landscapes change constantly. It is the implications of change for a landscape's values that is the effect" ¹⁵

As the first stage of the Mangakino 2060 vision, WMI are seeking to rezone land so that there is a degree of certainty around implementing non-rural activities on these sites. The act of rezoning, will not in itself have a tangible adverse landscape effect, however it will enable a return to urban development at a residential scale.

¹⁵ Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines. Page 135, 6.01-6.03.

Mangakino (Wider Scale)

While the proposal will allow for the alteration of land use from a farming activity to a residential activity, in the context of Mangakino Township, the proposed rezoning presents as a reinstatement of a previous urban extent. As all of the proposed sites are located directly adjacent to the existing Residential Environment zoning, the urban footprint of Mangakino will be maintained as a defined edge between rural and residential, and from public (land and water based) locations the landscape amenity is considered to be maintained.

Overall, the potential adverse effect on Landscape Values at the Mangakino Township scale is considered to be **Very Low**.

Lake Road (Site Scale)

For the Lake Road site, some physical landform modification will be necessary to provide access across the site, however due to the former use as a sawmill/timber yard, the site is already well suited to accommodate a degree of earthworks. Perceptually, the Waikato River Trail access point along Lake Road is considered to act as a notable gateway into the township. There is an existing gully landform feature that this trail follows (across WMI land) near the western boundary of the site, and the intention to extend the urban limit to this gateway, will maintain a defined threshold between urban and rural land use.

It is also noted that the parcel of land immediately west of the Lake Rd site contains a former Council fill disposal area, and while its inclusion would make sense in relation to consolidation of available flat land, it is acknowledged that residential development could not be located here. This however does not preclude the land from providing a complimentary use (e.g. access or open space opportunities) in the subsequent design phase.

The built development along the lake edge escarpment will need to be managed so that it provides a consistent level of character and amenity as the Kōrari Crescent lakeside interface. The recent creation of Lakeview Place also demonstrates how residential scale development can be suitably accommodated into this setting. Overall, the potential adverse effect on Landscape Values at the Lake Rd Site is considered to be **Low-Moderate**.

Karamū Street (Site Scale)

The site has previously been used for residential sections, and it has close proximity to the Mangakino town centre, Education facilities and other community facilities. Residential use here will result in a seamless reintegration with the Mangakino urban form. Overall the potential adverse effect on Landscape Values at the Karamū St Site is considered to be **Low**.

Outstanding Natural Feature and Landscape 56 – Waikato River

This assessment has also considered the Waikato River, as it is identified as an Outstanding Natural Feature and Landscape. The key consideration, as extracted from Schedule 7.1 of the District Plan, is to ensure that subdivision, use and development does not adversely affect the identified landscape attributes. Those attributes are identified above and it is considered that the proposed WMI rezoning will not appreciably impact these attributes.

The scale of ONFL56 is also relevant, with the Mangakino interface on the dammed Lake Maraetai being only a brief part of the Waikato Rivers' journey from Taupō to Karapiro. The rezoning proposal will not compromise the Waikato Rivers status as; a prominent feature, NZ's longest river, an area of high amenity and recreational value, or as a highly significant cultural feature. Overall, the potential adverse effect on ONFL65 is considered to be **Very Low**.

Visual Effects

*"A visual effect is a kind of landscape effect. It is a consequence for landscape values as experienced in views. Visual effects are a subset of landscape effects. A visual assessment is one method to help understand landscape effects."*¹⁶

For the purpose of the rezoning proposal, the viewing audience is categorised as; public views from the adjacent road network or river/lake, and private views from adjacent landowners. No private properties were visited during the site visit, however the representative viewpoints contained within Attachment 1 are sufficient to consider potential adverse visual effects. It is noted that, as displayed in Figure 2 of this report, land to the east of all the proposed sites is owned by WMI, as well as land to the south of the Lake Rd and Taniwha St sites.

Lake Road

The public views of this site can be obtained from a small section of the Waikato River Trail (that is on WMI land), from along Lake Road (Attachment 1: Viewpoints I & K), Kōrari Crescent and Waipoua Steet (Attachment 1: Viewpoints N & O), and from views obtained from the lake/river (Attachment 1: Viewpoints 1, 2 & 3).

While there will be an obvious change from a rural landuse to residential development, the location and context of the site (including historical landuse) will ensure that the proposed Residential Environment rezoning will integrate seamlessly with the receiving environment.

¹⁶ Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines. Page 135, 6.08.

The private views, obtained from the immediately adjacent sections to the east, are not generally orientated toward the site, rather they are orientated north or east. The implementation of future development will need to be sympathetic to the adjacent residential sections, with the recent Lakeview Place subdivision has demonstrated how this could be appropriately achieved.

Overall, the potential adverse effect on visual amenity values surrounding the Lake Rd site are considered to be **Low** on both the adjacent private views and public views.

Karamū Street

The public views of this site can be obtained from along Karamū St and Wairenga Rd. WML own the adjacent Rangiamokura Te Kohanga Reo and Gospel Chapel, while TDC own the rugby ground to the north and the Ministry of Education control Mangakino School to the south. Essentially, the potentially affected private views are from properties on the eastern side of Karamū Road (facing the site).

As the site was historically part of Tapere Crescent (with Karamū St actually being the southern portion of the Tapere Crescent loop), and it is located in close proximity to the Mangakino town centre, the visual change resulting from reverting the site to residential is considered to be an appropriate proposal.

Overall, the potential adverse effect on visual amenity values surrounding the Karamū St site (public and private views) are considered to be **Very Low** on the public views and **Low** on the adjacent private views.

Summary - Landscape and Visual Amenity Effects

The following table provides an effects overview of the propose rezoning.

Effect Type	Location	Adverse Effect
Landscape	Mangakino (Wider Scale)	Very Low
	Lake Rd (Site Scale)	Low-Moderate
	Karamū St (Site Scale)	Low
	ONFL56	Very Low
Visual Amenity	Lake Rd - Public Views	Low
	Lake Rd - Private Views	Low
	Karamū St - Public Views	Very Low
	Karamū St - Private Views	Low

Mitigation Discussion

The rezoning proposal is an initial step toward WMI being able to consider development in Mangakino that align with their vision for the township. Most of the potential mitigation of effects will come through the subdivision design phase, after rezoning has been achieved. The key landscape issues identified earlier in this report remain as;

- Potential adverse landscape and visual amenity effects on nearby residential properties; and
- Ensuring that the treatment of perimeter development appropriately integrates with the receiving environment (be that neighbouring residential properties, roads, escarpments or the lake/river edge).

It is considered that rezoning these sites to General Residential Zone is appropriate in relation to landscape and visual amenity. Prior to the subdivision stage enabling development on these sites, a detailed subdivision design will be developed to, at a minimum, address the subdivision matters of control/discretion (Sub-R2). At which point measures can be incorporated such as;

- Application of the Height Restricted Area (northern edge of lots at the Lake Rd site);
- Demonstration that earthworked batters can be revegetated with indigenous species;
- Addresses fencing typology and height to maintain a high level of amenity at the site perimeter (potentially including permeable fencing where lots front the lake);
- Include street tree planting along newly formed roads;
- Indicate a potential pedestrian/cycle connection to the Lake forshore;
- Allow for the provision of stormwater treatment throughout the site (e.g. consider utilising stormwater to enhance an ecological corridor at the River Road site); and
- Identify how the site development acknowledges the historic land use (e.g. configuration/naming).
- Include native planting along the lake edge where stability issues have been identified by the Geotechnical Engineer.

It is noted that similar approaches have been previously adopted (e.g. DEV-5: Whareroa North¹⁷). This will ensure that the sites are developed in a manner that is sympathetic to the receiving environment. This level of detail is not considered necessary for the Karamū St site, which is much smaller and would likely follow a configuration that is similar to the previous Tapere Crescent.

¹⁷ Taupō District Plan – 14.5 DEV5 – Whareroa North

Lastly, in relation to the Height Restricted Area overlay at the Lake Road site, it is considered that a 75m setback from the boundary would be appropriate (Figure 16). This recognises the relative elevation of the site in relation to the Lake Maraetai proximity, along with the varied contours and terraces of this land.



Figure 16: Height Restriction Overlay (suggested 75m setback across the Lake Rd WMI Site)

Conclusion

Based on the above assessment of landscape and visual amenity effects, it is considered that the two proposed WMI rezoning sites would be capable of accommodating a Residential Environment zoning.

The rezoning itself won't cause an adverse landscape effect. However, to ensure future development is well integrated into the receiving environment, it is recommended that an Outline Development Plan is prepared for the WMI Lake site.

A significant contributing factor, which has diminished potential adverse landscape and visual amenity effects, is the historical context relating to the Pouākani Block and Mangakino Hydroelectric Dam Village. With both of the sites having previously held an urban landuse.

It has been concluded that the level of landscape and visual amenity effect, as a result of rezoning to General Residential Zone, does not exceed a **Low-Moderate** adverse effect (Minor) for the Lake Rd site, or exceed a **Low** adverse effect (less than minor) for the Karamū St site.

Joshua Hunt
Registered NZILA Landscape Architect

Appendix 1: Effects Scale

The following table outlines the scale of effects used within this assessment. Rather than duplication of this table for both Landscape Effects and Visual Amenity Effects, the conjunction 'or' has been used within the table to provide for either of these two effect assessment categories. It is noted that while the primary consideration is typically in relation to negative effects of a proposal, effects can also be neutral or positive.

Very High	Total loss/modification of key elements / features / characteristics, i.e. amounts to a fundamental change of landscape character or visual amenity.	Significant Effect
High	Major loss/modification or loss of most key elements / features / characteristics, i.e. substantial change to the pre- development landscape character or visual amenity.	Significant Effect
High-Moderate	Loss/modification of several key elements / features / characteristics of the baseline, i.e. the pre-development landscape character or visual amenity remains evident but is distinctly changed.	More than Minor Effect
Moderate	Partial loss/modification to key elements / features / characteristics of the baseline, i.e. new elements may be prominent but not necessarily uncharacteristic within the receiving landscape or views.	More than Minor Effect
Low-Moderate	Minor loss/modification to one or more key elements / features / characteristics, i.e. new elements are not prominent or uncharacteristic within the receiving landscape or views.	Minor Effect Less than Minor Effect
Low	No material loss/modification to key elements / features / characteristics. i.e. modification or change is not uncharacteristic and integrates seamlessly within the receiving landscape or views.	
Very Low	Little or no loss/modification to key elements / features / characteristics of the baseline, i.e. approximating a 'no change' situation that is barely discernible.	

Appendix 2: Relevant Taupō District Plan

OPERATIVE

GENERAL RESIDENTIAL ZONE (13.1)

Objective

GRZ-O1: The maintenance and enhancement of the character and amenity of the GRZ.

Policies

GRZ-P1: Maintain and enhance the character and amenity of the GRZ by controlling the bulk, location and nature of activities to ensure activities are consistent with a residential scale of development, including an appropriate density and level of environmental effects.

GRZ-P2: Enable a range of small scale home based employment opportunities, and local community facilities and services to establish in the GRZ subject to:

- a. compatibility with GRZ amenity and character;
- b. avoidance of adverse effects on the function and amenity of the TCZ, and the adjoining road network; and
- c. a consistent scale of non residential buildings and activities that maintain residential coherence and amenity.

GRZ-P3: Any relevant [Structure](#) Plans, strategies or guidelines should be taken into account in the design of any development within the GRZ.

GRZ-P4: Encourage a wide range of appropriate activities and development within the GRZ while ensuring any adverse effects are avoided, remedied or mitigated.

GRZ-P6: Recognise the important role of reserves and their existing [infrastructure](#) and services (including those provided by commercial operators) in providing recreational opportunities for the community.

GENERAL RURAL ZONE (13.4)

Objective

GRUZ-O2: Enable a range of activities in the General Rural Zone that are compatible with and cumulatively do not erode rural character.

Policies

GRUZ-P1: Maintain the general rural character, as defined by;

- a. A predominance of Primary Production Activities
- b. [Renewable Electricity Generation Activities](#) and electricity transmission and distribution, including [geothermal areas](#)
- c. Generally large open spaces between built [structures](#)
- d. A mix of [buildings](#) related [Primary Production](#), visitor accommodation, tourism activity and [Rural Industry](#)
- e. Generally infrequent vehicle movements to and from a [site](#)
- f. [Effects](#) generated from rural activities including [noise](#), vibration, odour, [dust](#) and light spill
- g. Limited signage that directly relates to the activity operating on the [site](#).

LAND DEVELOPMENT (6.3)

Objective

LD-O5: Ensure land development does not detract from the amenity value or qualities of the local environment.

Policies

LD-P17: Ensure that proposals for the subdivision and development of land assess the particular amenity values of the area including the physical characteristics of the land and avoids, remedies or mitigates any adverse effects.

LD-P18: Subdivision and subsequent development shall either maintain or enhance, but not detract from, the significance of features or areas of cultural, spiritual, historical, landscape or natural value, (as identified through the provisions of this Plan).

LD-P19: Enable the creation of allotments below any minimum allotment size identified as a controlled activity in this Plan for the exclusive purpose of providing or enhancing public or private access, or to exclusively accommodate a complying network utility activity and infrastructure.

LANDSCAPE VALUES (10.3)

Objective NFL-O1: Protect Outstanding Landscape Areas from inappropriate subdivision, use and development which may adversely affect the Landscape Attributes.

Policies

NFL-P1: Ensure use and development is located and designed in a way that protects the [Landscape Attributes](#) of Outstanding Natural Features and [Landscapes](#).

NFL-P2: Protect Outstanding Natural Features and Landscapes from more than minor adverse visual effects of [earthworks](#), including more than minor visible scarring or more than minor adverse change to the natural landform or natural feature.

NFL-P3: Avoid the erection of built structures that will have more than minor adverse visual effects on the [Landscape Attributes](#) of Outstanding Natural Features and [Landscapes](#), or will result in cumulative adverse effects from increased built density.

NFL-P4 Where SNA - Significant Natural Areas are within Outstanding Natural Features and [Landscapes](#), avoid, remedy, or mitigate more than minor adverse visual effects of [Indigenous Vegetation Clearance](#) on the [Landscape Attributes](#) of the [Outstanding Natural Feature and Landscape](#).

NFL-P5: Remedy or mitigate potential adverse effects of use or development on the attributes of Outstanding Natural Features and [Landscapes](#), giving consideration to:

- a. The suitability of the site for the proposed use or development.
- b. Recognise specific site requirements for some uses or development.
- c. The scale, location, design and nature of the use or development, and whether it will be sympathetic with the [Landscape Attributes](#) of the [Outstanding Natural Features and Landscapes](#).
- d. The ability to remedy or mitigate significant adverse effects.
- e. The extent of any disturbance or modification to the [Outstanding Natural Features and Landscapes](#) as a result of use or development, including potential impacts of [earthworks](#) and the ability of earthworked areas to be rehabilitated.
- f. The visual impact of [Indigenous Vegetation Clearance](#) within SNA - Significant Natural Areas on the [Landscape Attributes](#), and the ability to revegetate cleared areas with appropriate indigenous species.
- g. The effectiveness and appropriateness of proposed mitigation to address adverse landscape and visual effects of use or development, including appropriateness of mitigating vegetation to screen or soften built structures, and ongoing maintenance of mitigation planting.

HEIGHT RESTRICTION OVERLAY (GRZ-R5.7)

Maximum Building Height: 5m within Height Restricted Areas

FORESHORE PROTECTION (GRUZ-R3)

Rule

Any building on or above ground within a Foreshore Protection Area is a discretionary activity.

Assessment criteria

- a. All actual and potential effects of the activity to be considered.

SCHEDULE OF SITES (Schedule 10.3 - NFL)

ONFL56 – Waikato River

Highly prominent feature although secluded from most viewing locations due to high cliff sides. Unique as NZ's largest river covering some 425km in distance from its source at Lake Taupō. The water quality is best at the headwaters, providing a distinctive turquoise blue colour.

Presence of 5 hydroelectric power dams within the District has significantly altered the river in those locations and these dams, their associated hydroelectric power structures, and the Taupō Control Gate structure are not included within the area of the outstanding landscape. Remaining free flowing river and lake areas provide a high level of amenity and recreation for local communities. Kayaking value depends on water flows - best around 100 to 150 cubic metres per second. National kayaking slalom site near Reids Farm, and play hole feature down stream of Huka Lodge, and wave feature at Ngawaapurua Rapids, located down stream of Aratiatia Power Station - ideal surfing level from 180 to 240 cubic meters per second. Very high cultural significance as historical access through the North Island.

SUBDIVISION (SUB-11)

Rules

SUB-R2: Matters of Control/Discretion GRZ, MRZ, LRZ, NCZ

- a. The design and layout of the [subdivision](#) to ensure safe and efficient access onto existing and/or proposed [roads](#), suitable building platforms to accommodate future complying [buildings](#), and adequate management of [stormwater](#).
- b. The identification of any natural hazards or contaminated [sites](#) and how these may affect the stability of the [land](#) and suitability of any future [building sites](#), including any information provided by a suitably qualified person whose investigations are supplied with the [subdivision](#) application.
- c. Whether the desired environmental outcome with a consistent and appropriate standard of [infrastructure](#) is achieved such as through compliance with the Council's Development Guidelines and Development Area Plans.
- d. The extent to which [earthworks](#) and vegetation removal is required to create vehicle tracks and building platforms.
- e. Any actual or potential [effects](#) on areas or features of cultural, historic, landscape or natural value as identified in [the plan](#).
- f. The imposition of conditions in accordance with Sections 108 and 220 of the Resource Management Act 1991.
- g. Any potential adverse [effects](#) from natural hazards, including flood inundation or erosion from the District's waterways and [Lakes](#).
- h. In the case of [subdivision](#) at Whareroa North, additional matters as set out in [DEV5-Whareroa North](#).

APPENDIX 3: Condensed Timeline of The Pouākani Block and Mangakino Township

The information and dates below are extracted from Chapter 14 (the Sage of the Pouākani Block) and Chapter 15 (The Mangakino Township) of 'Wairarapa Moana: The Lake and its People'. This is not intended to be an exhaustive overview, but simply a brief summary of key dates relating to milestone of the Pouākani Block land.

- 1915** - The lands provided to WMI in 1915 as substitution for the loss of ancestral lands in the Wairarapa were all that were on offer and made available by the Crown.
- 1942** - The Department of Works and the State Hydro-electric Department began occupying land, which was the cause of significant impediment to the development ambitions of the Māori landowners.
- 1946** - The Crown under the Public Works Act, officially required a portion of the unoccupied Pouakani Block alongside the Waikato River to build a "hydroelectric station", with Mangakino being established to house the hundreds of construction workers needed and their families.
- 1948** - The Pouākani land was still desolate.
- First return on the land this year by selling the cutting rights to the native bush.
- 6 single men arrived from the Wairarapa.
- 1949** - the first pastures were appearing.
- 20 more men arrived in 1949 (Selection criteria = Decendent of an owner and single).
- 1950** - 25 Wairarapa Men were working on the land development scheme, living in the No.4 single working mens camp alongside the hydro-station construction workers.
- By July, approximately 1/3 of the 30,000 acre block was suitable for development.
- 1956** - The 'Proprietors of the Mangakino Township Incorporation' (MTI) was appointed by the Maori Land Court in May 1956 to represent the collective interest of the owners, and sought to settle the terms of the township lease with the Crown.
- 1958** - 23 Farms established on the Pouākani Block.
- 1959** - After years of negotiations, an agreement was reached (lease agreements) in June 1959 with the newly named Ministry of Works.
- The Committee were aware of the need for new industry and opportunity in the region.
- 1961** - The ministry of Works undertook a survey of the Mangakino Township and determined the town had certain shortcomings (including its isolation and lack of industry) which did not "indicate a favourable future for the town" (predicting a population decrease from 6,400 to approx. 1000).
- 1962** - lack of on-farm investment apparent and noted in a Letter from the District Officer.
- The Committee agreed to gift the towns existing sewerage, water reticulation and drainage services to Taupō County Council in return for Council upgrading stormwater, drainage, roading/ footpaths.
- The first freehold commercial sale was to the Waitomo Electric Power Board
- 1963** - Severe drought.
- Auckland based land agent (Barfoot and Thompson) negotiated the sole right to purchase houses and locate them on vacant Mangakino town sections.
- 1966** - The Ministry of Works formally surrendered its lease over the town.
- 1967** - Development Scheme Debt \$1,108,000.
- 1969** - Another severe drought.
- 1970** - Department of Māori Affairs released 16,000 acres for a JV with NZFP (pine plantation).
- The Maraetai Dam construction was completed.
- 1972** - Existing Pouākani Farms were consolidated into 18 larger dairy units and two sheep and beef properties (incorporating additional land beyond the original 23 smaller farm units).
- The Committee decided to begin farming in its own right and took up a lease on Farm 5 (a development scheme farm) and established a 150 head dairy operation. This was a significant milestone and Farm 5 was later renamed 'Matene Farm' to mark this initiative.
- Tamateapokaiwhenua (The Whare) at Pouākani Marae was opened by Te Atairangikaahu.

- 1976** - The MTI Committee sought shareholder permission to sell 12 sections on the newly created Korari Crescent, citing declining school rolls, and vacant shops as evidence of the need for new growth and initiate.
- 1977** - Special General Meeting on 22 January, Wairarapa Moana owners agreed to remove the Pouākani block from Department of Māori Affairs administration and return control to the owners. DMA agreed, however the Māori land court required agreement from 40% of the owners.
- At a Special General Meeting held at Pouākani Marae, the owners agreed to the sale of 12 sections. Despite a profit made from the sale, the sections took 4 years to sell.
- 1983** - In March, the Māori Land Court intervened on behalf of the owners and vested the land into the Pouākani 2 Trust, appointing the Committee of Management of the Proprietors of the Mangakino Township Incorporation (The Committee) as the Trustee.
- In July 1983, there was a formal hand over of the land at Pouākani marae, giving the first actual opportunity of the Committee to assess the quality and potential of their farmland.
- The Committee saw sharemilking as the best way to increase production and performance.
- 1983 to 1989** - The Committee began investing in capital purchases, along with significant spending on fertiliser, pasture recovery, and repairs and maintenance. The Trust making a profit in just half of these first 16 years of operation.
- 1984** - The Committee formally advised the Department of Māori Affairs of its intention to seek redress on behalf of the owners for inadequacies of the administration and supervision of farm leases, and also rejected the proposed 10% interest rate on loans associated with the land development.
- After a few years of 'flip-flopping' for various reasons, the owners voted to approve a motion to freehold 100 sections and the tourist lodge.
- 1986** - By February 1986 all 100 sections had sold.
- 1988** - The committee proposed further sales and was met by opposition.
- 1989** - The committee lodged a claim before the Waitangi (August) due to dissatisfaction with the performance of the Department of Māori Affairs in managing the Pouākani Land Development Schemes (and unwillingness to take responsibility for many of the scheme's failings).
- 1993** - Department of Māori Affairs complete task of confirming legal title over each of the farm units (10 years after the formal handover).
- 1996** - Enough support from Pouākani Owners to proceed with an application to the Māori Land Court to amalgamate the two entities that the Committee managed. Being the Pouākani No.2 Trust and the Proprietors of Mangakino Township Incorporation.
- 1999** - Māori Land Court remove the Committee and appointed Kingi Smiler and Ron Mark as Trustees to provide independent stewardship through the process of amalgamation.
- 2000 to 2002** - significant period of new investment and dairy expansion under the new Trustees resulting in the highest recorded level of production, improved net profit and engagement with the local community and dairy industry.
- 2002** - The amalgamation was completed, with the establishment of Wairarapa Moana ki Pouākani Incorporation (WMI).
- 2004 to 2005** - The Committee presented evidence to the Waitangi Tribunal (December 2004) and counsel made closing submissions (June 2005).
- 2007** - The Marae Complex was destroyed by arson.
- 2010** - Waitangi Tribunal recommendations and findings include; compensate the Pouākani landowners for burden of the administration of the Mangakino leases (approximately 40 years of nil return), redress/compensate the owners for the land taken for the construction of the Maraetai Dam, and compensate Wairarapa Māori owners for the land at Pouākani for the loss of productivity occasioned by the powerline corridors.
- 2012** - New Marae complex was opened.

References

Evidence of Murray Hemi: on Behalf of Wairarapa Moana ki Pouākani Incorporation (July 2019), In the Matter of the Proposed Waikato Regional Plan Change 1, Block 3 Hearings, Supplementary Evidence in response from Council Officers to questions from Hearing Panel: Question 18: Ancestral Lands.

Ian F. Grant. (2012). *Wairarapa Moana: The Lake and its People.* Published by Wairarapa Archive in association with Fraser Books.

- Chapter 14: The Saga of the Pouākani Block (pp.221-238)
- Chapter 15: The Mangakino Township: Problems and Solutions (pp.239-260)

Pouakanimarae.nz/History

Wairarapamoana.org.nz



Detailed Site Investigation Report

**37 Lake Road and 3 Karamu Street
Mangakino**

**15 May 2026
Job# 210606
Rev A**

Detailed Site Investigation Report 37 Lake Road and 3 Karamu Street Mangakino

This report has been prepared for Wairarapa Moana Ki Poukani inc (The Client) by Geohazard Environmental Ltd. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other parties.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

The contents of this report comply with good practice and professional standards. It has been approved for release and signed by a Suitably Qualified and Experienced Practitioner.

Quality Assurance Statement		
Task	Responsibility	Signature
Prepared	Susan M ^c Lachlan	
Reviewed	Jonathan Findon	
Approved for issue	Jonathan Findon	

Revision Schedule		
Revision	Reason	Date
Original Report	-	27 June 2025
A	Major Change. Merged 37 Lake Rd and 3 Karamu Street into single report for Plan change. Updated recommendations and conclusions etc	15 May 2026

Prepared by:

Geohazard Environmental Ltd

PO Box 7053

Rotorua 3042

Telephone: 0800 GEOHAZARD (436 429)

Job No.: 210606

E-mail: info@geohazard.co.nz

Detailed Site Investigation Report 37 Lake Road and 3 Karamu Street Mangakino TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
Recommendations	4
Remediation Possibilities	5
 1.0 INTRODUCTION	 6
1.1 Background and Objectives	6
1.2 Scope of Work	6
1.3 Limitations	7
 2.0 SITE OVERVIEW	 8
2.1 Site Identification	8
2.2 Summary of Site History	11
2.3 Previous Investigations	12
2.4 Current and Future Use	13
2.5 Geology and Hydrology	13
2.6 Climate	13
2.7 Additional Site Information	13
 3.0 SITE CONDITION AND SURROUNDING ENVIRONMENT	 15
3.1 Site Inspection – 37 Lake Road	15
3.2 Summary of Potential Contamination Risks Identified	19
3.3 Initial Conceptual Site Model	20
 4.0 DISPOSITION OF SITE CONTAMINATION	 25
4.1 Basis for Soil Contaminants Standards (SCS)	25
4.2 Field Sampling and Analysis	27
4.3 Results – 37 Lake Road	32
4.4 Results – 3 Karamu St	42
4.5 Quality Control	45
 5.0 SITE CHARACTERISATION	 54
5.1 Type of Environmental Contamination	54
5.2 Extent of Environmental Contamination	54
5.3 Potential for Degradation and Interaction	55
5.4 Additional Risk Assessment	55
5.5 Exposure Routes and Risks to Exposed Populations	56
5.6 NES Consents	60
5.7 Other Consent Requirements	62
 6.0 PROPOSED SITE REMEDIATION/MANAGEMENT OPTIONS	 63
6.1 Remediation Objectives	63
6.2 Option 1 – Remediation Earthworks	64
6.3 Option 2 - Site Management (Capping)	64
6.4 Option 3 – Soil Mixing	65
6.5 Completion Reporting	66

7.0	CONCLUSIONS AND RECOMMENDATIONS	67
8.0	REFERENCES	68
APPENDIX A	SITE, SAMPLE AND RESULTS PLANS	
APPENDIX B	LABORATORY RESULTS	
APPENDIX C	UCL RESULTS	

EXECUTIVE SUMMARY

Wairarapa Moana Ki Poukani inc (The Client) has commissioned Geohazard Environmental Ltd to prepare a Detailed Site Investigation (DSI) Report to investigate 37 Lake Road and 3 Karamu Street Mangakino for the presence of contaminants. The primary purpose of this is to investigate whether contaminants are present at high levels that would warrant further action prior to use for the proposed activities.

This report summarises Geohazard Environmental Ltd.'s investigation, and has been prepared following the Ministry for the Environment's Guidelines for investigations involving potentially contaminated land (referred to herein as the MfE Guidelines). The report consisted of a desktop study and interviews, to gather information about the site and its history, and a site inspection; this information was used to develop an initial conceptual site model, which identifies potential sources of contamination, pathways for release, and potential effects.

The findings reported herein indicate that, based on the conceptual site model and laboratory testing, contamination is present at the site at 37 Lake Road at levels that are in excess of relevant soil guideline values for some purposes. Remediation or Site management is recommended. 3 Karamu Street is suitable for residential use.

The presence of any contaminants at site, even at levels that exceed the relevant soil guideline values, does not necessarily mean that an unacceptable human health risk or environmental risk exists.

Specific conclusions and recommendations based on findings herein are summarised as follows:

Preliminary Site Investigation Summary

37 Lake Road

- Geohazard Environmental Ltd (PSI) issued a Preliminary Site Investigation (PSI) on 02 September 2021. The PSI found:
 - There was evidence of potential contamination at the site and given the historical uses of the site (a sawmill and associated services), the potential for contamination on parts of the site couldn't be wholly discounted.
 - From at least 1946 until at least 1963 a sawmill, timber store and associated services and sawdust disposal areas are on various areas of the site. It is more likely than not that the following HAIL activities occurred on the site:
 - **HAIL A.17:** *Storage tanks or drums for fuel, chemical or liquid waste.*
 - **HAIL A.18:** *Wood treatment or preservation including the commercial use of antisapstain chemicals during milling, or bulk storage of treated timber outside.*
 - Further review of historical site layout plans, and assessment of laboratory results indicates that there is no evidence of wide-scale timber treatment at the site.
 - **HAIL E.1:** *asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition.*

- **HAIL E.3:** Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process.
 - **HAIL F.4:** Motor vehicle workshops.
 - **HAIL F.7:** Service stations including retail or commercial refuelling facilities.
 - **HAIL F.8:** Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances.
 - **HAIL G.5:** Waste disposal to land (excluding where biosolids have been used as soil conditioners).
 - **HAIL H:** Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment.
 - **HAIL I:** Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.
- The site is considered to be a “**piece of land**” under NES legislation.
- From at least 1953 until sometime between 1963 and 1976 the adjacent site had been used for rubbish disposal, coal yards, a stainers yard and a morgue (**HAIL H**), however, these activities had ceased by 1976 and the site had begun to be revegetated. Between 1963 and 1976 the sawmill ceased operating on the site and all structures excluding the bus bay were removed.
 - By 1983 the majority of site appears to be in pasture and an area in the northeast of the site is scrub covered. By 1995 rowing club buildings had been constructed in the eastern corner of the site and between 1995 and 2007 the bus barn along the southern boundary was removed.
 - A site inspection was conducted on 11/08/2021.
 - There was evidence of potential contamination at the site.
 - Given the historical uses of the site (a sawmill and associated services), the potential for contamination on parts of the site couldn't be wholly discounted at the time of the site inspection.
 - It is more likely than not that **HAIL A.17, E.1, E.3, F.4, F.7, F.8, HAIL H and HAIL I** activities have occurred.
 - The site is considered to be a “**piece of land**” under NES legislation.

3 Karamu Street

- From at least 1946, 3 Karamu Street appeared to support undeveloped assumed grazing land and construction of a road network appeared to be underway. By 1949, the property supported numerous residential properties and a section of a road. Between 1963 and 1976, 3 Karamu Street appeared to have been cleared to form undeveloped assumed grazing land.

Detailed Site Investigation Summary

37 Lake Road

- Geohazard Environmental Ltd staff returned to site on the 24th – 26th May 2023 to collect soil samples.
- Soil samples were collected from 25 locations at 3 depths on a 26m (S series samples). 51 surface level soil samples were collected on a 28m (A & T series samples) grid basis and 23 surface level soil samples were collected at c.19m intervals along the western boundary (W series). Targeted samples were collected in the vicinity of the Bus Barn (B Series), Cement Shed (C series) and Sawmill (M series) (a total of 15 locations). Where relevant, analysis was undertaken for a suite of metals, organochlorine pesticides (OCP), pentachlorophenol (PCP), polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbon (TPH) and/or asbestos.
 - All results for the suite of metals were within SCS guidelines for a commercial use.
 - Lead concentrations in samples A05, C02, C03, T22, T27, T29, T34, T36 and T42 exceeded SCS guidelines for a residential use. Additionally lead concentrations in sample C02 exceeded Eco SGV for a residential use and a number of samples contained lead concentration in excess of predicted background concentrations.
 - Zinc concentrations in sample W13 exceeded Eco SGV for both residential and commercial use and zinc concentrations in sample W13 exceeded predicted background concentrations.
 - Copper concentrations in sample T18 exceeded predicted background concentrations.
 - All samples tested for OCP, PAH, TPH and PCP contained levels below the laboratory limit of reporting and, therefore, below the human health or environmental criteria or within SCS guidelines for residential and commercial use and with Eco SGV.
 - Asbestos was present above BRANZ guidelines for residential and commercial use in samples A01 and C03.
- From the data available, it appears that soils in some sample locations in the south and centre of the site are affected by elevated lead concentrations above guideline values for a residential land use.
- The most likely source of the elevated lead is considered to be associated with the buildings associated with the operation of the sawmill. The most likely source of asbestos is also considered to be associated with buildings which have historically been on site.
- It is assumed the sawdust will be removed prior to any residential development. An assessment of gas generation potential has therefore not been made.
- A Remediation Action Plan/Site Management Plan is recommended. This will include additional soil sampling to delineate the horizontal and vertical extent of any contamination.

- As contaminants are above applicable criteria, it is considered likely that the District Council will require a **Restricted Discretionary Consent**. This will include provision of a Remediation Action Plan or Site Management Plan, followed by a Validation Report.
- Due to the nature of this investigation, it is not possible to detail the full extent of contamination at the site and neighbouring sites, and there remains a possibility that the site may have been impacted by previous site activities to a degree greater than apparent from results reported herein.
- The extent of any contamination at the site beyond the area of focus for this report and neighbouring sites is unknown at this stage.

3 Karamu Street:

- 30 surface level soil samples were collected on a 25m grid basis across the land parcel (sample locations 3K-01 to 3K-30). Each soil sample was individually analysed for a suite of metals and screened for asbestos (presence/absence).
 - Some samples contained cadmium, copper, lead, nickel and zinc above published background concentrations.
 - No asbestos was detected in the 30 samples screened.
 - Concentrations of all contaminants of concern were found to be within SCS for either a residential or commercial land use.
- 3 Karamu Street is considered suitable for either residential or commercial use. No further work regarding contaminated land is required at 3 Karamu Street.

Recommendations

The advice of a planner should be sought, or contact made with the District and Regional Councils, prior to undertaking any earthworks at the site, to ensure all rules are complied with.

Based on the results of this DSI, Geohazard Environmental Ltd recommend to Wairarapa Moana Ki Poukani inc that if the site at 37 Lake Road is to be developed remediation or site management should be undertaken.

As part of a Remediation Action Plan (RAP) a further assessment of the impacted areas would be undertaken to better constrain the extent of contaminants detected in soil samples taken from the site, in accord with the MfE Guidelines for the Management of Contaminated Land. It is envisaged that the assessment would comprise of the following:

- Additional soil sampling at surface and depth to determine the extent to which contamination may have occurred.
 - Samples should be collected at depth and horizontally around all areas where soil exceeds human health and waste acceptance criteria.
- Preparation of a Remediation Action Plan detailing findings and making recommendations going forward.

Remediation Possibilities

Remediation or Site Management is expected to be required on the site. Options include excavation and offsite disposal, onsite encapsulation, soil mixing, or some combination. **There are no technical limitations for remediation to be successful at the site.** Limitations will mostly be driven by cost and any desire to have titles clear of any site management requirements.

Some soils, where metals are above guidelines for residential use, could be managed by placing in appropriate zones, e.g. passive recreation reserves or any proposed commercial zones, provided controls are in place to manage discharges.

Alternatively, it may be possible to mix soils with onsite or imported clean soils to reduce overall contaminant concentrations. Mixing could be in-situ, or ex-situ where soils are excavated prior to mixing. Further investigations would be required to ensure that mixing is appropriate and may include field trials.

Asbestos impacted soils are not suitable for mixing but could be encapsulated on site or taken to a landfill facility. Onsite encapsulation of contaminated soils would likely be the most cost-effective method for dealing with some soils, especially soils where asbestos is present. That said, the site owner may prefer to not have long-term management requirements that encapsulation requires.

Offsite disposal of soils to landfill is a remediation option, although anticipated to be relatively expensive. It may be preferable to take selected soils only offsite to landfill, and manage other soils in place.

1.0 INTRODUCTION

1.1 Background and Objectives

Historically, the site at 37 Lake Road and 3 Karamu Street Mangakino has been used as a sawmill and then apparent grazing land. 3 Karamu Street was used for housing workers. Wairarapa Moana Ki Poukani inc requested that Geohazard Environmental Ltd investigate the site to determine whether environmental contamination might be present. The primary deliverable of the work is this Report, which includes conclusions as to the site's disposition with respect to known or potential environmental contamination, and, as appropriate, recommended steps needed to ensure that contaminant risk is mitigated for end-users of the site.

1.2 Scope of Work

Consistent with the MfE Guidelines for reports of potentially contaminated land, the following scope of work was undertaken:

- (i) Review of all relevant information, including searching for any previous reports pertaining to 37 Lake Road and 3 Karamu Street Mangakino. Sources were as follows:
 - Taupō District Council property file records.
 - The National Library of New Zealand.
 - Historical Certificates of Title.
 - Historical aerial images.
 - Archives New Zealand
 - Rowing Camp tenant
- (ii) Inspection of the site to assess its present state and any indications of potentially contaminating activities that have taken place historically or are currently occurring at the site.
- (iii) Preparation of this report, which includes all relevant information (collected from above), and complies with relevant reporting guidelines (MfE, 2003). Herein, this report will assess the following:
 - Whether previous and/or current on-site activities had or have the potential to cause on-site contamination.
 - The likely nature of any contamination.
 - The risks to future site users from any contamination.
 - The requirement for further on-site investigations to define the extent of any contamination.

1.3 Limitations

Geohazard Environmental Ltd has performed services for this project in accordance with current professional standards for environmental site assessments. No guarantees are either expressed or implied. This report does not attempt to fulfil the requirements of legal due diligence.

There is no investigation that is thorough enough to preclude the presence of materials at the site that presently, or in the future, may be considered hazardous. As regulatory criteria are subject to change, contaminant concentrations present and considered to be acceptable may, in the future, become subject to different regulatory standards that cause them to become unacceptable for existing or proposed land use activities.

Any recommendations, opinions or findings stated in this report are based on circumstances, facts and regulatory criteria as they existed at the time that Geohazard Environmental Ltd performed the work and on data obtained from the investigations and site observations as detailed in this report. Opinions and judgements expressed in this report, which are based on an understanding and interpretation of current regulatory standards, should not be construed as legal opinions. This report and the information it contains have been prepared solely for the use of Wairarapa Moana Ki Poukani inc. Any reliance on this report by other parties shall be at such party's own risk.

2.0 SITE OVERVIEW

2.1 Site Identification

The Site Comprises 2 land parcels located at 37 Lake Road, Mangakino and 3 Karamu Lane Mangakino.

- **37 Lake Road** - The site is listed on Taupo District Council files as Valuation ID: 073909904A. The site is legally described as Lot 3 DPS 433655 BLK II Whakamaru SD. The land parcel site is 150260m² in size.
- **3 Karamu Street** - This land parcel forms part of a cluster of lots legally described as Part Pouakani Block and listed on the Taupō District Council files as Valuation Number 0739400101 (Parcel ID 4323021). The land parcel is c.2ha in size.

Figure 1 illustrates the general locale of the site. In this report, reference to “the site” constitutes all land parcels combined.



Figure 1: Map View of the Site Location in Relation to Mangakino and Lake Maraetai

In Figure 2, the area located inside the red box is the site at 37 Lake Road.



Figure 2: 37 Lake Road, Mangakino, Lot 3 DPS 43655

In Figure 3, the area located inside the red box is the site at 3 Karamu Street.



Figure 3: 3 Karamu Street, Mangakino

2.2 Summary of Site History

37 Lake Road

From at least 1946 until at least 1963 a sawmill, timber store and associated services and sawdust disposal areas are on various areas of the site (**HAIL A.17, A.18, E.1, E.3, F.4, F.7, F.8, G.5 & I**).

From at least 1953 until sometime between 1963 and 1976 the adjacent site had been used for rubbish disposal, coal yards, a stainers yard and a morgue (**HAIL H**), however, these activities had ceased by 1976 and the site had begun to be revegetated. Between 1963 and 1976 the sawmill ceased operating on the site and all structures excluding the bus bay were removed.

By 1983 the majority of site appears to be in pasture and an area in the northeast of the site is scrub covered. By 1995 rowing club buildings had been constructed in the eastern corner of the site and between 1995 and 2007 the bus barn along the southern boundary was removed.

An aerial image dated 15/04/1953 shows the site during its operation as a sawmill including timber storage areas, ancillary buildings and the sawdust disposal area.



Historical Aerial Image 1: 37 Lake Road 1953 (Image Ref.:SN808 2136/2, Courtesy of Retrolens)

3 Karamu Street

From at least 1946, 3 Karamu Street appeared to support undeveloped assumed grazing land and construction of a road network appeared to be underway. By 1949, the property supported numerous residential properties and a section of a road. Between 1963 and 1976, 3 Karamu Street appeared to have been cleared to form undeveloped assumed grazing land.



Historical Aerial Image 2: Karamu Street 1950 (Image Ref.:SN808 2136/2, Courtesy of Retrolens)

2.3 Previous Investigations

37 Lake Road

Geohazard Environmental Ltd (PSI) issued a Preliminary Site Investigation (PSI) on 02 September 2021. The PSI found:

- There was evidence of potential contamination at the site and given the historical uses of the site (a sawmill and associated services), the potential for contamination on parts of the site couldn't be wholly discounted.
- It is more likely than not that **HAIL** activities have occurred, in particular E.1 ...*buildings containing asbestos in a degraded condition*, and possibly HAIL I ... *any other land use subject to intentional or accidental release of hazardous substances*....
- The site is considered to be a “**piece of land**” under NES legislation.

3 Karamu Street

In June 2020, Geohazard Environmental Ltd issued a Preliminary Site Investigation (PSI) relating to 38 Lake Road, 9, 44 and 46 Wairenga Road, 3 Karamu Street, 16 and 19 Commerce Street, the Hotel Service Lane, 19 College Street, 54 Rangatira Drive and the Rimu Street Block (issued under separate cover).

Pertinent information from the PSI has been incorporated in the main body of this report (where applicable), and the main findings of the PSI are detailed below:

- 38 Lake Road, 9, 44 and 46 Wairenga Road, 3 Karamu Street, 16 and 19 Commerce Street, 19 College Street, 54 Rangatira Dr and Rimu Street Block are considered to be a “**piece of land**” under NES legislation (however, it was noted that these areas may be revised as part of this DSI).

- Soil sampling and analysis for non-volatile contaminants (including but not limited to metals, asbestos, OCP and/or PCP) was proposed in various areas including around former temporary accommodation/former dwellings/old structures at 3 Karamu Street (and other sites).

2.4 Current and Future Use

The site currently supports undeveloped grazing land. It is understood that the site is being investigated for future development.

2.5 Geology and Hydrology

The site is generally flat in topography.

The geology is mapped as Late Pleistocene river deposits (Hinuera Formation) described as “*Cross-bedded pumice sand, silt and gravel with interbedded peat.*”

The nearest surface water feature is the Waikato River is located approximately 70m north of the Lake Road site. Lake Maraetai is located approximately 400m east of the Lake Road site and 650m east of the Karamu St site.

There are seven groundwater abstraction bores recorded within a 500m radius of the Lake Road site, the nearest of which is located approximately 100m east of the site. The bore (Well Number 72_9441) is shown on the Regional Council GIS website as being 5m deep. The bore was drilled in February 2007.

2.6 Climate

Rainfall is influenced by season with ~31% of rainfall expected in the winter months of June to August and ~22% during summer months of December to February. Heavy rainfall may occur in this region.

According to the National Climate Database, annual statistics normalised (average) for a given 30 year period (1981 – 2010) recorded at a station in Taupō were as follows:

Table 1: Average Climate Recorded over 1981 - 2010 at Taupō Aws

Description	Station	From - To	Annual
Total Rainfall (mm)	1858	1981 – 2010	960.1
Mean Air Temperature (Celsius)			11.7
Mean Daily Maximum Air Temperature (Celsius)			16.7
Mean Daily Minimum Air Temperature (Celsius)			6.8

2.7 Additional Site Information

Additional details concerning the site’s present disposition are summarised in Table 2 below.

Table 2: Summary of Additional Site Information – 37 Lake Rd

Zoning/Classifications	– All land parcels on the site are zoned “Rural Environment” in the Taupō District Plan.
Easements	– A Right of Way easement was established in October 1990.
Building Consents / Permits	– Taupo District Council holds no property files on the site, the Archive New Zealand files were reviewed on August 6 th , 2021, by Geohazard Environmental staff. The

	Archive New Zealand files contained maintenance records, but no building permits/PIMs issued for the site
Underground / Aboveground Storage Tanks	– Although not found specifically in the information accessed, it is possible that storage tanks have been on site given the previous use of the site as a sawmill.
Additional Features	– Archive NZ and historic aerial photos indicated that a sawmill, timber storage yard and associated buildings and services have been located on this site (HAIL A.18, HAIL E.1, HAIL E.3, HAIL F.8 and HAIL I). – Historic aerial photos indicate that Earthworks appear to have occurred on site (HAIL I). – Archive NZ and Historic aerial photos indicate a coal yard, a stainer yard, a morgue and a rubbish disposal site have been located immediately adjacent the western boundary (HAIL A.18, HAIL E.5, HAIL H and HAIL I).

Table 3: Summary of Additional Site Information – 3 Karamu St

Ownership	– Previous owners of the site have included The Proprietors of Mangakino Township Incorporated/The Proprietors of Mangakino Township. In August 2011, there was a change in name to Wairarapa Moana ki Pouakani Incorporation.
Zoning/Classifications	– 3 Karamu Street, and 44 and 46 Wairenga Road are zoned as “Rural Environment”, 9 Wairenga Road, 16 Commerce Street, 54 Rangatira Drive and 19 College Street are zoned as “Residential Environment” and 19 Commerce Street is zoned as “Town Centre Environment” in the Taupō District Council Plan.
Caveats / Covenants / Easements	– CTs refer to various building line restrictions and fencing covenants.
Building Consents / Permits	– As part of the 2020 PSI, the Taupō District Council property files were reviewed on 01 May 2020 by Geohazard Environmental staff. The property files contained various building permits/consents relating to the site.
Resource Consents	– No resource consents have been identified with respect to activities on the site from either the Waikato Regional Council or the Taupō District Council.
Underground / Aboveground Storage Tanks	– Information provided by the Client referred to a Dangerous Goods Licence issued to Telecom Central Ltd for a 2,300 litre Class 3 underground fuel storage tank (UST) and a 120 litre Class 3 aboveground fuel storage tank (AST). It is unclear if this relates to 19 Commerce Street, or the Telecom Exchange compound situated immediately adjacent to the north of 19 Commerce Street. The District Council property file for 19 Commerce Street included a plan associated with a 2003 application, which labelled a 1230 litre underground fuel tank and fuel vent external to the compound situated off-site immediately adjacent to the north.
Sewerage and Services	– The Taupō District Council GIS indicates that sewerage and services are present on-site.

3.0 SITE CONDITION AND SURROUNDING ENVIRONMENT

3.1 Site Inspection – 37 Lake Road

A site inspection of the accessible areas of the site was conducted on 11 August 2021. The inspection was conducted by Geohazard Environmental Ltd staff to examine the site and observe any evidence of contamination. Specific points noted are conditions at the site boundaries and visible signs of contamination or odours that might suggest contamination. A cursory inspection of factors that relate to site geology and hydrology is also performed to ensure consistency with what is known of the surrounding area. An overall picture of the site geology and hydrology is useful in assessing the transport potential of contaminants to or from the site.

Geohazard Environmental Ltd staff returned to site on 24th – 26th May 2023 to collect samples.

3.1.1 Conditions at Site Boundaries

Conditions at the site boundaries are as described below:

North – For the most part the land adjacent to the northern boundary was scrub, towards the eastern end there was some native bush and a grassed area of the Rowing Camp and grazing land at the western end.

East – Along the eastern boundary is the old hospital site and further north a recent subdivision.

South – Lake Road runs along the southern boundary, a concrete pad and bunker remain on a site which this site surrounds on three sides.

West – At the southern end of the western boundary is a gravel cycleway with recent native plantings, further north along this boundary is grazing land.

The site boundaries are defined by changes in slope angle, vegetation and wire fences. Fencing will not affect migration of any contaminants onto or off the site. The vegetation is unlikely to prevent contamination onto or off site, however changes in slope may assist or prevent contamination migration. The road along the southern boundary may form a barrier from offsite contaminants migrating to or from the site.

3.1.2 Visible Inspection, Signs of Contamination and Odours

The ground surface of much of the site investigated is in pasture, in good condition. There were no noticeable bare patches.

A cycleway and associated native planting now run along a section of the western boundary towards the lake before it veers to the west over the adjacent site.

The potential for ground contamination from use as a sawmill was confirmed via visual cues including building rubble, likely foundations were located under vegetation.

The northeast of the site is currently being used as a rowing camp with associated buildings and facilities.

Along the northern boundary the site slopes steeply down towards the Lake. Sawdust derived from the milling of native trees and containing steel cable was seen around the edges of the sawdust disposal area.

A landfill appears to be present adjacent to the site. A number of old vehicles were noted in a gully to the west, and it is considered possible that the gully was the edge of the tip-face.

From the visible indications, there are evident signs of potential contamination. The existence of building rubble and foundations, sawdust disposal and topsoil stockpiling validate the possibility of contamination being present from use as a sawmill and adjacent subdivision and rubbish disposal site. However, no widespread staining was observed.

During the second site visit on the 24th May 2023 Geohazard Environmental Ltd staff met with Michael Allan (Wairarapa Moana ki Pounakani Incorporation). The boundary fencing was discussed, and it was noted that the boundary fence is located inside the surveyed boundary. Additionally, the sawdust disposal area in the north of the site that was previously overgrown had been cleared and resown into pasture. A gully along the northern boundary had been cleared of vegetation, metal and concrete (it is noted that this gully is being set aside as a green space).

Photographs below show the general nature of the site.



Photograph 1: Looking north from part way along the western boundary. The area to the left of the gully is the historic rubbish disposal site, to the right is the site of interest.



Photograph 2: Looking Southeast from the Northwest Corner of Site.



Photograph 3: Section of Sawmill.



Photograph 4: The Recently Cleared Northeast Corner of Site (24 May 2023).



Photograph 5: The Recently Cleared Gully in the North of the Site (24 May 2023).



Photograph 6: Cable Remaining in the Cleared Gully in the North of the Site (24 May 2023).

3.2 Summary of Potential Contamination Risks Identified

The site history and site walkover information are combined to identify potential contamination risks.

Table 4, below outlines typical contaminants found on land uses similar to the site. It does not imply some or all the contaminants will be found on site.

Table 4: Contaminants on Similar Sites

Activity or Industry	Possible Contaminants	Possible Locations	Possible Vertical Extent	Notes
Motor Vehicle Workshops	Metals	Elevated concentrations in and around workshops and storage areas.	Surface soils (0.0 to 0.1m) likely to be affected by surface activities. Deeper soils may be affected by point-source spills etc.	A Bus Barn was on site, it is possible that this was also a workshop.
	Hydrocarbons	Fuel storage areas and workshops.	Deeper soils (to groundwater) may be affected by downward migration of hydrocarbons.	
Service Station	Metals	Elevated concentrations in and around workshops and storage areas.	Surface soils (0.0 to 0.1m) likely to be affected by surface activities. Deeper soils may be affected by point-source spills etc.	A Bus Barn was on site, it is possible that vehicles were refuelled here.
Sawdust disposal	Metals	Elevated concentrations within the disposed sawdust.	All disposed sawdust material may be affected. Deeper soils may also be affected by downward migration of contaminants.	Sawdust disposal occurred in the northeast of the site. It is likely sawdust is present in significant volumes.

Wood treatment or preservation	Dioxins, pesticides (including PCP and NaPCP), and metals	Elevated concentrations in and around unsealed timber yards and processing plants.	Surface soils (0.0 to 0.1m) likely to be affected. Deeper soils may be affected by downward migration of contaminants (such as PCP) or by point-source spills etc.	The site was used as a sawmill and timber store until between 1963 and 1974. It is not clear if timber was treated.
Buildings containing asbestos products known to be in a deteriorated condition	Asbestos	In and around old structures.	Surface soils (0.0 to 0.1m) likely to be affected. Deeper soil may be affected if ploughing/earthworks has occurred.	Most buildings that are or have been on site were constructed prior to 2000 and many are likely to have had asbestos containing products used in their construct. Most buildings have since been removed from site.
Pastoral Farming	Pesticides, metals	In and around sheds, near water supplies (mixing chemicals), animal holding yards and dips. Lower or residual levels across paddocks from fertiliser and pesticide broadcast application.	Surface soils (0.0 to 0.1m) likely to be affected by surface application of pesticides. Deeper soils may be affected where ploughing has occurred. Deeper soils may be affected by point-source spills etc.	No sheds on site. No animal handling yards or likely dip sites present. Cadmium likely to be most common contaminant if fertiliser use was extensive.
	Hydrocarbons	Fuel storage areas, sheds and workshops on farm	Deeper soils (to groundwater) may be affected by downward migration of hydrocarbons.	

3.3 Initial Conceptual Site Model

An initial Conceptual Site Model (CSM) is developed to understand how potential contaminants in soils may interact with receptors such as end users or the environment. The initial Conceptual Site Model is updated as more information regarding a site comes to hand, e.g. soil sample results.

Decisions regarding soil sample numbers and locations are partly driven by the CSM. Table 5 below shows the Initial CSM for this site.

Table 5: Initial Conceptual Site Model

Source	Receptor	Pathway	Pathway Complete?
Historic Sawmill and Timber Storage (37 Lake Rd) HAIL category A17: Storage tanks or drums for fuel, chemicals or liquid waste. HAIL category A.18: Wood treatment or preservation including the commercial use of antisapstain chemicals during milling, or bulk storage of treated timber outside.	Construction workers	Dermal contact	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible for contaminants associated with HAIL A.17 and A.18.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use from a storage and distribution centre to industrial and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – The site is currently grazing land.
		Ingestion	
		Inhalation of dust/vapours	

Source	Receptor	Pathway	Pathway Complete?
	General public	Dermal contact	Incomplete Pathway –It is unlikely that contaminants associated with HAIL use would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to surface water.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to groundwater.
Asbestos containing building products used the construction of historic sawmill buildings (37 Lake Rd and 3 Karamu St) E1: Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition	Construction workers	Dermal contact	Potentially Complete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. However, asbestos can be an immediate or short-term risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Asbestos may be present at a level that poses a risk to human health with a change in land use from production land to residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Potentially Complete Pathway – Asbestos may be present at a level that poses a risk to human health with a change in land use from production land to residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway –As no current disturbance works are occurring, it is unlikely that asbestos would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Incomplete Pathway – Asbestos will generally remain in the surface soils on the site.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Asbestos will generally remain in the surface soils on the site.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – The site and surrounding area is a highly modified ecosystem and asbestos will have a negligible risk to the environment.
		Dermal contact	

Source	Receptor	Pathway	Pathway Complete?
Historic Bus Barn in which a Motor vehicle workshop and/or service station areas were possible. (37 Lake Rd) HAIL category F.4: Motor vehicle workshops. HAIL category F.7: Service stations including retail or commercial refuelling facilities. HAIL category F.8: Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances.	Construction workers	Ingestion	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible for contaminants associated with HAIL F.4, F.7 and F.8.
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use from production land may require specific controls.
		Ingestion	
	Current site users	Inhalation of dust/vapours	Incomplete Pathway – The site is currently grazing land.
	General public	Dermal contact	Incomplete Pathway –It is unlikely that contaminants associated with HAIL use would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
	Surface water	Inhalation of dust/vapours	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to surface water.
Disposal of sawdust to land in the northeast of the site. (37 Lake Road) HAIL category G.5: Waste disposal to land (excluding where biosolids have been used as soil conditioners).	Construction workers	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to groundwater.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Potentially Complete Pathway – The site and surrounding area is a highly modified ecosystem. However, contaminant exceedances may impact on species and how they function on the site.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Potentially Complete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible for contaminants associated with sawdust disposal.
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use from production land may require specific controls.
		Ingestion	
	Current site users	Inhalation of dust/vapours	Incomplete Pathway – The site is currently grazing land.
	General public	Dermal contact	Incomplete Pathway –It is unlikely that contaminants associated with HAIL use would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
	Surface water	Inhalation of dust/vapours	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to surface water.
	Construction workers	Sediment and runoff directly into surface water discharging into nearby	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible for contaminants associated with sawdust disposal.
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use from production land may require specific controls.
		Ingestion	
	Current site users	Inhalation of dust/vapours	Incomplete Pathway – The site is currently grazing land.
	General public	Dermal contact	Incomplete Pathway –It is unlikely that contaminants associated with HAIL use would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
	Surface water	Inhalation of dust/vapours	Potentially Complete Pathway –The types of contaminants associated with HAIL use could potentially migrate to surface water.

Source	Receptor	Pathway	Pathway Complete?
		watercourses (The Waikato River is 70m North of the site).	
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Potentially Complete Pathway – The types of contaminants associated with HAIL use could potentially migrate to groundwater.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Potentially Complete Pathway – The site and surrounding area is a highly modified ecosystem. However, contaminant exceedances may impact on species and how they function on the site.
Land adjacent to a Landfill (37 Lake Road) HAIL category H: Any other land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment.	Construction workers	Dermal contact	Potentially Complete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. However, some contaminants such as asbestos can be an immediate or short-term risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use from production land to residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Potentially Complete Pathway – The site is currently grazing land, However, short term exposure to some contaminants such as asbestos can be an immediate or short-term risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Potentially Complete Pathway – The types of contaminants associated with HAIL use could potentially migrate offsite.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Potentially Complete Pathway – The types of contaminants associated with HAIL use could potentially migrate to surface water.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Potentially Complete Pathway – The types of contaminants associated with HAIL use could potentially migrate to groundwater.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Potentially Complete Pathway – The site and surrounding area is a highly modified ecosystem. However, contaminant exceedances may impact on species and how they function on the site.
Cadmium from fertilizer use on grazing land. Other minor contamination sources such as lead from buildings. (37 Lake Road and 3 Karamu Street)	Construction workers	Dermal contact	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Cadmium may be present at a level that poses a risk to human health with a
		Ingestion	
		Inhalation of dust/vapours	

Source	Receptor	Pathway	Pathway Complete?
HAIL category I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment			change in land use to rural residential and may require specific controls.
	Current site users	Dermal contact	Incomplete Pathway – The site is currently grazing land.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway –It is unlikely that cadmium migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Incomplete Pathway –Cadmium will generally remain in the surface soils on the site.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Cadmium will generally remain in the surface soils on the site.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Potentially Complete Pathway – The site and surrounding area is a highly modified ecosystem. However, cadmium exceedances may impact on species and how they function on the site.

4.0 DISPOSITION OF SITE CONTAMINATION

The disposition of any contamination at site must be confirmed with results from field sampling and analysis, and, for contaminated land, these results must be evaluated against soil guideline values (SGV), also known as soil contaminant standards (SCS). This section summarises appropriate SCS for the site, followed by Geohazard Environmental Ltd review of readily available information concerning the disposition of site contamination.

4.1 Basis for Soil Contaminants Standards (SCS)

A SCS is a first stage screening value that provides the concentration of a contaminant in soil to which people (and/or ecological receptors) on or near a site can be exposed without creating an unacceptable level of risk to health. For the protection of human health, SCS are derived by defining a critical receptor (e.g. a child of a certain age and weight) and defining tolerable daily intake for a particular contaminant. Then, using assumptions regarding exposure (e.g. amount, duration, pathway), the soil concentrations that would equal the tolerable daily intake are calculated. Exposure pathways reflect how people are exposed to contaminants.

SCS are based on generic exposure scenarios based on use. An exposure scenario is a combination of exposure pathways typical of a particular activity or use in which exposure to soil contaminants is likely to occur; an activity could be, for instance, a child playing in a residential area. The intent is to estimate the intake of a contaminant for each particular scenario. For simple risk assessment, generic use scenarios are used, with a standard combination of exposure pathways for each scenario. The generic use scenarios used for the SCS are intended to be typical of the great majority of situations in which New Zealanders may be exposed to soil contaminants.

The site investigated here is classed as Rural Environment by the Taupō District Council, and also considering the site's proposed residential and/or commercial use, the residential and industrial use scenarios, described in Table 6 below, are most relevant to this investigation. As a result, based on the MfE Guidelines, any results should be assessed against SCS given for this scenario. There are both more conservative and more liberal standards that could be applied; however, the one presented is appropriate both to the use classification of the site based on the information available.

Table 6: Use Scenario Most Relevant to this Report.

Parks / Recreational	Covers exposure at public and private green areas and reserves that are used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Residential	Covers standard residential lots for single dwelling sites with gardens, including home-grown produce consumption (up to 10 %).
Rural/ lifestyle block	Rural residential use, including home-grown produce consumption. Applicable to the residential portion of farms, but not productive parts of agricultural land.
Commercial/Industrial	Commercial / industrial sites with varying degrees of exposed soil.

SCS in this report, tabulated in Section 4.2.1, are taken from the National Environmental Standards (NES) and New Zealand Ministry for the Environment (MfE) wherever possible. In some cases, the MfE has not developed a specific SCS for some contaminants under some use scenarios. When MfE values are unavailable, guideline values from reputable sources such as the Australian National Environmental Protection Council (NEPC) are used, according to acceptable SCS sources and the hierarchy of use for these sources that is specified by the MfE (2007).

The NES for contaminated land was introduced in order to address a legacy of soil contamination in New Zealand that has resulted from the use, and improper storage and disposal, of chemicals in industry and agriculture.

The NES controls apply to “Land use change, subdivision, and disturbance of any land where, according to the best information available to the local authority, there has been a facility on the land, or a hazardous activity carried out on the land that may have involved the intentional or accidental discharges of hazardous substances that could now be a risk to human health”. Hence the NES is applicable to the present site due to the proposed use change. The NES contains SCS, and where present these supersede those previously published in MfE industry-specific guidelines.

4.1.1 Background Levels

The NES defines background as “natural background” levels. Background soil concentration predictions were developed by Landcare Research from geostatistical analysis of trace element data from regional councils, national soils database and GNS Science identifying associations with geological parameters adapted from the GNS Science QMAP geological map dataset. The applicable guidelines are shown in the tables in Section 4.2.1 below. Background levels are particularly relevant when considering whether soils are suitable for disposal as cleanfill.

Background soil concentrations are specifically mentioned in the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (2012) which is implemented by District and City Councils.

The Waikato Regional Council presents “background” trace elements data for selected elements in soil of the Waikato region. The most common method of estimating natural background values is sampling soil at native reserve sites where no direct human use has occurred (i.e. well removed from urban areas and fertilised land). This approach is applicable in New Zealand where we have experienced negligible atmospheric inputs of trace elements to soil.

Soil samples from 38 sites were reportedly chosen to represent background concentrations for the Waikato region. Their soil types represented the most common in the region but did not include peat soils (as these have quite different properties). Each sample was reportedly analysed for acid recoverable trace element content (except for total fluorine) and the 95th percentile was calculated for each element to give an upper limit for the natural range of concentrations (see the table below).

4.1.2 Environmental Protection Guidelines

In addition to human health standards, Regional Council typically requires that contaminants be assessed against guidelines for the protection of the environment. The applicable guidelines are shown in the tables below. The environmental guideline values used in this report are:

- User Guide: Background soil concentrations and soil guideline values for the protection of ecological receptors (Eco SGV) Consultation draft (Landcare Research 2019).
- Interim Environmental Guidelines as required.

The Eco SGV have been used as they have been developed as a nationally consistent method for assessing the ecological impact of contaminants in soil.

The Interim Environmental Guidelines have been used where no published Eco SGV is available and are based on the now defunct Auckland Council District Plan.

4.2 Field Sampling and Analysis

For this DSI, the Client's brief specifically entailed conducting field sampling and analysis, and this provides an evidentiary basis for determination of the disposition of contaminants at the site.

Information about the site indicates that HAIL (Hazardous Activities and Industries List) associated use has occurred, hence HAIL compounds associated with this use were chosen for analysis.

37 Lake Road

- Asbestos, and heavy metals are recognized as contaminants of concern at sites of historic buildings.
- Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPH) are contaminants of concern at vehicle workshops or where refuelling has been undertaken.
- Heavy metals and Pentachlorophenol (PCP) are contaminants of concern where treated timber has been stored.
- PAH, organochloride pesticides (OCP), heavy metals and asbestos are contaminants of concern on land adjacent historic landfill.

Soil samples were collected from 25 locations at 3 depths on a 26m (S series samples). 51 surface level soil samples were collected on a 28m (A & T series samples) grid basis and 23 surface level soil samples were collected at c.19m intervals along the western boundary (W series) in line with Ministry for the Environment guidelines. Where relevant, analysis was undertaken for a suite of metals, organochlorine pesticides (OCP), pentachlorophenol (PCP), polycyclic aromatic hydrocarbons (PAH) and/or asbestos.

Targeted samples were collected in the vicinity of the Bus Barn (B Series), Cement Shed (C series) and Sawmill (M series) (a total of 15 locations). Where relevant, analysis was undertaken for a suite of metals, pentachlorophenol (PCP), polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbon (TPH) and/or asbestos.

In addition, the W series samples collected from along the western boundary were composited (mixed) in the laboratory and analysed for a suite of persistent pesticides. The purpose of taking composite samples, i.e. samples that represent a mixture of several sub-samples taken from different locations, is to reduce needless laboratory expense – if contamination is present at high levels, even if some of the sub-samples are uncontaminated, the resulting sample will still reflect the presence of the contaminated sub-samples that went into the composite.

3 Karamu Street:

- 30 surface level soil samples were collected on a 25m grid basis across the land parcel (sample locations 3K-01 to 3K-30). Each soil sample was individually analysed for a suite of metals and screened for asbestos (presence/absence).

Samples were collected using a hand auger or trowel. The auger and trowel were cleaned between each sample location and a depth using Decon90 (a non-phosphate laboratory grade detergent) and deionised water. Samples were placed into laboratory supplied jars and placed into a chillibin. Samples were couriered to Analytica Laboratories in Hamilton under Chain of Custody documentation.

4.2.1 Soil Description

The topsoil at site is a dark brown silty sand at Karamu St and Lake Road. At Lake Road it was noted that in some sample locations where buildings have historically been located (some A, B and C series samples in the south of the site and samples T29, T30 and T31 in the centre of the site) the topsoil was underlain by gravel. Future sampling at depth may be required depending on development plans.



Photograph 7: Topsoil at Site.

In the north of the site at 37 Lake Road in the sawdust disposal area the soil profile was variable.

Typical soil profile in the south and west of the sawdust disposal area (sample locations S01, S10, S11 and S20-S25), horizon depths and thicknesses vary (shown on the right), the depths given on the left are at sample location S24:

0-200mm	Dark brown sandy silt topsoil.	} c.1m Silty sand - sand
200-250mm	Pale yellow silt.	
250-350mm	Black silty clay (only present at this location).	
350-1000mm	Light brown silt.	
1m- 1.25m	Pale yellowish tan sand.	
1.25 – 1.45m	Mid brown clay.	} 200-350mm thick
1.45 – 1.8m+	Yellowish orange clay.	



Photograph 8: Soil Profile at Sample Location S24 (0-450mm).



Photograph 9: Soil Profile at Sample Location S24 (250 - 700mm).



Photograph 10: Soil Profile at Sample Location S24 (700-1100mm).



Photograph 11: Soil Profile at Sample Location S24 (1.1 – 1.5m).



Photograph 12: Soil Profile at Sample Location S24 (1.3 – 1.7m).

Typical soil profile in the north and east of the sawdust disposal area (sample locations S02, S03, S06 – S09, S13 – S19), horizon depths and thicknesses vary (shown on the right), the depths given (shown on the left) are at sample location S07:

0-200mm	Dark brown sandy silt topsoil.	c.200mm thick
200 - 600mm	Sawdust (voids in some samples)	200-1100mm thick
0.6 – 2.1m	Pale yellowish tan silt become grey sandy silt.	200-1500mm thick
2.1m+	Mid brown clay becoming yellowish orange clay	



Photograph 13: Buried sawdust in the north and east of the earthwork area.

4.3 Results – 37 Lake Road

Some contaminant concentrations exceed guideline values. Per MfE Guidelines, all results reported herein that exceed SCS (for a residential use) are highlighted; this report uses grey highlighting to emphasise any results over guideline values.

4.3.1 Metals

The results from analysis of samples for metals are summarised in Table 7 below.

- All results were within SCS guidelines for a commercial use.
- Lead concentrations in samples A05, C02, C03, T22, T27, T29, T34, T36 and T42 exceeded SCS guidelines for a residential use.
- Lead concentrations in sample C02 exceeded Eco SGV for a residential use.
- Zinc concentrations in sample W13 exceeded Eco SGV for both residential and commercial use.

- Lead concentrations in samples A01-A04, A06, C01-C03, T17-T20, T22, T25, T27 – T34, T36, T42, T43, W09 and W16 exceeded predicted background concentrations.
- Copper concentrations in sample T18 exceeded predicted background concentrations.
- Zinc concentrations in sample W13 exceeded predicted background concentrations.

Table 7: Results from Analysis for Metals (all results in mg/kg).

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
A Series Results										
A01	3.6	0.24	<1.3	0.561	15.1	20.6	102	<0.025	5.47	189
A02	11	0.23	1.4	0.3	7.8	14.3	119	0.032	5.48	59.4
A03	4.9	0.37	4.4	0.4	9.3	16.1	135	0.11	8.92	67.8
A04	4.7	0.44	2.3	0.3	8.3	13.1	134	0.046	6.13	63.2
A05	4.9	0.42	1.5	0.29	14.2	22	431	0.053	7.27	62
A06	4.1	0.26	1.4	0.33	8.6	21.6	154	<0.025	6.04	78.3
B Series Results										
B01	3.3	0.51	1.7	0.26	5.3	11.8	17.3	0.077	4.3	31.6
B02	2.1	0.25	1.4	0.564	5.5	13.7	61.3	<0.025	4.8	33.4
B03	4.2	0.63	2.3	0.23	6.3	12.1	31.4	0.063	3.9	45.1
B04	3.1	0.27	1.9	0.44	6.7	14.3	93.4	0.035	7.13	64.3
B05	3.2	0.46	3	0.32	6.6	12.2	23.7	0.043	5.61	35.4
C Series Results										
C01	2.2	0.24	1.4	0.29	4.9	44.5	117	<0.025	5.23	30.8
C02	4.4	0.24	<1.3	0.29	12	56.7	2670	0.041	5.8	124
C03	2.7	0.27	<1.3	0.19	9.5	14.2	586	<0.025	5.74	74.7
C04	2.4	0.18	<1.3	0.28	5.5	89.6	98.9	<0.025	5.3	36.6
C05	2.2	0.19	<1.3	0.25	5.2	8.76	88.4	0.026	4.6	25.2
M Series Results										
M01	2.8	0.26	6.4	0.16	9.5	20.7	88.6	0.048	31.6	79
M02	3.3	0.31	2.6	0.092	4	16	24.5	0.054	2.7	53
M03	2.6	0.19	2.3	0.12	3.6	17.6	76.3	0.043	2.2	67.2
M04	3.3	0.44	<1.3	0.053	4.4	6	16.9	0.052	2.4	31.1
M06	2.8	0.26	6.4	0.16	9.5	20.7	88.6	0.048	31.6	79
S Series Results										
S01 0.0	4.6	0.54	2.4	0.12	5.2	22.3	17.6	0.075	2.8	62.4
S01 0.5	1.5	0.29	1.4	0.038	1.5	2.6	3.3	<0.025	0.92	12.6
S01 1.2	4.3	0.65	2.2	0.054	5.4	8.7	7.68	0.088	2.9	33.5
S02 0.0	3.4	0.39	1.4	0.081	4.1	8.44	12.3	0.056	1.9	45.6
S02 0.5	0.51	0.049	<1.3	0.039	0.71	2.2	1.7	<0.025	0.47	13.7
S02 2.1	1.4	0.1	<1.3	0.019	1.8	2.2	1.8	<0.025	1.2	18
S03 0.0	3.2	0.3	1.3	0.16	4	16.5	19.2	0.069	2.7	74.3

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
S03 0.5	3.5	0.28	<1.3	0.1	4.4	9.5	14	0.056	2.6	66.4
S03 2.1	3.3	0.15	<1.3	0.026	3	4.4	3.1	<0.025	1.6	33.8
S04 0.0	1.1	0.035	<1.3	0.033	0.93	3	4.5	<0.025	0.32	19.4
S04 0.5	5.5	0.13	<1.3	0.011	3.1	15.1	9.63	0.17	1.3	12.4
S04 0.8	6.3	0.27	1.7	0.018	3.7	14.6	9.92	0.13	1.9	22.6
S05 0.0	1.4	0.05	2.5	0.055	2.8	17.1	12.8	0.066	1.7	26.2
S05 0.5	1.9	0.17	<1.3	0.036	2	3.7	3.3	<0.025	1.4	18.4
S05 1.1	5.9	1	1.8	0.11	8.1	16.7	11.4	0.15	3.9	53.2
S06 0.0	2.9	0.29	<1.3	0.2	3	8.07	10.3	0.064	1.6	49.2
S06 0.5	2.3	0.36	<1.3	0.071	2	2.4	4.4	<0.025	1.3	33.1
S06 1.5	3.5	0.81	1.4	0.07	8.8	7.68	8.81	0.082	3.3	28
S07 0.0	3.1	0.32	2.5	0.17	4.3	16	19.1	0.067	2.4	67.9
S07 0.6	1.3	0.29	1.3	0.05	2	2.4	4.7	<0.025	1.2	36.5
S07 2.1	3.4	0.83	1.6	0.1	5.1	13.1	7.29	0.13	2.3	28.3
S08 0.0	2.3	0.36	2	0.14	3.8	20.2	14	0.056	2.2	54.1
S08 0.7	1.4	0.32	<1.3	0.043	1.3	3.8	3.4	<0.025	0.86	23.9
S08 1.8	4.2	0.92	1.9	0.046	8.5	10.6	8.92	0.099	3.3	34.7
S09 0.0	2.6	0.38	1.8	0.18	3.5	16.6	11.4	0.075	1.9	53.6
S09 0.7	1.5	0.21	<1.3	0.03	2.1	3.4	2.5	0.03	1.2	22.7
S09 1.2	4.5	0.94	2.6	0.06	7.9	22.2	9.35	0.14	3.6	42.5
S10 0.0	2.1	0.2	3.2	0.17	2.7	13.1	18.1	0.049	2	58
S10 0.5	4.8	0.67	1.6	0.075	5.1	20.8	6.39	0.082	2.6	34.6
S10 1.2	4.7	1	2	0.057	6.1	18.1	9.2	0.089	3.1	40.4
S11 0.0	1.8	0.25	1.3	0.07	1.9	5.3	22.2	0.029	1.2	31
S11 0.5	1.1	0.14	<1.3	0.011	1.1	1.2	1.4	<0.025	0.79	10.6
S11 2.0	4.2	0.89	1.5	0.07	7.2	14.8	9.18	0.072	3	32.3
S12 0.0	1.5	0.24	1.5	0.12	2.4	9.46	15.9	0.048	1.3	36.3
S12 0.5	1.2	0.13	<1.3	0.016	1.5	1.2	2.1	<0.025	1	14.5
S12 1.8	4.2	0.72	1.6	0.05	4.9	14.5	8.51	0.049	2.6	26
S13 0.0	2.9	0.22	1.8	0.14	3.5	15.6	18.9	0.08	2	29.5
S13 0.5	1.1	0.26	<1.3	0.05	1.8	4.6	3.8	<0.025	1.2	27.1
S13 2.1	4.1	0.59	<1.3	0.051	4.1	8.89	5.69	0.085	2.2	26.8
S14 0.0	6.5	0.28	1.9	0.18	3.8	16.4	19	0.056	2.6	74.5
S14 0.5	1.4	0.26	<1.3	0.1	2.9	7.56	5.87	<0.025	1.6	51.8
S14 2.1	2.4	0.42	<1.3	0.055	3.1	7.5	4.5	0.052	1.8	23.5
S15 0.0	1.9	0.19	<1.3	0.16	2.9	14.5	14.9	0.06	1.7	134
S15 0.5	2.3	0.25	<1.3	0.12	3.5	11.9	22.3	0.067	2.4	54.5
S15 2.1	3.6	0.88	<1.3	0.13	5.3	8.56	8.72	0.064	2.7	35
S16 0.0	2.2	0.3	<1.3	0.15	3.3	12.6	14.5	0.04	1.7	50.7
S16 0.8	0.8	0.074	<1.3	0.016	2.3	10	6.36	0.029	0.82	7.24

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
S16 2.1	3.7	0.44	<1.3	0.071	4.1	7.92	7.43	0.031	3.3	70.8
S17 0.0	2.9	0.26	1.5	0.15	3.9	14.2	23.9	0.053	1.7	48.9
S17 0.5	1.6	0.35	<1.3	0.11	2.4	6.1	5.7	0.039	1.5	37.4
S17 2.2	3.1	0.51	<1.3	0.046	4.9	7.74	5.69	0.072	2.2	29.7
S18 0.0	2.4	0.31	2	0.19	4.2	22.2	41	0.076	2.4	53
S18 0.5	1.1	0.19	<1.3	0.023	1.2	2.4	2.8	<0.025	1	13.3
S18 1.8	5.3	1.33	2.6	0.076	8.5	13.2	11.1	0.3	3.1	37.7
S19 0.0	1.9	0.36	<1.3	0.18	2.6	9.17	8.65	0.045	1.6	25.8
S19 0.5	1.8	0.4	<1.3	0.089	1.8	8.35	4.1	<0.025	1.5	24.3
S19 1.4	4.5	1	1.6	0.069	9.4	12.2	10.8	0.39	3.2	35.1
S20 0.0	3.6	0.43	1.3	0.1	4.3	10.6	22.7	0.081	2.4	44.5
S20 0.5	1.3	0.2	<1.3	0.017	1.2	1.5	2.1	<0.025	1	9.33
S20 2.2	3.8	0.3	<1.3	0.077	3.8	10.2	4.4	0.065	1.8	22.8
S21 0.0	2.2	0.28	1.3	0.15	2.9	7.55	16.7	0.043	1.4	32.4
S21 0.5	1.1	0.17	<1.3	0.018	1.1	1.4	1.6	<0.025	0.85	9.84
S21 1.8	4.6	0.97	1.4	0.053	7.9	13.4	9.18	0.13	2.8	33.6
S22 0.0	2.5	0.24	1.6	0.22	4.6	18.4	29.6	0.063	2.6	46.3
S22 0.5	1.3	0.23	<1.3	0.032	1.5	2.1	2.7	<0.025	1.3	17.6
S22 1.8	4.9	0.83	<1.3	0.043	7.3	13	9.91	0.063	3.6	33.7
S23 0.0	5.2	0.26	1.5	0.18	5.1	20.5	34.9	0.058	2.9	101
S23 0.5	1.9	0.23	<1.3	0.085	2.3	5.7	9.89	0.029	2.1	36
S23 2.1	5.1	0.89	1.8	0.068	8	11.9	13.7	0.065	3.7	43.4
S24 0.0	2.6	0.24	2.2	0.19	4.2	17.9	22.6	0.068	3.1	55.4
S24 0.5	1.8	0.24	<1.3	0.038	1.7	2.6	3.7	<0.025	1.2	20.8
S24 1.8	5.1	1	1.5	0.062	8.8	14.5	11.9	0.095	4	40.9
S25 0.0	1.8	0.26	<1.3	0.1	1.8	6.5	10.6	<0.025	0.79	21.2
S25 0.5	1.9	0.13	<1.3	0.02	2.6	2.3	4.1	<0.025	1	25.2
S25 1.8	6	0.97	1.3	0.065	8.1	15.8	12	0.11	4.2	40.7
T Series Results										
T01	2.5	0.33	1.6	0.33	5.3	9.12	26.7	0.031	5.34	31.9
T02	2.3	0.36	1.6	0.43	5.7	10.1	34.1	<0.025	5.49	28.5
T03	2.1	0.27	1.3	0.36	5.4	12	18.7	<0.025	7.28	28.6
T04	3.4	0.27	1.6	0.36	5.6	9.44	23.8	<0.025	4.9	35.8
T05	2.2	0.28	1.9	0.34	4.9	11.8	34	0.027	6.48	34.8
T06	2.2	0.25	1.4	0.29	4.4	13.2	8.78	<0.025	3.4	22.8
T07	2	0.22	<1.3	0.25	3.3	9.26	6.43	<0.025	2.9	19.6
T08	1.9	0.27	1.5	0.29	3.8	7.8	8.18	<0.025	3.4	22.3
T09	2.3	0.26	<1.3	0.28	4.4	8.83	21.1	<0.025	4.2	26.1
T10	2.1	0.32	1.4	0.35	5.1	10.1	98.2	0.032	4.4	40.4
T11	1.8	0.25	1.5	0.27	4.2	8.75	80.7	<0.025	3.6	35.9

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
T12	1.9	0.27	1.8	0.3	4.2	8.43	71.1	<0.025	3.4	33.7
T13	2.5	0.29	1.5	0.3	4.2	11.5	33.2	<0.025	3.4	31.5
T14	2.5	0.27	<1.3	0.24	5.4	8.79	77.2	<0.025	3.3	46.6
T15	2.1	0.32	1.6	0.32	4	36.4	43.5	<0.025	3.3	31.7
T16	2.8	0.29	1.5	0.34	5.2	7.4	48.2	<0.025	4.4	34.9
T17	2.3	0.17	<1.3	0.28	5.9	15.5	110	<0.025	4.7	39.9
T18	2.5	0.19	<1.3	0.41	6.1	269	139	<0.025	5.93	108
T19	2.5	0.21	<1.3	0.28	5.4	16.2	110	<0.025	3.7	50.8
T20	2	0.2	2.8	0.34	4	13	157	<0.025	3.3	84.3
T21	2.1	0.25	1.4	0.33	4.3	18.2	58.3	<0.025	4.6	44.1
T22	3	0.21	1.7	0.32	6.7	18.2	219	<0.025	5.09	76.3
T23	2.1	0.23	<1.3	0.35	7.4	17.5	69.1	<0.025	5.26	32.2
T24	2.3	0.23	1.5	0.34	4.5	9.88	69.3	<0.025	4.7	39.1
T25	2.6	0.23	<1.3	0.31	5.6	11.2	151	<0.025	4.5	56.5
T26	2.6	0.29	1.6	0.26	3.7	8.06	78.4	0.025	3.8	40.4
T27	4.3	0.31	1.7	0.24	5.5	16.5	438	0.026	4	109
T28	5.2	0.49	1.6	0.27	7.1	10.2	127	0.052	5.42	54.7
T29	4.1	0.31	1.5	0.27	7.4	13.6	345	<0.025	5	53
T30	3.5	0.24	1.4	0.29	6.1	10.1	112	<0.025	5.06	35.8
T31	3.4	0.22	<1.3	0.27	6.8	10.3	107	<0.025	3.9	37.8
T32	5.8	0.31	1.6	0.25	9.6	12.1	204	0.029	5.62	68.5
T33	4.8	0.35	<1.3	0.25	6.5	18	130	0.028	4.1	33.6
T34	6.1	0.27	<1.3	0.25	7.8	11.4	250	<0.025	4.3	41.6
T35	2.7	0.32	1.4	0.37	11	9.59	80.5	<0.025	6.35	34.6
T36	2.4	0.31	1.8	0.3	5.7	12.4	279	<0.025	4.7	73.6
T37	2.1	0.25	1.6	0.35	4.4	9.14	54.1	<0.025	4	37.1
T38	2.3	0.25	1.4	0.25	5.8	16.7	35.2	0.029	4.8	36.8
T39	2	0.23	<1.3	0.32	4.2	8.99	30.5	<0.025	3.7	26.8
T40	2.8	0.25	1.3	0.19	4.7	8.26	45.8	<0.025	3.1	34.7
T41	2.9	0.27	<1.3	0.24	5.7	8.22	33.9	<0.025	4.4	35.4
T42	3.6	0.25	<1.3	0.34	6	14.4	224	0.036	4.6	57.5
T43	3.7	0.31	<1.3	0.26	6.1	10.5	112	0.028	4.5	55.5
T44	2	0.2	<1.3	0.31	4.3	8.52	14.9	<0.025	3.4	22
T45	2.5	0.18	8.5	0.41	3.2	50.4	25	0.039	2.4	75.1
W Series Results										
W01	2.3	0.25	2.4	0.33	4.5	8.61	33.9	<0.025	5.01	52
W02	2.7	0.27	4.7	0.34	3.8	9.26	31.8	<0.025	4	69.2
W03	2.2	0.25	4.6	0.33	3.7	10	19.6	<0.025	3.6	55.7
W04	3	0.26	2.1	0.22	4.7	13.1	46.9	0.026	2.5	80.5
W05	4.5	0.27	2	0.26	4.4	25.3	97.1	0.041	2.5	77.9

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
W06	2.2	0.19	3.6	0.48	3.3	14.3	32.3	0.028	2.4	164
W07	3.1	0.19	3.6	0.37	4	24.1	31.2	0.026	2.6	117
W08	5.5	0.24	2.7	0.41	5.8	53.2	57.4	0.07	3.9	97.2
W09	4.7	0.24	1.7	0.46	7	58.6	101	0.53	4.1	84.2
W10	7.1	0.21	1.7	0.27	5	25.4	68	0.049	2.7	70.2
W11	3.6	0.18	1.3	0.16	4.9	12.2	60.6	0.044	2.3	52
W12	5.2	0.32	2.9	0.12	5.8	23.4	48.3	0.041	2.2	106
W13	7.6	0.41	9.1	0.804	7.7	30.6	82.5	0.084	6.04	491
W14	16.1	0.19	1.5	0.2	10	22.6	19.2	0.027	1.4	50.6
W15	5.9	0.6	4.9	0.27	7.8	64.9	47	0.36	6.14	118
W16	7.5	0.36	3.3	0.26	6.9	20.9	108	0.058	3.2	138
W17	2.5	0.21	<1.3	0.065	2.3	3.4	3.8	<0.025	1.2	25.8
W18	5.3	0.58	2.6	0.25	8.9	21	13.2	0.047	6.21	82.5
W19	4	0.51	2	0.25	6	23.2	9.82	0.059	4.9	83.1
W20	3.4	0.32	1.3	0.17	3.7	8.03	7.4	0.039	2.7	30.5
W21	4.8	0.45	2.1	0.16	5.3	10.3	15.4	0.071	1.9	44.3
W22	2.2	0.27	<1.3	0.076	2.5	6.4	11.8	0.039	0.93	32.2
W23	2.8	0.56	1.3	0.069	2.7	7.1	7.52	0.075	1.1	23.5
SCS (commercial)	70 ^a	500 ^b	>10,000 ^a	1,300 ^a	6,300 ^a	>10,000 ^a	3,300 ^a	4,200 ^a	6000 ^b	400,000 ^b
SCS (Residential)	20 ^a	60 ^b	>10,000 ^a	3 ^a	460 ^a	>10,000 ^a	210 ^a	310 ^a	400 ^b	7400 ^b
Eco SGV Residential^c	60 ^d	-	20 ^d	17 ^d	390 ^d	270 ^d	1300 ^d	0.75 ^c	105 ^c	240 ^d
Eco SGV Commercial^c	160 ^d	-	30 ^d	40 ^d	650 ^d	600 ^d	3000 ^d	0.75 ^c	105 ^c	480 ^d
“U95pred” Background^d	12.67	-	-	0.28	60.5	40.17	30.08	-	32.88	101.8
WRC Background ^e	6.8	-	6.7	0.22	30	25	20	0.23	7.6	53
Cleanfill Disposal Outside of High-Risk Locations (If less than 2500m³) ^f	17	-	15	0.8	56	120	78	1	33	175
Class A Landfill WAC ^g	100	200	400	20	100	100	100	4	200	200

As - Arsenic, Be - Beryllium, B - Boron, Cd - Cadmium, Cr - Chromium, Cu - Copper, Hg - Mercury, Pb - Lead, Ni - Nickel, Zn - Zinc
Cells highlighted in grey with exceed residential SCS; Underlined **red** text indicates values which exceed commercial Eco SGV; Underlined **pink** text indicates values which exceed commercial Eco SGV; Italicized text indicates values which exceed Class A Landfill WAC; Bold text indicates values which exceed predicted background concentrations; - indicates guideline not specified or not available.

- a) MfE 2012 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health,
- b) National Environment Protection Council (NEPC) updated 2013. Guideline on Health-Based Investigation Levels and Ecological Investigation Levels. *=standard residential
- c) Landcare Research (June 2019) User Guide: Background Soil Concentrations and Soil Guideline Values For The Protection of Ecological Receptors (Eco SGVs) Consultation draft. Residential / Recreation Area.
- d) Landcare Research Limited (June 2016) Predicted Background Soil Concentrations
- e) Natural Background Soil Concentrations in the Waikato Region (Regional Council website, accessed 31/01/2019)
- f) Information Received from a Senior Resource Officer at Regional Council dated 30 July 2018.
- g) MfE 2004 Module 2 Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification

4.3.2 Persistent Pesticides

Results for persistent pesticides are presented in this section.

With regards to the composited samples analysed for a suite of persistent pesticides, latest guidance from the Ministry for the Environment advises that generally there is no requirement to adjust the SCS.

The composite sample contained OCP below the laboratory limit of reporting and, therefore, below the human health or environmental criteria.

4.3.3 Pentachlorophenol (PCP) and Tetrachlorophenol (TCP)

PCP is a manufactured synthetic substance which does not occur naturally, it occurs as colourless crystals. TCP is a biodegradation of polychlorinated benzene and polychlorinated biphenols and occurs as a brown sand like substance with a strong odour.

PCP is a disinfectant, a fungicide and preservative for wood. TCP is an insecticide and bactericide and is used as a preservative for wood.

The samples (M and T series) tested for PCP and TCP contained levels below the laboratory limit of reporting and, therefore, below the human health or environmental criteria.

4.3.4 Polycyclic Aromatic Hydrocarbons (PAH)

Of the PAH, benzo[a]pyrene (BAP) is often used as an indicator of carcinogenic or cancer-causing PAH, and hence sometimes a BAP equivalent (BAP_{eqv}) is reported, which is a value that expresses the projected equivalency of the different kinds and amounts of PAH present in a sample as the equivalent of a single concentration of BAP.

The NES requires that nine PAH (BAA, BAP, BBF, BJF, BKF, CRY, DBA, FLA, and IND) and their associated potency equivalency factors be used in calculating BAP_{eqv} . In accordance with MfE guidelines, only detected concentrations are used for the calculation of the BAP_{eqv} .

Typically three values of PAH are identified for simplicity and clarity: benzo(a)pyrene, naphthalene, and pyrene, being representative of carcinogenic, non-carcinogenic and less volatile non-carcinogenic PAH respectively.

Table 8 below summarises results from analysis for PAH.

Table 8: Results from Analysis for PAH (all results in mg/kg).

Sample	ACE	ACY	AN	BAP	BAP _{eqv}	FLE	NAP	PHE	PYR
W01	0.01	<0.010	0.01	0.052	0.08	<0.010	<0.010	0.12	0.12
W02	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
W03	<0.010	<0.010	<0.010	0.014	0.03	<0.010	<0.010	0.016	0.034
W04	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
W05	<0.010	<0.010	<0.010	0.012	0.03	<0.010	<0.010	<0.010	<0.020
W06	<0.010	<0.010	<0.010	0.027	0.05	<0.010	<0.010	0.015	0.032
W07	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
W08	<0.010	<0.010	<0.010	0.012	0.03	<0.010	<0.010	<0.010	<0.020
W09	<0.010	<0.010	<0.010	0.011	0.03	<0.010	<0.010	<0.010	<0.020
W10	<0.010	<0.010	<0.010	0.038	0.06	<0.010	0.013	0.015	0.05
W11	<0.010	<0.010	<0.010	0.099	0.15	<0.010	<0.010	0.033	0.15
W12	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
W13	<0.010	<0.010	<0.010	0.037	0.06	<0.010	<0.010	0.022	0.071
W14	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
W15	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
W16	<0.010	<0.010	<0.010	0.015	0.03	<0.010	<0.010	<0.010	0.027
W17	0.058	0.012	0.18	0.32	0.48	0.036	<0.010	0.66	0.86
W18	<0.010	<0.010	<0.010	0.015	0.03	<0.010	<0.010	<0.010	0.033
W19	<0.010	<0.010	<0.010	0.014	0.03	<0.010	<0.010	<0.010	0.028
W20	<0.010	<0.010	<0.010	0.034	0.06	<0.010	<0.010	<0.010	0.07
W21	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
W22	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
W23	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
B01	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
B02	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
B03	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
B04	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
B05	<0.010	<0.010	<0.010	<0.010	0.03	<0.010	<0.010	<0.010	<0.020
SCS (Residential)	3,600 ^c	-	18,000 ^c	10 ^a	10 ^a	2,400 ^c	58 ^b	-	1600 ^b
SCS (commercial)	45,000 ^c	-	230,000 ^c	35 ^a	35	30,000 ^c	190 ^b	-	NA ^b
Environmental ^c	5.5 ^d	-	580 ^d	22 ^e	-	5.4 ^d	0.00038 ^d	-	13 ^d

NA indicates that the estimated criterion exceeds 20,000 mg/kg, at which concentration separate phase is hydrocarbon is expected to have formed in soil matrix. Underlined text indicates values which exceed US EPA for the protection of ground water; – indicates guideline not specified or not available.

Abbreviations for PAH are as follow: Benzo[a]pyrene, BAP; Naphthalene, NAP; Pyrene, PYR; Acenaphthene, ACE; Acenaphthylene, ACY; Anthracene, AN Fluorene, FLE; Phenanthrene, PHE.

- MfE 2011. National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
- MfE. 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Site's in New Zealand. Values shown are for sandy soil types and contamination < 1 m depth.
- US EPA guidelines (mg/kg).
- US EPA guidelines (mg/kg) risk-based SSL for the protection of ground water.
- Landcare Research (June 2019) User Guide: Background Soil Concentrations and Soil Guideline Values For The Protection of Ecological Receptors (Eco SGVs) Consultation draft. Residential / Recreation Area.

4.3.5 Total Petroleum Hydrocarbons (TPH)

Results from analysis for TPH are given in Table 9 below, along with breakdowns of the different constituent fractions for three aliphatic hydrocarbon groups C7-C9, C10-C14, and C15-C26, where the subscript identifies the number of carbons in each compound.

The MfE practice of reporting TPH by constituent groups serves two purposes. First, there are many possible sources of TPH, and the distribution of TPH within the three fractions given can sometimes serve as an indicator of the TPH source. Additionally, however, some TPH fractions are more toxic than others; hence this breakdown enables the more different fractions to be evaluated according to these different toxicities.

Table 9: Results from Analysis for TPH Results (all results in mg/kg).

Sample	C ₇ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₃₆	TPH (C ₇ -C ₃₆)
B01	<10	<15	326	326
B02	<10	<15	291	291
B03	<10	<15	167	167
B04	<10	<15	160	160
B05	<10	<15	285	285
SCS (Residential)	120 ^a	470 ^a	NA ^a	NA ^a
SCS (commercial)	120 ^a	1500 ^a	NA ^a	NA ^a
Environmental ^b	170	140	1700	

- MfE 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. In the source document, NA indicates that the estimated criterion exceeds 20,000 mg/kg, at which concentration separate phase is hydrocarbon is expected to have formed in soil matrix. Likewise, for C10-C14, the source document notes that values exceeding the threshold are likely to correspond to formation of residual separate phase.
- Landcare Research (June 2019) User Guide: Background Soil Concentrations And Soil Guideline Values For The Protection of Ecological Receptors (Eco SGVs) Consultation draft. Residential / Recreation Area.. Note there is a slight difference where laboratory reports C10-C14 whereas guideline is based on C9-C15. For practical reasons the difference is negligible.

4.3.6 Asbestos

Results from screening the samples for asbestos (presence/absence) are given in the table below.

Table 10: Results from Analysis for Asbestos

Sample	Analysis Results	Form
M01	Asbestos NOT Detected	-
M02	Asbestos NOT Detected	-
M03	Asbestos NOT Detected	-
M04	Asbestos NOT Detected	-
M06	Asbestos NOT Detected	-
A01	Chrysotile (white asbestos) Fibres	Free Fibres
A02	Asbestos NOT Detected	-
A03	Asbestos NOT Detected	-
A04	Amosite (Brown Asbestos) Fibres	Free Fibres
A05	Asbestos NOT Detected	-
A06	Asbestos NOT Detected	-
B01	Asbestos NOT Detected	-
B02	Asbestos NOT Detected	-
B03	Asbestos NOT Detected	-
B04	Asbestos NOT Detected	-
B05	Asbestos NOT Detected	-
C01	Asbestos NOT Detected	-
C02	Asbestos NOT Detected	-
C03	Chrysotile (white asbestos) Fibres	Free Fibres
C04	Asbestos NOT Detected	-
C05	Asbestos NOT Detected	-
T29	Asbestos NOT Detected	-
T30	Asbestos NOT Detected	-
T31	Asbestos NOT Detected	-

Results from further screening the samples A01, A04 and C03 for asbestos (semi quantitative) are given in the table below.

Table 11: Results from Further Analysis for Asbestos

Sample	Analysis Results	ACM Form	W/W% Asbestos as ACM	W/W% Asbestos as AF/FA
A01	Chrysotile Fibres	Free Fibres Fibre Bundle	<0.001	0.098
A04	Asbestos NOT detected	-	<0.001	<0.001
C03	Chrysotile Fibres	Free Fibres Fibre Bundle	<0.001	0.006
Soil Asbestos Investigation Criteria – w/w Asbestos for FA and AF ^a	-	-	-	0.001 %
Soil Asbestos Investigation Criteria – w/w Asbestos for ACM (Residential Use) ^a	-	-	0.01%	-
Soil Asbestos Investigation Criteria – w/w Asbestos for ACM (Commercial Use) ^a	-	-	0.05%	-

BRANZ New Zealand Guidelines for Assessing and Managing Asbestos Soil, November 2017

Copies of all laboratory results are given in Appendix C.

4.4 Results – 3 Karamu St

The results from analysis of samples, summarised in this section, indicate that all concentrations of contaminants are below SCS. Results from the analysis for metals are as follows:

Table 12: Results from Analysis for Metals (all results in mg/kg).

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
3K-01	2.7	0.34	2.3	0.19	3.6	17	48.7	<0.025	2.6	44.4
3K-02	2.7	0.27	1.7	0.3	4.1	11.1	91.1	<0.025	2.5	47.7
3K-03	2.6	0.3	3.1	0.33	6	26.3	47.6	0.028	4	48.6
3K-04	3.4	0.35	2	0.31	5.6	17.9	29.8	<0.025	4.3	46.3
3K-05	2.2	0.17	1.4	0.33	6.1	42.9	30.9	<0.025	6.03	33
3K-06	2.3	0.23	2.4	0.34	5.2	39.2	74.5	<0.025	5.47	42.3
3K-07	2.6	0.27	2.2	0.3	4	15.1	144	<0.025	2.6	68.8
3K-08	2.4	0.29	2.5	0.29	4.8	34.2	37.4	<0.025	3.5	35.5
3K-09	4.1	0.67	2.9	0.34	7	17.4	22.5	0.06	6.52	38.9
3K-10	2.8	0.43	1.8	0.26	6.4	32.5	66.5	<0.025	4.2	46.4
3K-11	2.2	0.23	3.1	0.39	6.6	21.6	47.9	0.026	4.6	44.3
3K-12	3	0.27	3.2	0.36	5.7	27.4	185	0.032	4.1	66.1
3K-13	3	0.36	3.3	0.33	5.1	79.8	79.4	0.04	4.1	46.2
3K-14	3.7	0.59	2.1	0.29	5.9	13.1	17.2	0.063	3.6	37
3K-15	3.1	0.36	2.3	0.33	6.1	26	95.5	0.031	4.5	52.6
3K-16	2.2	0.21	2	0.38	5.5	44.9	37.1	<0.025	5.26	31.3
3K-17	3.5	0.34	1.9	0.34	5.8	30.1	76	0.033	3.2	62.2
3K-18	2.4	0.27	2.6	0.3	4.6	28.3	35.7	<0.025	4.1	38.2
3K-19	2.1	0.2	1.6	0.35	5.1	23.6	12	<0.025	5.14	28.2

Sample	As	Be	Bo	Cd	Cr	Cu	Pb	Hg	Ni	Zn
3K-20	2.4	0.23	2.5	0.33	4.3	23.2	50.9	<0.025	4.2	37.5
3K-21	2.9	0.28	2.8	0.4	5.7	32.1	117	0.032	4.9	54.6
3K-22	2.8	0.31	3.1	0.38	5.6	33.7	73	0.034	5	50.8
3K-23	2.6	0.31	1.8	0.33	6.1	21.4	30.2	0.026	5.02	36.5
3K-24	3.2	0.44	3	0.37	6.3	42	57.7	0.048	5.27	38.4
3K-25	2.6	0.32	2.9	0.38	6.8	54.2	69.9	0.03	5	43.7
3K-26	2.8	0.29	3.1	0.4	6.2	77	73.5	0.03	8.16	54.9
3K-27	2.2	0.23	2.1	0.4	5.9	42.2	26.2	<0.025	5.69	28.7
3K-28	2.3	0.23	2	0.38	9.8	53	39.8	<0.025	6.93	35.5
3K-29	2.1	0.21	1.4	0.17	3	7.96	36.5	0.03	2.8	26.6
3K-30	2.5	0.27	2.1	0.33	5	16.8	71.4	0.028	3.5	54.5
SCS (Residential)	20 ^a	60 ^b	>10,000 ^a	3 ^a	460 ^a	>10,000 ^a	210 ^a	310 ^a	400 ^b	7400 ^b
SCS (commercial)	70 ^a	500 ^b	>10,000 ^a	1,300 ^a	6,300 ^a	>10,000 ^a	3,300 ^a	4,200 ^a	6000 ^b	400,000 ^b
Eco-SGV (residential/recreational) ^c	60	-	15	12	390	242.4	900	-	-	300.5
WRC Background ^d	6.8	-	6.7	0.22	30	25	20	0.23	7.6	53
Cleanfill Disposal Outside of High Risk Locations (If less than 2500m³) ^e	17	-	15	0.8	56	120	78	1	33	175
Class A Landfill WAC ^f	100	200	400	20	100	100	100	4	200	200

As - Arsenic, Be - Beryllium, B - Boron, Cd - Cadmium, Cr - Chromium, Cu - Copper, Hg - Mercury, Pb - Lead, Ni - Nickel, Zn - Zinc
Cells highlighted in bold exceed published background levels; - indicates guideline not specified or not available.

- a) MfE 2012 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
- b) National Environment Protection Council (NEPC) updated 2013. Guideline on Health-Based Investigation Levels and Ecological Investigation Levels. *=standard residential
- c) Landcare Research (June 2019) Updated User Guide: Background soil concentrations and soil guideline values for the protection of ecological receptors. Generic Eco-SGVs were developed for As, B, Cr, Cd and Pb (Table 5) and are considered applicable to all soil types for the appropriate land use. For Cu and Zn, ACL for aged typical soil (Table 6) were applied, combined with the 'Medpred' background concentrations published on the LRIS GIS
- d) Natural Background Soil Concentrations in the Waikato Region (Regional Council website, accessed 27/07/2020)
- e) Information Received from a Senior Resource Officer at Regional Council dated 30 July 2018.
- f) MfE 2004 Module 2 Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification

Results from screening the samples for asbestos (presence/absence) are given in the table below.

Table 13: Results from Analysis for Asbestos

Sample	Analysis Results	Form
3K-01	No Asbestos Detected	-
3K-02	No Asbestos Detected	-
3K-03	No Asbestos Detected	-
3K-04	No Asbestos Detected	-
3K-05	No Asbestos Detected	-
3K-06	No Asbestos Detected	-
3K-07	No Asbestos Detected	-
3K-08	No Asbestos Detected	-
3K-09	No Asbestos Detected	-
3K-10	No Asbestos Detected	-
3K-11	No Asbestos Detected	-
3K-12	No Asbestos Detected	-
3K-13	No Asbestos Detected	-
3K-14	No Asbestos Detected	-
3K-15	No Asbestos Detected	-
3K-16	No Asbestos Detected	-
3K-17	No Asbestos Detected	-
3K-18	No Asbestos Detected	-
3K-19	No Asbestos Detected	-
3K-20	No Asbestos Detected	-
3K-21	No Asbestos Detected	-
3K-22	No Asbestos Detected	-
3K-23	No Asbestos Detected	-
3K-24	No Asbestos Detected	-
3K-25	No Asbestos Detected	-
3K-26	No Asbestos Detected	-
3K-27	No Asbestos Detected	-
3K-28	No Asbestos Detected	-
3K-29	No Asbestos Detected	-
3K-30	No Asbestos Detected	-

4.5 Quality Control

The objectives of the sampling were to determine the concentration of contaminants across the site. The sample plan incorporated a grid-pattern to allow for statistical analysis.

Quality control included washing equipment between each sample location using laboratory grade detergent and deionised water and using fresh disposable gloves.

Duplicate samples were collected.

4.5.1 Laboratory Quality Control

The laboratory undertook duplicate sampling for:

- A suite of metals on samples M01, S06 1.5, S13 0.5, S20 0.0, S24 0.0, T03, T23, T43 and W15.
- OCP on Composite A.
- PCP and TCP on samples M01 and T27.
- PAH on sample B05.

A typical data quality objective would be for a sample to be acceptable if the relative percent difference (RPD) for field duplicate samples is less than 30–50%, depending on the analyte. The RPD is calculated as:

$$RPD = \frac{(\text{Result No. 1} - \text{Result No. 2}) \times 100}{(\text{Mean result})}$$

For laboratory split samples, an RPD of 30-50% would typically be acceptable.

- Composite A contained OCP below the Laboratory Limit of reporting and therefore the RPD could not be calculated.
- Samples M01 and T27 contained PCP and TCP below the Laboratory Limit of reporting and therefore the RPD could not be calculated.
- Sample B05 contained PAH below the Laboratory Limit of reporting and therefore the RPD could not be calculated.

Table 14: Laboratory Duplicate Results

	M01	M01 (Laboratory Duplicate)	RPD
(As)	2.8	3.2	13.33
(Be)	0.26	0.25	3.92
(B)	6.4	7	8.96
(Cd)	0.16	0.16	0.00
(Cr)	9.5	8.6	9.94
(Cu)	20.7	21.5	3.79
(Pb)	88.6	90.2	1.79
(Hg)	0.048	0.057	17.14
(Ni)	31.6	31.5	0.32
(Zn)	79	81.5	3.12

Table 15: Laboratory Duplicate Results

	S06 1.5	S06 1.5 (Laboratory Duplicate)	RPD
(As)	3.5	3.7	5.56
(Be)	0.81	0.81	0.00
(B)	1.4	1.5	6.90
(Cd)	0.07	0.07	0.00
(Cr)	8.8	8.9	1.13
(Cu)	7.68	8.05	4.70
(Pb)	8.81	8.43	4.41
(Hg)	0.082	0.077	6.29
(Ni)	3.3	3.5	5.88
(Zn)	28	29.9	6.56

Table 16: Laboratory Duplicate Results

	S13 0.5	S13 0.5 (Laboratory Duplicate)	RPD
(As)	1.1	1	9.52
(Be)	0.26	0.24	8.00
(B)	<1.3	<1.3	-
(Cd)	0.05	0.052	3.92
(Cr)	1.8	1.8	0.00
(Cu)	4.6	4.5	2.20
(Pb)	3.8	3.8	0.00
(Hg)	<0.025	0.029	-
(Ni)	1.2	1.1	8.70
(Zn)	27.1	25.3	6.87

Table 17: Laboratory Duplicate Results

	S20 0.0	S20 0.0 (Laboratory Duplicate)	RPD
(As)	3.6	3	18.18
(Be)	0.43	0.34	23.38
(Cd)	0.1	0.089	11.64
(Cr)	4.3	3.9	9.76
(Cu)	10.6	9.01	16.22
(Pb)	22.7	17.9	23.65
(Hg)	0.081	0.049	49.23
(Ni)	2.4	1.9	23.26
(Zn)	44.5	37.7	16.55

Table 18: Laboratory Duplicate Results

	S24 0.0	S24 0.0 (Laboratory Duplicate)	RPD
(B)	2.2	1.9	14.63

Table 19: Laboratory Duplicate Results

	T03	T03 (Laboratory Duplicate)	RPD
(As)	2.1	2.1	0.00
(Be)	0.27	0.27	0.00
(B)	1.3	1.3	0.00
(Cd)	0.36	0.33	8.70
(Cr)	5.4	5.6	3.64
(Cu)	12	11.7	2.53
(Pb)	18.7	17.6	6.06
(Hg)	<0.025	<0.025	-
(Ni)	7.28	5.02	36.75
(Zn)	28.6	26.7	6.87

Table 20: Laboratory Duplicate Results

	T23	T23 (Laboratory Duplicate)	RPD
(As)	2	2.1	4.88
(Be)	0.22	0.23	4.44
(B)	<1.3	<1.3	-
(Cd)	0.33	0.35	5.88
(Cr)	5.2	7.4	34.92
(Cu)	17.1	17.5	2.31
(Pb)	65.7	69.1	5.04
(Hg)	<0.025	<0.025	-
(Ni)	4.1	5.26	24.79
(Zn)	31.7	32.2	1.56

Table 21: Laboratory Duplicate Results

	T43	T43 (Laboratory Duplicate)	RPD
(As)	3.7	3.7	0.00
(Be)	0.31	0.32	3.17
(B)	<1.3	<1.3	-
(Cd)	0.26	0.26	0.00
(Cr)	6.1	6.3	3.23
(Cu)	10.5	10.8	2.82
(Pb)	112	161	35.90

(Hg)	0.028	0.035	22.22
(Ni)	4.5	4.8	6.45
(Zn)	55.5	58.6	5.43

Table 22: Laboratory Duplicate Results

	W15	W15 (Laboratory Duplicate)	RPD
(As)	5.9	5	16.51
(Be)	0.6	0.52	14.29
(B)	4.9	4.7	4.17
(Cd)	0.27	0.25	7.69
(Cr)	7.8	6.9	12.24
(Cu)	64.9	56.2	14.37
(Pb)	47	42.9	9.12
(Hg)	0.36	0.32	11.76
(Ni)	6.14	5.56	9.91
(Zn)	118	113	4.33

For this site, the laboratory quality control is considered adequate.

4.5.2 Field Quality Control

A duplicate sample was collected at locations listed below:

- A06 and labelled A07
- B02 and labelled B06
- C02 and labelled C06
- M02 and labelled M05
- S10 0.0 and labelled S26 0.0
- S22 0.0 and labelled S27 0.0
- T10 and labelled T46
- T20 and labelled T47
- T30 and labelled T48
- T41 and labelled T49
- W10 and labelled W24
- W20 and labelled W25

The duplicate samples were submitted for analysis for a suite of metals.

A typical data quality objective would be for a sample to be acceptable if the relative percent difference (RPD) for field duplicate samples is less than 30–50%, depending on the analyte. The RPD is calculated as:

$$\text{RPD} = \frac{(\text{Result No. 1} - \text{Result No. 2}) \times 100}{(\text{Mean result})}$$

Table 23: Field Duplicate Results

	A06	A07 (Field Duplicate of A06)	RPD
(As)	4.1	4	2.47
(Be)	0.26	0.26	0.00
(B)	1.4	1.5	6.90
(Cd)	0.33	0.32	3.08
(Cr)	8.6	8.3	3.55
(Cu)	21.6	20.8	3.77
(Pb)	154	144	6.71
(Hg)	<0.025	<0.025	-
(Ni)	6.04	6.43	-6.26
(Zn)	78.3	76	2.98

Table 24: Field Duplicate Results

	B02	B06 (Field Duplicate of B02)	RPD
(As)	2.1	2.4	13.33
(Be)	0.25	0.25	0.00
(B)	1.4	1.5	6.90
(Cd)	0.564	0.546	3.24
(Cr)	5.5	5.6	1.80
(Cu)	13.7	12.7	7.58
(Pb)	61.3	59.2	3.49
(Hg)	<0.025	<0.025	-
(Ni)	4.8	6.01	22.39
(Zn)	33.4	36.9	9.96

Table 25: Field Duplicate Results

	C02	C06 (Field Duplicate of C02)	RPD
(As)	4.4	4.8	8.70
(Be)	0.24	0.23	4.26
(B)	<1.3	1.3	-
(Cd)	0.29	0.33	12.90
(Cr)	12	16.1	29.18
(Cu)	56.7	27.8	68.40
(Pb)	2670	2510	6.18
(Hg)	0.041	0.044	7.06
(Ni)	5.8	8.92	42.39
(Zn)	124	199	46.44

Table 26: Field Duplicate Results

	M02	M05 (Field Duplicate of M02)	RPD
(As)	3.3	3.1	6.25
(Be)	0.31	0.28	10.17
(B)	2.6	2.3	12.24
(Cd)	0.092	0.091	1.09
(Cr)	4	3.8	5.13
(Cu)	16	14.4	10.53
(Pb)	24.5	22.9	6.75
(Hg)	0.054	0.046	16.00
(Ni)	2.7	2.6	3.77
(Zn)	53	48.6	8.66

Table 27: Field Duplicate Results

	S10 0.0	S26 0.0 (Field Duplicate S10 0.0)	RPD
(As)	2.1	2.5	17.39
(Be)	0.2	0.3	40.00
(B)	3.2	1.7	61.22
(Cd)	0.17	0.14	19.35
(Cr)	2.7	3	10.53
(Cu)	13.1	11.9	9.60
(Pb)	18.1	16.7	8.05
(Hg)	0.049	0.037	27.91
(Ni)	2	1.8	10.53
(Zn)	58	55.9	3.69

Table 28: Field Duplicate Results

	S22 0.0	S27 0.0 (Field Duplicate S22 0.0)	RPD
(As)	2.5	2.7	7.69
(Be)	0.24	0.26	8.00
(B)	1.6	1.9	17.14
(Cd)	0.22	0.23	4.44
(Cr)	4.6	4.4	4.44
(Cu)	18.4	20.1	8.83
(Pb)	29.6	30.6	3.32
(Hg)	0.063	0.082	26.21
(Ni)	2.6	3	14.29
(Zn)	46.3	50.3	8.28

Table 29: Field Duplicate Results

	T10	T46 (Field Duplicate of T10)	RPD
(As)	2.1	2.1	0.00
(Be)	0.32	0.3	6.45
(B)	1.4	1.4	0.00
(Cd)	0.35	0.33	5.88
(Cr)	5.1	4.2	19.35
(Cu)	10.1	10.1	0.00
(Pb)	98.2	91.6	6.95
(Hg)	0.032	0.03	6.45
(Ni)	4.4	4.7	6.59
(Zn)	40.4	38	6.12

Table 30: Field Duplicate Results

	T20	T47 (Field Duplicate of T20)	RPD
(As)	2	2.4	18.18
(Be)	0.2	0.22	9.52
(B)	2.8	2.6	7.41
(Cd)	0.34	0.34	0.00
(Cr)	4	3.9	2.53
(Cu)	13	13	0.00
(Pb)	157	146	7.26
(Hg)	<0.025	<0.025	-
(Ni)	3.3	2.9	12.90
(Zn)	84.3	83.2	1.31

Table 31: Field Duplicate Results

	T30	T48 (Field Duplicate of T30)	RPD
(As)	3.5	3.5	0.00
(Be)	0.24	0.24	0.00
(B)	1.4	1.5	6.90
(Cd)	0.29	0.3	3.39
(Cr)	6.1	6	1.65
(Cu)	10.1	11	8.53
(Pb)	112	128	13.33
(Hg)	<0.025	<0.025	-
(Ni)	5.06	5.26	3.88
(Zn)	35.8	38.7	7.79

Table 32: Field Duplicate Results

	T41	T49 (Field Duplicate of T41)	RPD
(As)	2.8	2.8	0.00
(Be)	0.25	0.26	3.92
(B)	1.3	<1.3	-
(Cd)	0.19	0.24	23.26
(Cr)	4.7	5.5	15.69
(Cu)	8.26	9.21	10.88
(Pb)	45.8	62.4	30.68
(Hg)	<0.025	<0.025	-
(Ni)	3.1	4.4	34.67
(Zn)	2.8	31	14.37

Table 33: Field Duplicate Results

	W10	W24 (Field Duplicate of W10)	RPD
(As)	7.1	7.8	9.40
(Be)	0.21	0.22	4.65
(B)	1.7	1.9	11.11
(Cd)	0.27	0.3	10.53
(Cr)	5	6	18.18
(Cu)	25.4	23.2	9.05
(Pb)	68	73.7	8.05
(Hg)	0.049	0.051	4.00
(Ni)	2.7	2.7	0.00
(Zn)	70.2	78.2	10.78

Table 34: Field Duplicate Results

	W20	W25 (Field Duplicate of W20)	RPD
(As)	3.4	3.1	9.23
(Be)	0.32	0.35	8.96
(B)	1.3	<1.3	-
(Cd)	0.17	0.16	6.06
(Cr)	3.7	3.7	0.00
(Cu)	8.03	8.06	0.37
(Pb)	7.4	7.61	2.80
(Hg)	0.039	0.047	18.60
(Ni)	2.7	2.3	16.00
(Zn)	30.5	32.1	5.11

For this site, the field quality control is considered adequate with respect to sampling methodology. The elevated RPD values for some metals does present some concern. There is no introduction of boron or copper in the sampling methodology undertaken by Geohazard Environmental Ltd. It is possible that there is some non-homogenous soil as the samples were collected from an area which has recently been cleared or historically contained structure which have since been demolished. For the purposes of this report, no further investigation is made into the RPD discrepancy. Validation sampling at the conclusion of any remedial works should however incorporate additional sampling as a final quality check.

5.0 SITE CHARACTERISATION

5.1 Type of Environmental Contamination

The term contaminant refers to a substance that is not normally present in the environment. For this report however, the following operational definition is used: a contaminant is a substance that is present at levels that might cause harmful effects to humans or the environment. Therefore, this report does not consider whether or not the levels present are from natural sources or not, but only whether or not contamination is likely to, or does, exist above safe levels, i.e. SCS, BRANZ or Eco SGV.

For 3 Karamu Street, soils are within guidelines for the protection of human health.

At 37 Lake Road, the results from analysis of samples taken at site indicate that contaminants are present at levels above SCS, BRANZ and Eco SGV, and therefore, the site is contaminated with respect to the operational definition given above. Results of exceedances are summarised in Table 35 below.

Table 35: Summary of Environmental Contamination at Site - 37 Lake Rd.

Contaminant	SCS/BRANZ (residential)	Eco SGV (residential)	Eco SGV (commercial)	Range of Exceedances
Lead (Pb)	210			104.3% - 1,271.4%
Lead (Pb)		1300		205.4%
Zinc (Zn)		240		204.6%
Zinc (Zn)			480	102.3%
Asbestos	0.001			Exceeds

Although zinc along the western boundary of 37 Lake Road was found to be elevated above the commercial Eco SGV guidelines in a single sample, additional risk assessment (refer section 5.4) indicates the risk is negligible along the western boundary.

5.2 Extent of Environmental Contamination

3 Karamu Street

From the data available, the site is suitable for both residential or commercial use. Soils are not considered cleanfill however, and any offsite soil disposal shall be to a facility authorised to accept it.

37 Lake Road

From the data available, it appears that soils in some sample locations in the south and centre of the site are affected by elevated lead above guideline values for a residential land use.

The most likely source of the elevated lead is considered to be associated with the operation of the sawmill.

Additional soil sampling to further delineate the vertical and horizontal extent of the elevated lead is recommended as part of the proposed Remediation Action Plan/Site Management Plan (see Section 6).

The foregoing provides an assessment of the extent of the contamination at the site based on the information at hand, however it should not be regarded as definitive due to the preliminary nature of this investigation.

5.3 Potential for Degradation and Interaction

5.3.1 Lead

The general forms of lead that are released to the environment are ionic lead, lead oxides and hydroxides, and lead-metal oxyanion complexes. Inhalation and ingestion are the two routes of exposure, and the effects from both are the same. Lead accumulates in the body organs which may lead to poisoning or even death. The gastrointestinal tract, kidneys and central nervous system are also affected by the presence of lead. Children exposed to lead are at risk for impaired development, lower IQ, shortened attention span, hyperactivity and mental deterioration. Adults usually experience decreased reaction time, loss of memory, nausea, insomnia, anorexia and weakness of the joints when exposed to lead.

In general, plants do not absorb or accumulate lead. However, in soils testing high in lead, it is possible for some lead to be taken up. Higher concentrations are more likely to be found in leafy vegetables and on the surface of root crops. Since plants do not take up large quantities of lead, the lead levels in soil considered safe for plants will be much higher than soil lead levels where eating of soil is a concern. Most of the risk is from lead-contaminated soil or dust deposits on the plants, rather than from uptake of lead by the plant. Lead activity decreases with increasing soil pH.

Inorganic lead is generally considered to be relatively immobile in soil and has limited plant uptake. Because lead is strongly adsorbed to soil, it generally is retained in the upper layers of soil and does not leach appreciably into the subsoil and groundwater. Lead compounds may be transformed in the environment to other lead compounds; however, lead is an element and cannot be destroyed. Many anthropogenic sources of lead have been eliminated or strictly regulated due to lead's persistence and toxicity. Because lead does not degrade, these former uses leave their legacy as higher concentrations of lead in the environment.

5.3.2 Asbestos

Asbestos is a group of 6 naturally occurring minerals that are made up of heat-resistant fibres. Asbestos was historically used in brake lining and many building materials including external claddings. Asbestos does not break down or biodegrade in the environment, however if disturbed, such as during construction work, the fibres may become airborne and pose a significant risk to human health.

Inhalation of airborne asbestos fibres is primary means of exposure and can lead to asbestos related diseases. Asbestos fibres can remain suspended in the air for long periods of time and/or be transported long distances. Levels of airborne asbestos may be higher in dust and windblown soil closer to degrading asbestos products or waste sites where asbestos is disturbed.

5.4 Additional Risk Assessment

As some soil exceeded the Soil Contaminants Standards and Eco SGV, additional assessment has been undertaken to determine whether soils would be considered acceptable.

The 95% UCL gives an indication of the expected levels of contaminants across a given site. MfE guidelines outline a few conditions for use of statistical analysis, described below:

Table 36: Requirements for Statistical Analysis

Condition	Comment
A sufficient number of data points must be present to allow the analysis to be performed with accuracy (refer also to section 7.3.3). The number of data points will vary depending on the statistical test to be performed.	A minimum of 8-10 samples are required. Our dataset along the western boundary has 19 samples.
Statistics that rely on the assumption of a normal distribution should be performed only on data that is demonstrated to be normal.	Data appears to be normally distributed.
The data should be from the same statistical population (e.g., no inclusion of results representative of 'hotspots' in data sets used to calculate averages or means) (refer also to section 4 and section 7.4).	Samples collected on an approximate grid basis.
There must not be an over-representation of sample results that are below the laboratory limit of detection (refer to section 7.2.1).	No results are below laboratory detection limits.

The 95%UCL for zinc along the western boundary was calculated to be 124.8mg/kg (within Eco SGV for a commercial land use). Therefore, the area along the western boundary is suitable for **commercial use** with respect to the levels of zinc and operational definition given above. It is considered that the risk from the elevated zinc along the western boundary will be low.

As a sample along the western boundary contained zinc concentrations more than twice the Eco SGV for a residential use, the 95% UCL cannot be applied if residential development is undertaken. Remediation or Site Management is recommended for any residential use.

As some of the samples contained concentrations of lead, more than twice the SCS for a residential use, the 95% UCL cannot be applied to the centre and south of the site if residential development is undertaken. Remediation or Site Management is recommended.

5.5 Exposure Routes and Risks to Exposed Populations

For human health, exposure is the primary concern, and for exposure to occur there must be 1) contaminants present at site, and 2) exposure routes via which site users would be exposed to same. In the absence of verified contamination, no exposure risk can be fully assessed. A Detailed Site investigation is recommended given the history of the site which has been used for various HAIL activities. These include a sawmill and associated services, buildings constructed prior to 2000 and the possibility of contamination from the neighbouring sites. The site to the south is now used for silage and contains a bunker and concrete pad from historic use while the sites to the west and northwest have been used as a coal yard and rubbish disposal.

There are possible contaminants on site at levels that have not been assessed. The table below therefore shows a conceptual site model **with linkage** between potential contamination sources, pathways and receptors.

Source	Receptor	Pathway	Pathway Complete?
Historic Sawmill and Timber Storage HAIL category A17: Storage tanks or drums for fuel, chemicals or liquid waste. HAIL category A.18: Wood treatment or preservation including the commercial use of antisapstain chemicals during milling, or bulk storage of treated timber outside.	Construction workers	Dermal contact	Incomplete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. The risk to human health would be negligible for contaminants associated with HAIL A.17 and A.18.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Contaminants may be present at a level that poses a risk to human health with a change in land use from a storage and distribution centre to industrial and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – The site is currently grazing land.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway –It is unlikely that contaminants associated with HAIL use would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
Asbestos containing building products used the construction of historic sawmill buildings E1: Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition	Construction workers	Dermal contact	Potentially Complete Pathway – Contaminant exposure of a construction worker would be no more than a few occasions per year with minimal exposure. However, asbestos can be an immediate or short-term risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Potentially Complete Pathway – Asbestos may be present at a level that poses a risk to human health with a change in land use from production land to residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Potentially Complete Pathway – Asbestos may be present at a level that poses a risk to human health with a change in land use from production land to residential and may require specific controls.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway –As no current disturbance works are occurring, it is unlikely that asbestos would migrate offsite at concentrations that would be a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	

Source	Receptor	Pathway	Pathway Complete?
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Incomplete Pathway – Asbestos will generally remain in the surface soils on the site.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Asbestos will generally remain in the surface soils on the site.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – The site and surrounding area is a highly modified ecosystem and asbestos will have a negligible risk to the environment.
Historic Bus Barn in which a Motor vehicle workshop and/or service station areas were possible. HAIL category F.4: Motor vehicle workshops. HAIL category F.7: Service stations including retail or commercial refuelling facilities. HAIL category F.8: Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances.	Construction workers	Dermal contact	Incomplete Pathway – Contaminant is not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Incomplete Pathway – Contaminant is not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – The site is currently grazing land.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – Contaminant is not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Incomplete Pathway – Contaminant is not present at a level that poses a risk to surface water.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Contaminant is not present at a level that poses a risk to groundwater.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – Contaminant is not present at a level that poses a risk to ecological receptors.
Disposal of sawdust to land in the northeast of the site. HAIL category G.5: Waste disposal to land (excluding where biosolids have been used as soil conditioners).	Construction workers	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	

Source	Receptor	Pathway	Pathway Complete?
		Ingestion	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Incomplete Pathway – Contaminants are not present at a level that poses a risk to surface water.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Contaminants are not present at a level that poses a risk to groundwater.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – Contaminants are not present at a level that poses a risk to ecological receptors.
Land adjacent to a Landfill HAIL category H: Any other land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment.	Construction workers	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Current site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Potentially complete Pathway – Contaminants are present at a level that may impact on surface water, lead adsorbs onto soil particles which may then be transported to surface water.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Contaminants are not present at a level that poses a risk to groundwater.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Potentially Complete Pathway – The site and surrounding area is a highly modified ecosystem. However, lead exceedances may impact on species and how they function on the site.
Cadmium from fertilizer use on grazing land. HAIL category I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it	Construction workers	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Future site users	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
		Dermal contact	

Source	Receptor	Pathway	Pathway Complete?
could be a risk to human health or the environment	Current site users	Ingestion	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Inhalation of dust/vapours	
	General public	Dermal contact	Incomplete Pathway – Contaminants are not present at a level that poses a risk to human health.
		Ingestion	
		Inhalation of dust/vapours	
	Surface water	Sediment and runoff directly into surface water discharging into nearby watercourses (The Waikato River is 70m North of the site).	Incomplete Pathway – Contaminants are not present at a level that poses a risk to surface water.
	Groundwater	Leaching and migration of soil contaminants into groundwater.	Incomplete Pathway – Contaminants are not present at a level that poses a risk to groundwater.
	Soil microbes, plants, invertebrates and wildlife	Ingestion / uptake	Incomplete Pathway – Contaminants are not present at a level that poses a risk to ecological receptors.

5.6 NES Consents

The National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) outlines various 'Permitted Activities' (not requiring consent) and 'Controlled, Restricted Discretionary and Discretionary Activities' (requiring resource consent). The advice of a planner should be sought to ensure all consent requirements are met.

37 Lake Road

It is more likely than not that some areas of the site were used for timber storage (**HAIL A.17 & A.18**) and that a sawmill (**HAIL A.17 & A.18**) operated on the site. Onsite services associated with the sawmill included a bus barn (**HAIL F.8**) and a cement shed (**HAIL E.3**). Immediately adjacent the site was a rubbish disposal area (**HAIL H**), a stainers yard (**HAIL A.18**), a morgue (**HAIL I**). and a coal yard (**HAIL E.5**). Buildings constructed on site were prior to 2000 (**HAIL E.1 & I**) and sawdust disposal occurred on site (**HAIL G.5**). These areas of the site are considered to be a "piece of land" under NES legislation. In Figure 4 below, the light blue lines represent the approximate areas identified as a piece of land.



Figure 4: Areas On-Site Identified as potentially being a “Piece of Land”

5.6.1 Land Use Change

Section 8(4) of the NES states that subdivision or land use change is a Permitted Activity, provided a PSI exists, and the PSI states that it is highly unlikely that there will be a risk to human health. The act of subdivision itself, by simply altering lines on a plan, does not create any additional risk, provided that no change in use occurs. A change in use can include constructing buildings where there were none previously, even if the overall zoning stays the same.

Section 10 states land use change or subdivision is a Restricted Discretionary activity if contaminants are above guidelines.

Due to the presence of unacceptable levels of contaminants, it cannot be stated that it is highly unlikely there is a risk to human health. The proposed change of land use cannot be considered a “Permitted Activity” under NES legislation.

Of the c.175 soil samples analysed, 9 contained elevated concentrations of lead above SCS for a residential land use and 2 contained asbestos above BRANZ guidelines. It is likely that the District Council will require a **Restricted Discretionary Consent** for any future subdivision or land use change at the site.

5.6.2 Earthworks

The NES sets permitted standards in relation to soil disturbance under Regulation 8(3).

The wider land parcel area is approximately 150,260m². Based on calculations provided in the NES, approximately 7,513m³ may be disturbed and 1,503m³ may be removed as a permitted activity. There are other criteria regarding permitted activities that a planner will be able to assist

with. Exceedance of permitted volumes and other criteria means a consent may be required by the local council.

Geohazard Environmental Ltd has not been provided with details relating to the potential earthworks associated with the proposed development. Therefore, the potential for the earthworks associated with the proposed development to require consent cannot be fully discounted at this stage.

In the event future soil disturbance does exceed Permitted Activity criteria, a **Restricted Discretionary Consent** would likely be required. Furthermore, as soils are in excess of applicable guidelines, a Remediation Plan and/or Site Management Plan is likely to be required as part of any earthworks consent.

5.7 Other Consent Requirements

Soils for removal as part of the proposed development (if required) above background levels but within guidelines for the protection of human health and the environment will require consent for disposal to non-landfill sites if they are placed in a location where they may enter water. Soils imported to site above background levels will require consent from the Regional Council.

The advice of a planner should be sought to ensure all consent requirements are met.

6.0 PROPOSED SITE REMEDIATION/MANAGEMENT OPTIONS

As the site is planned to be redeveloped for future use, Remediation and/or Site Management is required in the vicinity of in the centre and south of the site and an area on the western boundary. In Figure 5 below the general areas likely to require remediation are shown in the light blue clouds. This area may be expanded as additional information is gathered in any Remediation Action Plan.



Figure 5: The General Area Requiring Remediation.

Potential remedial works could include several options, which are outlined below. Other remedial options may be available but are generally not suitable for rapid development, e.g. bioremediation. A full Remediation Action Plan and/or Site Management Plan is likely to be required as part of any Resource Consent application.

6.1 Remediation Objectives

The objective of any remediation is to remove linkages between the source and receptors. The linkages can be removed by either:

- Restricting access to affected soils (for example, by installing a cap).
- Excavation and removal of all affected soils, thereby removing the source.
- Soil mixing.
- A combination of the above.

These remediation/management techniques are briefly described below. The Client may elect which option they choose and advise the District Council accordingly.

6.2 Option 1 – Remediation Earthworks

Excavation of the identified impacted soil, and removal to an appropriate disposal location (such as a Class A Landfill facility). Confirmation of acceptance from the selected landfill facility will be required prior to undertaking the works. Any imported soils bought onto the site (used for backfilling, site levels etc) must be verified as clean. This is best done at the source rather than importing soils and then testing.

In order to identify volumes for removal, further soil sampling would need to be undertaken to delineate the horizontal and vertical extent of the contamination.

Once the excavation/removal has been undertaken, a Site Validation Report (SVR) would then be required (detailing the remedial works that were undertaken and results from any validation sampling undertaken etc.)

Advantages:

The site would likely be tagged as “remediated” on the Council file, and no on-going site monitoring and management plan would be required. Any future earthworks will not likely require specific protective measures or environmental controls for ground contamination etc.

Disadvantages:

Time and cost implications (for example, obtaining the relevant consents, reporting requirements, undertaking more sampling to delineate the extent of the contamination, undertaking the earthworks, transporting the soil to an appropriate facility, as well as landfill fees etc.)

6.3 Option 2 - Site Management (Capping)

A cap over affected soils aims to remove the pathway between the source and the receptor. The cap may include a ‘hard cap’ (e.g. concrete, gravel or asphalt etc.), or ‘soft cap’ (e.g. a layer of imported clean soils).

With regards to a soft cap, imported soils can be sourced from any suitable location. Testing of imported soils is required to ensure that additional contaminants are not brought onto site soils. A minimum depth of verified clean imported soils includes:

- 500mm of clean soil in the south of the site (asbestos present).
- 300mm of clean soil in the centre of the site (asbestos not present) if vegetables are grown in site soils.
- 100mm if raised vegetable gardens are to be used.

In addition to the soil, a physical indicator layer (such as a geotextile cloth) is required beneath imported soils.

For hard capping, the depth of soil removed can be limited to the minimum required to develop a suitable sub-base and may be less than 300mm. However, any topsoil excavated within the proposed capping area will need to be handled and disposed of correctly (i.e. to a Landfill Facility licenced to accept the material).

If this option is selected, further soil sampling should be undertaken to delineate the extent of the contamination to identify the size of the area which required capping. A Site Management Plan would be required (detailing the management objectives and goals, the capping methodology, dust/odour controls, worker protection, contingency and notification, duty to disclose, and ongoing long-term site management requirements).

Advantages:

It is typically expected to be less expensive to implement than compared with Option 1, depending on the size of the area (which is still to be delineated at this stage).

Disadvantages:

There would be on-going site management requirements (such as maintenance of the cap, controls regarding gardens/play areas on-site, and any future earthworks etc.)

In the event of any future earthworks, and/or any future removal of site soils below the cap, the owners would be responsible for the disposal of any soil to landfill, and for the reinstatement of the cap. Consent requirements would likely apply under the NES.

It should be noted that information regarding the site's soil quality would likely be included in Council LIM as part of public records, and a Consent Notice would likely be registered onto the title of the land.

6.4 Option 3 – Soil Mixing

Soil mixing involves ploughing site soils to mix affected surface soils with unaffected deeper soils. It is suitable for sites where contaminant concentrations are relatively low, uniform across the site, and likely to be at shallow depths.

As asbestos was detected in site soils in the south of the site, soil mixing is not considered to be an appropriate option in the south of the site.

The calculation provided by PDP in their report *Guideline for Contaminated Land Remediation by Soil Mixing* is used to estimate the appropriate mixing depth. The mixing depth in this section is provisional and dependant on further information regarding the vertical extent of contamination and additional data to determine a suitable site average.

Mixing depth calculation:

$$Y = \frac{x(a - b)}{0.9(SCS) - b}$$

Where:

Y = estimated vertical mixing depth (mm)

x = depth of soil profile where contamination is expected at level "a"

a = average concentration of contaminant at depth x (mg/kg)

b = average concentration of contaminant in underlying soils

SCS = soil contaminant standard.

If this option is selected, further soil sampling should be undertaken to delineate the extent of the contamination to identify the size of the area which requires mixing, as well as the depth of the contamination. A Site Management Plan would be required (detailing the management objectives and goals, the methodology, dust/odour controls, worker protection, contingency and notification, duty to disclose, and any ongoing long-term site management requirements).

Advantages:

If successful, this option is typically expected to be less expensive to implement than compared with Options 1 and 2.

Disadvantages:

There is the potential for mixing to be unsuccessful, and it could result in spreading the contamination.

It should be noted that information regarding the site's soil quality would likely be included in Council LIM as part of public records, and a Consent Notice would likely be registered onto the title of the land.

6.5 Completion Reporting

A Completion Report, known as a "Site Validation Report" (SVR) is usually required when remedial works are undertaken. The following information is typically retained and presented at completion of the works:

- Volumes and locations of any soil excavated and removed from the site.
- Provision of as-built plans.
- Transport operator details.
- Details of disposal location.
- Receipts from landfill operators showing the date and volume or tonnage of soil disposed.
- Details of any contingency measures invoked.
- Details of any additional sampling undertaken.
- A photographic record of works as they progress.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Please refer to executive summary for report conclusions.

8.0 REFERENCES

GNS Science (GNS) GeoAtlas, <http://data.gns.cri.nz/geology/> accessed 03.08.2021.

Ministry for the Environment (MfE) 2011. *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils.*

Ministry for the Environment (MfE) 2011. *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values.*

Ministry for the Environment (MfE) 2012 *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.*

National Institute of Water and Atmospheric Research (NIWA) 2011. *The National Climate Database*, <http://cliflo.niwa.co.nz/> -accessed 03.08.2015.

APPENDIX A

Site, Sample and Result Plans



37 Lake Rd Mangakino Site Feature Plan



Client:
Wairarapa Moana Ki Poukani inc

JOB # 210606

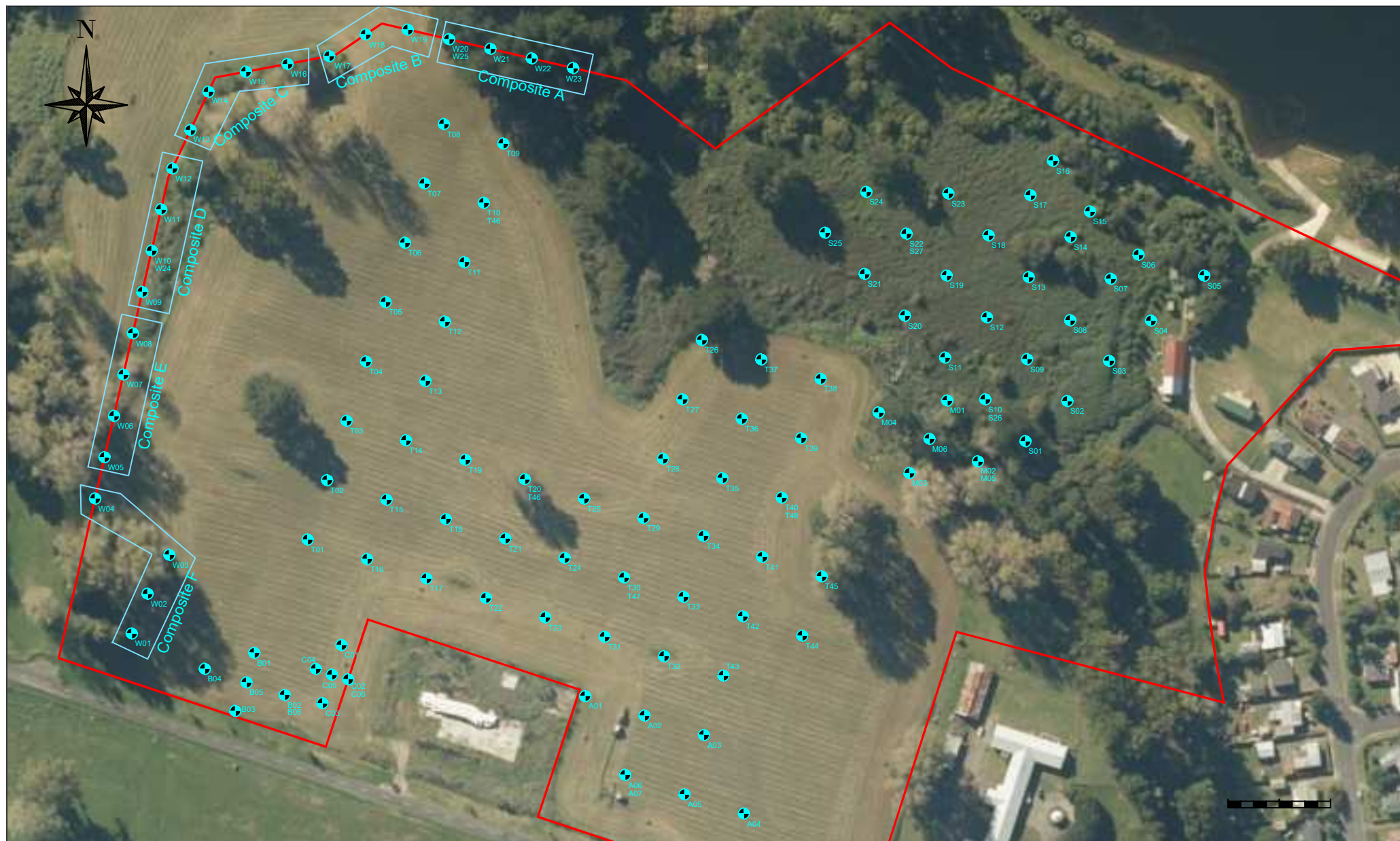
DATE: 02/09/21

DRG No. 001

SCALE:
NTS @ A4

DRAWN BY:
JF

REV. -



37 Lake Rd Mangakino SSample Location Plan



Client:
Wairarapa Moana Ki Poukani inc

JOB # 210606

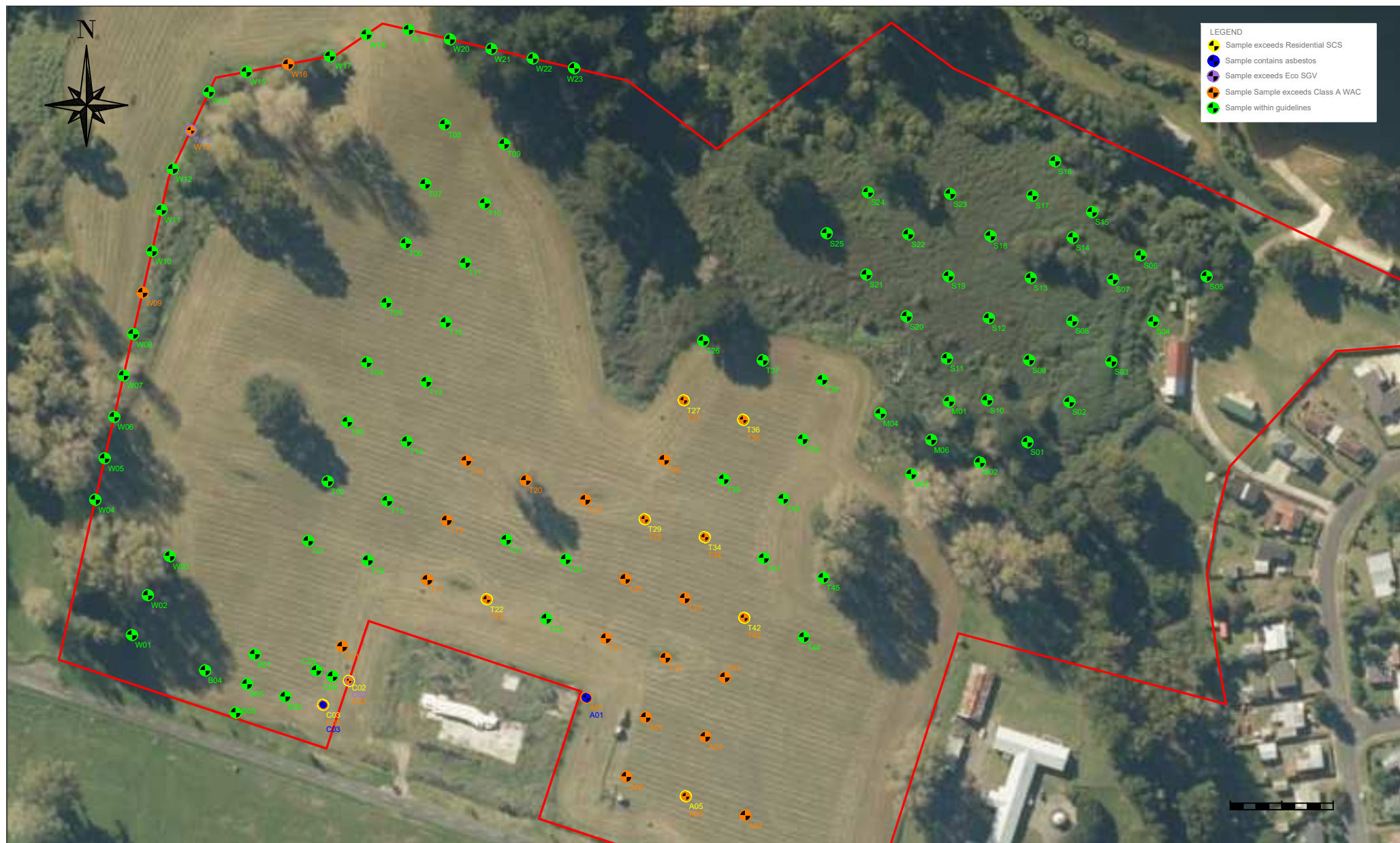
DATE: 23/05/23

DRG No. 006

SCALE:
NTS @ A4

DRAWN BY:
SAM

REV.
-



37 Lake Rd Mangakino Sample Results Plan



Client:
Wairarapa Moana Ki Poukani inc

JOB # 210606

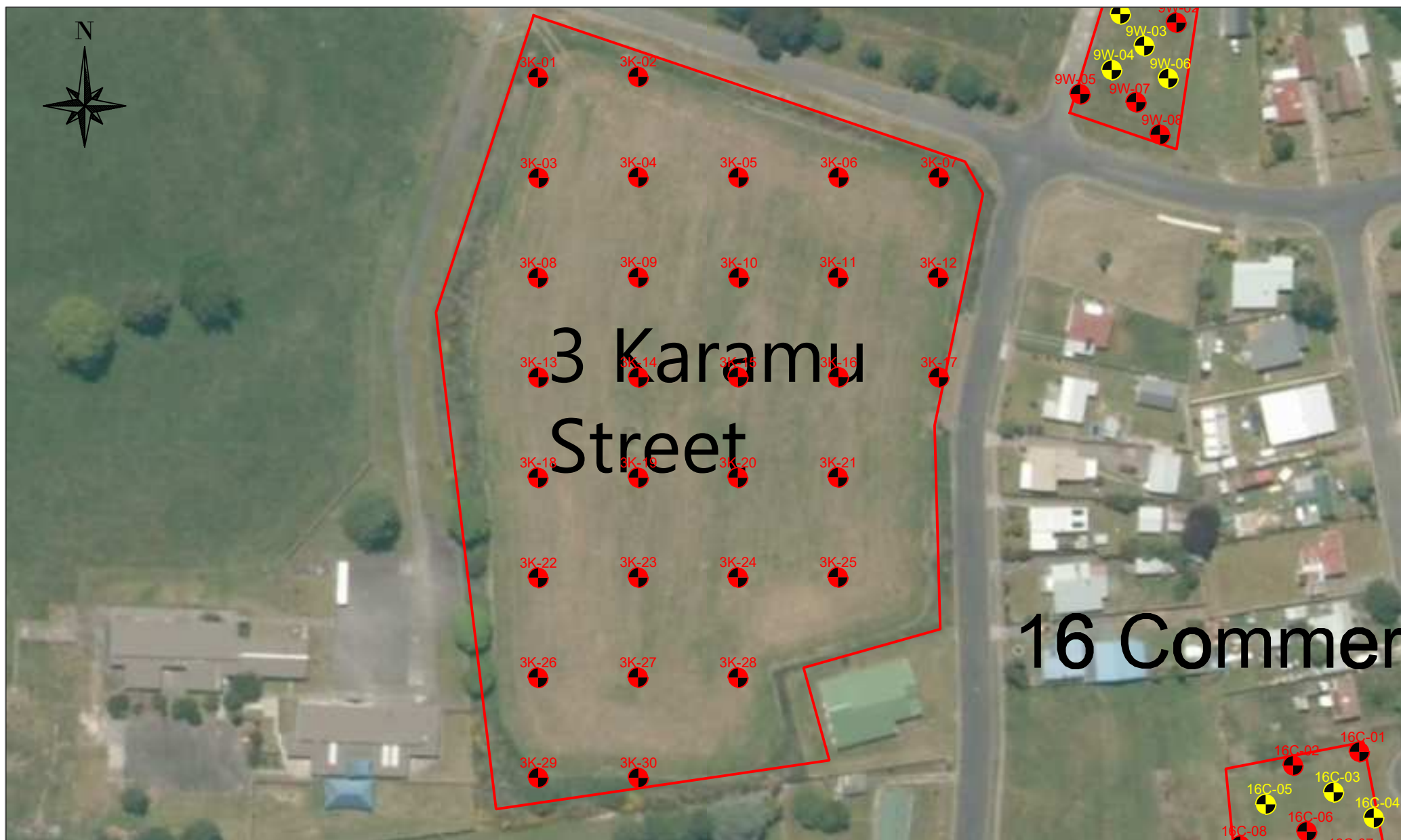
DATE: 13/06/231

DRG No. 007

SCALE:
NTS @ A4

DRAWN BY:
SAM

REV. -



Mangakino Portfolio
Sample Location Plan
3 Karamu Street



Client: Wairarapa Moana ki Pouakani Incorporation		SCALE: NTS
JOB # 200302	DATE: 03/08/20	DRAWN BY: NM
DRG No. 003	REV. -	

APPENDIX B

Laboratory Results



Certificate of Analysis

Geohazard Environmental Ltd
 Rotorua Arts Village (2nd Floor), 1240 Hinemaru St
 Rotorua 3010

Attention: Jonathan Findon
 Phone: 022 4364292
 Email: jonathan@geohazard.co.nz

Sampling Site: 37 Lake Rd

Lab Reference: 23-16218
 Submitted by: Susan
 Date Received: 29/05/2023
 Testing Initiated: 30/05/2023
 Date Completed: 9/06/2023
 Order Number:
 Reference: 210606

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report. Specific testing dates are available on request.

Heavy Metals in Soil

Client Sample ID			S01 0.0 0	S01 0.5 0.5	S01 1.2 1.2	S02 0.0 0	S02 0.5 0.5
Date Sampled			25/05/2023	25/05/2023	25/05/2023	25/05/2023	25/05/2023
Analyte	Unit	Reporting Limit	23-16218-1	23-16218-2	23-16218-3	23-16218-4	23-16218-5
Arsenic	mg/kg dry wt	0.125	4.6	1.5	4.3	3.4	0.51
Beryllium	mg/kg dry wt	0.013	0.54	0.29	0.65	0.39	0.049
Boron	mg/kg dry wt	1.25	2.4	1.4	2.2	1.4	<1.3
Cadmium	mg/kg dry wt	0.005	0.12	0.038	0.054	0.081	0.039
Chromium	mg/kg dry wt	0.125	5.2	1.5	5.4	4.1	0.71
Copper	mg/kg dry wt	0.075	22.3	2.6	8.70	8.44	2.2
Lead	mg/kg dry wt	0.25	17.6	3.3	7.68	12.3	1.7
Mercury	mg/kg dry wt	0.025	0.075	<0.025	0.088	0.056	<0.025
Nickel	mg/kg dry wt	0.05	2.8	0.92	2.9	1.9	0.47
Zinc	mg/kg dry wt	0.05	62.4	12.6	33.5	45.6	13.7

Heavy Metals in Soil

Client Sample ID			S02 2.1 2.1	S03 0.0 0	S03 0.5 0.5	S03 2.1 2.1	S04 0.0 0
Date Sampled			25/05/2023	25/05/2023	25/05/2023	25/05/2023	25/05/2023
Analyte	Unit	Reporting Limit	23-16218-6	23-16218-7	23-16218-8	23-16218-9	23-16218-10
Arsenic	mg/kg dry wt	0.125	1.4	3.2	3.5	3.3	1.1
Beryllium	mg/kg dry wt	0.013	0.10	0.30	0.28	0.15	0.035
Boron	mg/kg dry wt	1.25	<1.3	1.3	<1.3	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.019	0.16	0.10	0.026	0.033
Chromium	mg/kg dry wt	0.125	1.8	4.0	4.4	3.0	0.93
Copper	mg/kg dry wt	0.075	2.2	16.5	9.50	4.4	3.0

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.

This test report shall not be reproduced except in full, without the written permission of Analytica Laboratories.

Heavy Metals in Soil

Client Sample ID			S02 2.1 2.1	S03 0.0 0	S03 0.5 0.5	S03 2.1 2.1	S04 0.0 0
Date Sampled			25/05/2023	25/05/2023	25/05/2023	25/05/2023	25/05/2023
Lead	mg/kg dry wt	0.25	1.8	19.2	14.0	3.1	4.5
Mercury	mg/kg dry wt	0.025	<0.025	0.069	0.056	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	1.2	2.7	2.6	1.6	0.32
Zinc	mg/kg dry wt	0.05	18.0	74.3	66.4	33.8	19.4

Heavy Metals in Soil

Client Sample ID			S04 0.5 0.5	S04 0.8 0.8	S05 0.0 0	S05 0.5 0.5	S05 1.1 1.1
Date Sampled			25/05/2023	25/05/2023	25/05/2023	25/05/2023	25/05/2023
Analyte	Unit	Reporting Limit	23-16218-11	23-16218-12	23-16218-13	23-16218-14	23-16218-15
Arsenic	mg/kg dry wt	0.125	5.5	6.3	1.4	1.9	5.9
Beryllium	mg/kg dry wt	0.013	0.13	0.27	0.050	0.17	1.0
Boron	mg/kg dry wt	1.25	<1.3	1.7	2.5	<1.3	1.8
Cadmium	mg/kg dry wt	0.005	0.011	0.018	0.055	0.036	0.11
Chromium	mg/kg dry wt	0.125	3.1	3.7	2.8	2.0	8.1
Copper	mg/kg dry wt	0.075	15.1	14.6	17.1	3.7	16.7
Lead	mg/kg dry wt	0.25	9.63	9.92	12.8	3.3	11.4
Mercury	mg/kg dry wt	0.025	0.17	0.13	0.066	<0.025	0.15
Nickel	mg/kg dry wt	0.05	1.3	1.9	1.7	1.4	3.9
Zinc	mg/kg dry wt	0.05	12.4	22.6	26.2	18.4	53.2

Heavy Metals in Soil

Client Sample ID			S06 0.0 0	S06 0.5 0.5	S06 1.5 1.5	S07 0.0 0	S07 0.6 0.6
Date Sampled			25/05/2023	25/05/2023	25/05/2023	25/05/2023	25/05/2023
Analyte	Unit	Reporting Limit	23-16218-16	23-16218-17	23-16218-18	23-16218-19	23-16218-20
Arsenic	mg/kg dry wt	0.125	2.9	2.3	3.5	3.1	1.3
Beryllium	mg/kg dry wt	0.013	0.29	0.36	0.81	0.32	0.29
Boron	mg/kg dry wt	1.25	<1.3	<1.3	1.4	2.5	1.3
Cadmium	mg/kg dry wt	0.005	0.20	0.071	0.070	0.17	0.050
Chromium	mg/kg dry wt	0.125	3.0	2.0	8.8	4.3	2.0
Copper	mg/kg dry wt	0.075	8.07	2.4	7.68	16.0	2.4
Lead	mg/kg dry wt	0.25	10.3	4.4	8.81	19.1	4.7
Mercury	mg/kg dry wt	0.025	0.064	<0.025	0.082	0.067	<0.025
Nickel	mg/kg dry wt	0.05	1.6	1.3	3.3	2.4	1.2
Zinc	mg/kg dry wt	0.05	49.2	33.1	28.0	67.9	36.5

Heavy Metals in Soil

Client Sample ID			S07 2.1 2.1	S08 0.0 0	S08 0.7 0.7	S08 1.8 1.8	S09 0.0 0
Date Sampled			25/05/2023	25/05/2023	25/05/2023	25/05/2023	25/05/2023
Analyte	Unit	Reporting Limit	23-16218-21	23-16218-22	23-16218-23	23-16218-24	23-16218-25
Arsenic	mg/kg dry wt	0.125	3.4	2.3	1.4	4.2	2.6
Beryllium	mg/kg dry wt	0.013	0.83	0.36	0.32	0.92	0.38
Boron	mg/kg dry wt	1.25	1.6	2.0	<1.3	1.9	1.8
Cadmium	mg/kg dry wt	0.005	0.10	0.14	0.043	0.046	0.18
Chromium	mg/kg dry wt	0.125	5.1	3.8	1.3	8.5	3.5
Copper	mg/kg dry wt	0.075	13.1	20.2	3.8	10.6	16.6
Lead	mg/kg dry wt	0.25	7.29	14.0	3.4	8.92	11.4
Mercury	mg/kg dry wt	0.025	0.13	0.056	<0.025	0.099	0.075

Heavy Metals in Soil

Client Sample ID			S07 2.1 2.1	S08 0.0 0	S08 0.7 0.7	S08 1.8 1.8	S09 0.0 0
Date Sampled			25/05/2023	25/05/2023	25/05/2023	25/05/2023	25/05/2023
Nickel	mg/kg dry wt	0.05	2.3	2.2	0.86	3.3	1.9
Zinc	mg/kg dry wt	0.05	28.3	54.1	23.9	34.7	53.6

Heavy Metals in Soil

Client Sample ID			S09 0.7 0.7	S09 1.2 1.2	S10 0.0 0	S10 0.5 0.5	S10 1.2 1.2
Date Sampled			25/05/2023	25/05/2023	25/05/2023	25/05/2023	25/05/2023
Analyte	Unit	Reporting Limit	23-16218-26	23-16218-27	23-16218-28	23-16218-29	23-16218-30
Arsenic	mg/kg dry wt	0.125	1.5	4.5	2.1	4.8	4.7
Beryllium	mg/kg dry wt	0.013	0.21	0.94	0.20	0.67	1.0
Boron	mg/kg dry wt	1.25	<1.3	2.6	3.2	1.6	2.0
Cadmium	mg/kg dry wt	0.005	0.030	0.060	0.17	0.075	0.057
Chromium	mg/kg dry wt	0.125	2.1	7.9	2.7	5.1	6.1
Copper	mg/kg dry wt	0.075	3.4	22.2	13.1	20.8	18.1
Lead	mg/kg dry wt	0.25	2.5	9.35	18.1	6.39	9.20
Mercury	mg/kg dry wt	0.025	0.030	0.14	0.049	0.082	0.089
Nickel	mg/kg dry wt	0.05	1.2	3.6	2.0	2.6	3.1
Zinc	mg/kg dry wt	0.05	22.7	42.5	58.0	34.6	40.4

Heavy Metals in Soil

Client Sample ID			S11 0.0 0	S11 0.5 0.5	S11 2.0 2.0	S12 0.0 0	S12 0.5 0.5
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-31	23-16218-32	23-16218-33	23-16218-34	23-16218-35
Arsenic	mg/kg dry wt	0.125	1.8	1.1	4.2	1.5	1.2
Beryllium	mg/kg dry wt	0.013	0.25	0.14	0.89	0.24	0.13
Boron	mg/kg dry wt	1.25	1.3	<1.3	1.5	1.5	<1.3
Cadmium	mg/kg dry wt	0.005	0.070	0.011	0.070	0.12	0.016
Chromium	mg/kg dry wt	0.125	1.9	1.1	7.2	2.4	1.5
Copper	mg/kg dry wt	0.075	5.3	1.2	14.8	9.46	1.2
Lead	mg/kg dry wt	0.25	22.2	1.4	9.18	15.9	2.1
Mercury	mg/kg dry wt	0.025	0.029	<0.025	0.072	0.048	<0.025
Nickel	mg/kg dry wt	0.05	1.2	0.79	3.0	1.3	1.0
Zinc	mg/kg dry wt	0.05	31.0	10.6	32.3	36.3	14.5

Heavy Metals in Soil

Client Sample ID			S12 1.8 1.8	S13 0.0 0	S13 0.5 0.5	S13 2.1 2.1	S14 0.0 0
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-36	23-16218-37	23-16218-38	23-16218-39	23-16218-40
Arsenic	mg/kg dry wt	0.125	4.2	2.9	1.1	4.1	6.5
Beryllium	mg/kg dry wt	0.013	0.72	0.22	0.26	0.59	0.28
Boron	mg/kg dry wt	1.25	1.6	1.8	<1.3	<1.3	1.9
Cadmium	mg/kg dry wt	0.005	0.050	0.14	0.050	0.051	0.18
Chromium	mg/kg dry wt	0.125	4.9	3.5	1.8	4.1	3.8
Copper	mg/kg dry wt	0.075	14.5	15.6	4.6	8.89	16.4
Lead	mg/kg dry wt	0.25	8.51	18.9	3.8	5.69	19.0
Mercury	mg/kg dry wt	0.025	0.049	0.080	<0.025	0.085	0.056
Nickel	mg/kg dry wt	0.05	2.6	2.0	1.2	2.2	2.6
Zinc	mg/kg dry wt	0.05	26.0	29.5	27.1	26.8	74.5

Heavy Metals in Soil

Client Sample ID			S14 0.5 0.5	S14 2.1 2.1	S15 0.0 0.0	S15 0.5 0.5	S15 2.1 2.1
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-41	23-16218-42	23-16218-43	23-16218-44	23-16218-45
Arsenic	mg/kg dry wt	0.125	1.4	2.4	1.9	2.3	3.6
Beryllium	mg/kg dry wt	0.013	0.26	0.42	0.19	0.25	0.88
Boron	mg/kg dry wt	1.25	<1.3	<1.3	<1.3	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.10	0.055	0.16	0.12	0.13
Chromium	mg/kg dry wt	0.125	2.9	3.1	2.9	3.5	5.3
Copper	mg/kg dry wt	0.075	7.56	7.5	14.5	11.9	8.56
Lead	mg/kg dry wt	0.25	5.87	4.5	14.9	22.3	8.72
Mercury	mg/kg dry wt	0.025	<0.025	0.052	0.060	0.067	0.064
Nickel	mg/kg dry wt	0.05	1.6	1.8	1.7	2.4	2.7
Zinc	mg/kg dry wt	0.05	51.8	23.5	134	54.5	35.0

Heavy Metals in Soil

Client Sample ID			S16 0.0 0	S16 0.8 0.8	S16 2.1 2.1	S17 0.0 0	S17 0.5 0.5
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-46	23-16218-47	23-16218-48	23-16218-49	23-16218-50
Arsenic	mg/kg dry wt	0.125	2.2	0.80	3.7	2.9	1.6
Beryllium	mg/kg dry wt	0.013	0.30	0.074	0.44	0.26	0.35
Boron	mg/kg dry wt	1.25	<1.3	<1.3	<1.3	1.5	<1.3
Cadmium	mg/kg dry wt	0.005	0.15	0.016	0.071	0.15	0.11
Chromium	mg/kg dry wt	0.125	3.3	2.3	4.1	3.9	2.4
Copper	mg/kg dry wt	0.075	12.6	10.0	7.92	14.2	6.1
Lead	mg/kg dry wt	0.25	14.5	6.36	7.43	23.9	5.70
Mercury	mg/kg dry wt	0.025	0.040	0.029	0.031	0.053	0.039
Nickel	mg/kg dry wt	0.05	1.7	0.82	3.3	1.7	1.5
Zinc	mg/kg dry wt	0.05	50.7	7.24	70.8	48.9	37.4

Heavy Metals in Soil

Client Sample ID			S17 2.2 2.2	S18 0.0 0	S18 0.5 0.5	S18 1.8 1.8	S19 0.0 0
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-51	23-16218-52	23-16218-53	23-16218-54	23-16218-55
Arsenic	mg/kg dry wt	0.125	3.1	2.4	1.1	5.3	1.9
Beryllium	mg/kg dry wt	0.013	0.51	0.31	0.19	1.33	0.36
Boron	mg/kg dry wt	1.25	<1.3	2.0	<1.3	2.6	<1.3
Cadmium	mg/kg dry wt	0.005	0.046	0.19	0.023	0.076	0.18
Chromium	mg/kg dry wt	0.125	4.9	4.2	1.2	8.5	2.6
Copper	mg/kg dry wt	0.075	7.74	22.2	2.4	13.2	9.17
Lead	mg/kg dry wt	0.25	5.69	41.0	2.8	11.1	8.65
Mercury	mg/kg dry wt	0.025	0.072	0.076	<0.025	0.30	0.045
Nickel	mg/kg dry wt	0.05	2.2	2.4	1.0	3.1	1.6
Zinc	mg/kg dry wt	0.05	29.7	53.0	13.3	37.7	25.8

Heavy Metals in Soil

Client Sample ID			S19 0.5 0.5	S19 1.4 1.4	S20 0.0 0	S20 0.5 0.5	S20 2.2 2.2
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-56	23-16218-57	23-16218-58	23-16218-59	23-16218-60
Arsenic	mg/kg dry wt	0.125	1.8	4.5	3.6	1.3	3.8
Beryllium	mg/kg dry wt	0.013	0.40	1.0	0.43	0.20	0.30
Boron	mg/kg dry wt	1.25	<1.3	1.6	1.3	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.089	0.069	0.10	0.017	0.077
Chromium	mg/kg dry wt	0.125	1.8	9.4	4.3	1.2	3.8
Copper	mg/kg dry wt	0.075	8.35	12.2	10.6	1.5	10.2
Lead	mg/kg dry wt	0.25	4.1	10.8	22.7	2.1	4.4
Mercury	mg/kg dry wt	0.025	<0.025	0.39	0.081	<0.025	0.065
Nickel	mg/kg dry wt	0.05	1.5	3.2	2.4	1.0	1.8
Zinc	mg/kg dry wt	0.05	24.3	35.1	44.5	9.33	22.8

Heavy Metals in Soil

Client Sample ID			S21 0.0 0	S21 0.5 0.5	S21 1.8 1.8	S22 0.0 0	S22 0.5 0.5
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-61	23-16218-62	23-16218-63	23-16218-64	23-16218-65
Arsenic	mg/kg dry wt	0.125	2.2	1.1	4.6	2.5	1.3
Beryllium	mg/kg dry wt	0.013	0.28	0.17	0.97	0.24	0.23
Boron	mg/kg dry wt	1.25	1.3	<1.3	1.4	1.6	<1.3
Cadmium	mg/kg dry wt	0.005	0.15	0.018	0.053	0.22	0.032
Chromium	mg/kg dry wt	0.125	2.9	1.1	7.9	4.6	1.5
Copper	mg/kg dry wt	0.075	7.55	1.4	13.4	18.4	2.1
Lead	mg/kg dry wt	0.25	16.7	1.6	9.18	29.6	2.7
Mercury	mg/kg dry wt	0.025	0.043	<0.025	0.13	0.063	<0.025
Nickel	mg/kg dry wt	0.05	1.4	0.85	2.8	2.6	1.3
Zinc	mg/kg dry wt	0.05	32.4	9.84	33.6	46.3	17.6

Heavy Metals in Soil

Client Sample ID			S22 1.8 1.8	S23 0.0 0	S23 0.5 0.5	S23 2.1 2.1	S24 0.0 0
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-66	23-16218-67	23-16218-68	23-16218-69	23-16218-70
Arsenic	mg/kg dry wt	0.125	4.9	5.2	1.9	5.1	2.6
Beryllium	mg/kg dry wt	0.013	0.83	0.26	0.23	0.89	0.24
Boron	mg/kg dry wt	1.25	<1.3	1.5	<1.3	1.8	2.2
Cadmium	mg/kg dry wt	0.005	0.043	0.18	0.085	0.068	0.19
Chromium	mg/kg dry wt	0.125	7.3	5.1	2.3	8.0	4.2
Copper	mg/kg dry wt	0.075	13.0	20.5	5.7	11.9	17.9
Lead	mg/kg dry wt	0.25	9.91	34.9	9.89	13.7	22.6
Mercury	mg/kg dry wt	0.025	0.063	0.058	0.029	0.065	0.068
Nickel	mg/kg dry wt	0.05	3.6	2.9	2.1	3.7	3.1
Zinc	mg/kg dry wt	0.05	33.7	101	36.0	43.4	55.4

Heavy Metals in Soil

Client Sample ID			S24 0.5 0.5	S24 1.8 1.8	S25 0.0 0	S25 0.5 0.5	S25 1.8 1.8
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-71	23-16218-72	23-16218-73	23-16218-74	23-16218-75
Arsenic	mg/kg dry wt	0.125	1.8	5.1	1.8	1.9	6.0
Beryllium	mg/kg dry wt	0.013	0.24	1.0	0.26	0.13	0.97
Boron	mg/kg dry wt	1.25	<1.3	1.5	<1.3	<1.3	1.3
Cadmium	mg/kg dry wt	0.005	0.038	0.062	0.10	0.020	0.065
Chromium	mg/kg dry wt	0.125	1.7	8.8	1.8	2.6	8.1
Copper	mg/kg dry wt	0.075	2.6	14.5	6.5	2.3	15.8
Lead	mg/kg dry wt	0.25	3.7	11.9	10.6	4.1	12.0
Mercury	mg/kg dry wt	0.025	<0.025	0.095	<0.025	<0.025	0.11
Nickel	mg/kg dry wt	0.05	1.2	4.0	0.79	1.0	4.2
Zinc	mg/kg dry wt	0.05	20.8	40.9	21.2	25.2	40.7

Heavy Metals in Soil

Client Sample ID			S26 0.0 0	S27 0.0 0	M01 0	M02 0	M03 0
Date Sampled			25/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-76	23-16218-77	23-16218-78	23-16218-79	23-16218-80
Arsenic	mg/kg dry wt	0.125	2.5	2.7	2.8	3.3	2.6
Beryllium	mg/kg dry wt	0.013	0.30	0.26	0.26	0.31	0.19
Boron	mg/kg dry wt	1.25	1.7	1.9	6.4	2.6	2.3
Cadmium	mg/kg dry wt	0.005	0.14	0.23	0.16	0.092	0.12
Chromium	mg/kg dry wt	0.125	3.0	4.4	9.5	4.0	3.6
Copper	mg/kg dry wt	0.075	11.9	20.1	20.7	16.0	17.6
Lead	mg/kg dry wt	0.25	16.7	30.6	88.6	24.5	76.3
Mercury	mg/kg dry wt	0.025	0.037	0.082	0.048	0.054	0.043
Nickel	mg/kg dry wt	0.05	1.8	3.0	31.6	2.7	2.2
Zinc	mg/kg dry wt	0.05	55.9	50.3	79.0	53.0	67.2

Heavy Metals in Soil

Client Sample ID			M04 0	M05 0	M06 0	W01 0	W02 0
Date Sampled			24/05/2023	24/05/2023	24/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-81	23-16218-82	23-16218-83	23-16218-84	23-16218-85
Arsenic	mg/kg dry wt	0.125	3.3	3.1	2.4	2.3	2.7
Beryllium	mg/kg dry wt	0.013	0.44	0.28	0.25	0.25	0.27
Boron	mg/kg dry wt	1.25	<1.3	2.3	<1.3	2.4	4.7
Cadmium	mg/kg dry wt	0.005	0.053	0.091	0.040	0.33	0.34
Chromium	mg/kg dry wt	0.125	4.4	3.8	2.9	4.5	3.8
Copper	mg/kg dry wt	0.075	6.0	14.4	5.5	8.61	9.26
Lead	mg/kg dry wt	0.25	16.9	22.9	10.5	33.9	31.8
Mercury	mg/kg dry wt	0.025	0.052	0.046	0.027	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	2.4	2.6	2.3	5.01	4.0
Zinc	mg/kg dry wt	0.05	31.1	48.6	29.1	52.0	69.2

Heavy Metals in Soil

Client Sample ID			W03 0	W04 0	W05 0	W06 0	W07 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-86	23-16218-87	23-16218-88	23-16218-89	23-16218-90
Arsenic	mg/kg dry wt	0.125	2.2	3.0	4.5	2.2	3.1
Beryllium	mg/kg dry wt	0.013	0.25	0.26	0.27	0.19	0.19
Boron	mg/kg dry wt	1.25	4.6	2.1	2.0	3.6	3.6
Cadmium	mg/kg dry wt	0.005	0.33	0.22	0.26	0.48	0.37
Chromium	mg/kg dry wt	0.125	3.7	4.7	4.4	3.3	4.0
Copper	mg/kg dry wt	0.075	10.0	13.1	25.3	14.3	24.1
Lead	mg/kg dry wt	0.25	19.6	46.9	97.1	32.3	31.2
Mercury	mg/kg dry wt	0.025	<0.025	0.026	0.041	0.028	0.026
Nickel	mg/kg dry wt	0.05	3.6	2.5	2.5	2.4	2.6
Zinc	mg/kg dry wt	0.05	55.7	80.5	77.9	164	117

Heavy Metals in Soil

Client Sample ID			W08 0	W09 0	W10 0	W11 0	W12 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-91	23-16218-92	23-16218-93	23-16218-94	23-16218-95
Arsenic	mg/kg dry wt	0.125	5.5	4.7	7.1	3.6	5.2
Beryllium	mg/kg dry wt	0.013	0.24	0.24	0.21	0.18	0.32
Boron	mg/kg dry wt	1.25	2.7	1.7	1.7	1.3	2.9
Cadmium	mg/kg dry wt	0.005	0.41	0.46	0.27	0.16	0.12
Chromium	mg/kg dry wt	0.125	5.8	7.0	5.0	4.9	5.8
Copper	mg/kg dry wt	0.075	53.2	58.6	25.4	12.2	23.4
Lead	mg/kg dry wt	0.25	57.4	101	68.0	60.6	48.3
Mercury	mg/kg dry wt	0.025	0.070	0.53	0.049	0.044	0.041
Nickel	mg/kg dry wt	0.05	3.9	4.1	2.7	2.3	2.2
Zinc	mg/kg dry wt	0.05	97.2	84.2	70.2	52.0	106

Heavy Metals in Soil

Client Sample ID			W13 0	W14 0	W15 0	W16 0	W17 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-96	23-16218-97	23-16218-98	23-16218-99	23-16218-100
Arsenic	mg/kg dry wt	0.125	7.6	16.1	5.9	7.5	2.5
Beryllium	mg/kg dry wt	0.013	0.41	0.19	0.60	0.36	0.21
Boron	mg/kg dry wt	1.25	9.1	1.5	4.9	3.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.804	0.20	0.27	0.26	0.065
Chromium	mg/kg dry wt	0.125	7.7	10	7.8	6.9	2.3
Copper	mg/kg dry wt	0.075	30.6	22.6	64.9	20.9	3.4
Lead	mg/kg dry wt	0.25	82.5	19.2	47.0	108	3.8
Mercury	mg/kg dry wt	0.025	0.084	0.027	0.36	0.058	<0.025
Nickel	mg/kg dry wt	0.05	6.04	1.4	6.14	3.2	1.2
Zinc	mg/kg dry wt	0.05	491	50.6	118	138	25.8

Heavy Metals in Soil

Client Sample ID			W18 0	W19 0	W20 0	W21 0	W22 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-101	23-16218-102	23-16218-103	23-16218-104	23-16218-105
Arsenic	mg/kg dry wt	0.125	5.3	4.0	3.4	4.8	2.2
Beryllium	mg/kg dry wt	0.013	0.58	0.51	0.32	0.45	0.27
Boron	mg/kg dry wt	1.25	2.6	2.0	1.3	2.1	<1.3
Cadmium	mg/kg dry wt	0.005	0.25	0.25	0.17	0.16	0.076
Chromium	mg/kg dry wt	0.125	8.9	6.0	3.7	5.3	2.5
Copper	mg/kg dry wt	0.075	21.0	23.2	8.03	10.3	6.4
Lead	mg/kg dry wt	0.25	13.2	9.82	7.40	15.4	11.8
Mercury	mg/kg dry wt	0.025	0.047	0.059	0.039	0.071	0.039
Nickel	mg/kg dry wt	0.05	6.21	4.9	2.7	1.9	0.93
Zinc	mg/kg dry wt	0.05	82.5	83.1	30.5	44.3	32.2

Heavy Metals in Soil

Client Sample ID			W23 0	W24 0	W25 0	A01 0	A02 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-106	23-16218-107	23-16218-108	23-16218-109	23-16218-110
Arsenic	mg/kg dry wt	0.125	2.8	7.8	3.1	3.6	11
Beryllium	mg/kg dry wt	0.013	0.56	0.22	0.35	0.24	0.23
Boron	mg/kg dry wt	1.25	1.3	1.9	<1.3	<1.3	1.4
Cadmium	mg/kg dry wt	0.005	0.069	0.30	0.16	0.561	0.30
Chromium	mg/kg dry wt	0.125	2.7	6.0	3.7	15.1	7.8
Copper	mg/kg dry wt	0.075	7.1	23.2	8.06	20.6	14.3
Lead	mg/kg dry wt	0.25	7.52	73.7	7.61	102	119
Mercury	mg/kg dry wt	0.025	0.075	0.051	0.047	<0.025	0.032
Nickel	mg/kg dry wt	0.05	1.1	2.7	2.3	5.47	5.48
Zinc	mg/kg dry wt	0.05	23.5	78.2	32.1	189	59.4

Heavy Metals in Soil

Client Sample ID			A03 0	A04 0	A05 0	A06 0	A07 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-111	23-16218-112	23-16218-113	23-16218-114	23-16218-115
Arsenic	mg/kg dry wt	0.125	4.9	4.7	4.9	4.1	4.0
Beryllium	mg/kg dry wt	0.013	0.37	0.44	0.42	0.26	0.26
Boron	mg/kg dry wt	1.25	4.4	2.3	1.5	1.4	1.5
Cadmium	mg/kg dry wt	0.005	0.40	0.30	0.29	0.33	0.32
Chromium	mg/kg dry wt	0.125	9.3	8.3	14.2	8.6	8.3
Copper	mg/kg dry wt	0.075	16.1	13.1	22.0	21.6	20.8
Lead	mg/kg dry wt	0.25	135	134	431	154	144
Mercury	mg/kg dry wt	0.025	0.11	0.046	0.053	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	8.92	6.13	7.27	6.04	6.43
Zinc	mg/kg dry wt	0.05	67.8	63.2	62.0	78.3	76.0

Heavy Metals in Soil

Client Sample ID			T01 0	T02 0	T03 0	T04 0	T05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-116	23-16218-117	23-16218-118	23-16218-119	23-16218-120
Arsenic	mg/kg dry wt	0.125	2.5	2.3	2.1	3.4	2.2
Beryllium	mg/kg dry wt	0.013	0.33	0.36	0.27	0.27	0.28
Boron	mg/kg dry wt	1.25	1.6	1.6	1.3	1.6	1.9
Cadmium	mg/kg dry wt	0.005	0.33	0.43	0.36	0.36	0.34
Chromium	mg/kg dry wt	0.125	5.3	5.7	5.4	5.6	4.9
Copper	mg/kg dry wt	0.075	9.12	10.1	12.0	9.44	11.8
Lead	mg/kg dry wt	0.25	26.7	34.1	18.7	23.8	34.0
Mercury	mg/kg dry wt	0.025	0.031	<0.025	<0.025	<0.025	0.027
Nickel	mg/kg dry wt	0.05	5.34	5.49	7.28	4.9	6.48
Zinc	mg/kg dry wt	0.05	31.9	28.5	28.6	35.8	34.8

Heavy Metals in Soil

Client Sample ID			T06 0	T07 0	T08 0	T09 0	T10 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-121	23-16218-122	23-16218-123	23-16218-124	23-16218-125
Arsenic	mg/kg dry wt	0.125	2.2	2.0	1.9	2.3	2.1
Beryllium	mg/kg dry wt	0.013	0.25	0.22	0.27	0.26	0.32
Boron	mg/kg dry wt	1.25	1.4	<1.3	1.5	<1.3	1.4
Cadmium	mg/kg dry wt	0.005	0.29	0.25	0.29	0.28	0.35
Chromium	mg/kg dry wt	0.125	4.4	3.3	3.8	4.4	5.1
Copper	mg/kg dry wt	0.075	13.2	9.26	7.80	8.83	10.1
Lead	mg/kg dry wt	0.25	8.78	6.43	8.18	21.1	98.2
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	<0.025	0.032
Nickel	mg/kg dry wt	0.05	3.4	2.9	3.4	4.2	4.4
Zinc	mg/kg dry wt	0.05	22.8	19.6	22.3	26.1	40.4

Heavy Metals in Soil

Client Sample ID			T11 0	T12 0	T13 0	T14 0	T15 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-126	23-16218-127	23-16218-128	23-16218-129	23-16218-130
Arsenic	mg/kg dry wt	0.125	1.8	1.9	2.5	2.5	2.1
Beryllium	mg/kg dry wt	0.013	0.25	0.27	0.29	0.27	0.32
Boron	mg/kg dry wt	1.25	1.5	1.8	1.5	<1.3	1.6
Cadmium	mg/kg dry wt	0.005	0.27	0.30	0.30	0.24	0.32
Chromium	mg/kg dry wt	0.125	4.2	4.2	4.2	5.4	4.0
Copper	mg/kg dry wt	0.075	8.75	8.43	11.5	8.79	36.4
Lead	mg/kg dry wt	0.25	80.7	71.1	33.2	77.2	43.5
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	3.6	3.4	3.4	3.3	3.3
Zinc	mg/kg dry wt	0.05	35.9	33.7	31.5	46.6	31.7

Heavy Metals in Soil

Client Sample ID			T16 0	T17 0	T18 0	T19 0	T20 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-131	23-16218-132	23-16218-133	23-16218-134	23-16218-135
Arsenic	mg/kg dry wt	0.125	2.8	2.3	2.5	2.5	2.0
Beryllium	mg/kg dry wt	0.013	0.29	0.17	0.19	0.21	0.20
Boron	mg/kg dry wt	1.25	1.5	<1.3	<1.3	<1.3	2.8
Cadmium	mg/kg dry wt	0.005	0.34	0.28	0.41	0.28	0.34
Chromium	mg/kg dry wt	0.125	5.2	5.9	6.1	5.4	4.0
Copper	mg/kg dry wt	0.075	7.4	15.5	269	16.2	13.0
Lead	mg/kg dry wt	0.25	48.2	110	139	110	157
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	4.4	4.7	5.93	3.7	3.3
Zinc	mg/kg dry wt	0.05	34.9	39.9	108	50.8	84.3

Heavy Metals in Soil

Client Sample ID			T21 0	T22 0	T23 0	T24 0	T25 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-136	23-16218-137	23-16218-138	23-16218-139	23-16218-140
Arsenic	mg/kg dry wt	0.125	2.1	3.0	2.0	2.3	2.6
Beryllium	mg/kg dry wt	0.013	0.25	0.21	0.22	0.23	0.23
Boron	mg/kg dry wt	1.25	1.4	1.7	<1.3	1.5	<1.3
Cadmium	mg/kg dry wt	0.005	0.33	0.32	0.33	0.34	0.31
Chromium	mg/kg dry wt	0.125	4.3	6.7	5.2	4.5	5.6
Copper	mg/kg dry wt	0.075	18.2	18.2	17.1	9.88	11.2
Lead	mg/kg dry wt	0.25	58.3	219	65.7	69.3	151
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	4.6	5.09	4.1	4.7	4.5
Zinc	mg/kg dry wt	0.05	44.1	76.3	31.7	39.1	56.5

Heavy Metals in Soil

Client Sample ID			T26 0	T27 0	T28 0	T29 0	T30 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-141	23-16218-142	23-16218-143	23-16218-144	23-16218-145
Arsenic	mg/kg dry wt	0.125	2.6	4.3	5.2	4.1	3.5
Beryllium	mg/kg dry wt	0.013	0.29	0.31	0.49	0.31	0.24
Boron	mg/kg dry wt	1.25	1.6	1.7	1.6	1.5	1.4
Cadmium	mg/kg dry wt	0.005	0.26	0.24	0.27	0.27	0.29
Chromium	mg/kg dry wt	0.125	3.7	5.5	7.1	7.4	6.1
Copper	mg/kg dry wt	0.075	8.06	16.5	10.2	13.6	10.1
Lead	mg/kg dry wt	0.25	78.4	438	127	345	112
Mercury	mg/kg dry wt	0.025	0.025	0.026	0.052	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	3.8	4.0	5.42	5.0	5.06
Zinc	mg/kg dry wt	0.05	40.4	109	54.7	53.0	35.8

Heavy Metals in Soil

Client Sample ID			T31 0	T32 0	T33 0	T34 0	T35 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-146	23-16218-147	23-16218-148	23-16218-149	23-16218-150
Arsenic	mg/kg dry wt	0.125	3.4	5.8	4.8	6.1	2.7
Beryllium	mg/kg dry wt	0.013	0.22	0.31	0.35	0.27	0.32
Boron	mg/kg dry wt	1.25	<1.3	1.6	<1.3	<1.3	1.4
Cadmium	mg/kg dry wt	0.005	0.27	0.25	0.25	0.25	0.37
Chromium	mg/kg dry wt	0.125	6.8	9.6	6.5	7.8	11
Copper	mg/kg dry wt	0.075	10.3	12.1	18.0	11.4	9.59
Lead	mg/kg dry wt	0.25	107	204	130	250	80.5
Mercury	mg/kg dry wt	0.025	<0.025	0.029	0.028	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	3.9	5.62	4.1	4.3	6.35
Zinc	mg/kg dry wt	0.05	37.8	68.5	33.6	41.6	34.6

Heavy Metals in Soil

Client Sample ID			T36 0	T37 0	T38 0	T39 0	T40 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-151	23-16218-152	23-16218-153	23-16218-154	23-16218-155
Arsenic	mg/kg dry wt	0.125	2.4	2.1	2.3	2.0	2.8
Beryllium	mg/kg dry wt	0.013	0.31	0.25	0.25	0.23	0.25
Boron	mg/kg dry wt	1.25	1.8	1.6	1.4	<1.3	1.3
Cadmium	mg/kg dry wt	0.005	0.30	0.35	0.25	0.32	0.19
Chromium	mg/kg dry wt	0.125	5.7	4.4	5.8	4.2	4.7
Copper	mg/kg dry wt	0.075	12.4	9.14	16.7	8.99	8.26
Lead	mg/kg dry wt	0.25	279	54.1	35.2	30.5	45.8
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	0.029	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	4.7	4.0	4.8	3.7	3.1
Zinc	mg/kg dry wt	0.05	73.6	37.1	36.8	26.8	34.7

Heavy Metals in Soil

Client Sample ID			T41 0	T42 0	T43 0	T44 0	T45 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-156	23-16218-157	23-16218-158	23-16218-159	23-16218-160
Arsenic	mg/kg dry wt	0.125	2.9	3.6	3.7	2.0	2.5
Beryllium	mg/kg dry wt	0.013	0.27	0.25	0.31	0.20	0.18
Boron	mg/kg dry wt	1.25	<1.3	<1.3	<1.3	<1.3	8.5
Cadmium	mg/kg dry wt	0.005	0.24	0.34	0.26	0.31	0.41
Chromium	mg/kg dry wt	0.125	5.7	6.0	6.1	4.3	3.2
Copper	mg/kg dry wt	0.075	8.22	14.4	10.5	8.52	50.4
Lead	mg/kg dry wt	0.25	33.9	224	112	14.9	25.0
Mercury	mg/kg dry wt	0.025	<0.025	0.036	0.028	<0.025	0.039
Nickel	mg/kg dry wt	0.05	4.4	4.6	4.5	3.4	2.4
Zinc	mg/kg dry wt	0.05	35.4	57.5	55.5	22.0	75.1

Heavy Metals in Soil

Client Sample ID			T46 0	T47 0	T48 0	T49 0	B01 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-161	23-16218-162	23-16218-163	23-16218-164	23-16218-165
Arsenic	mg/kg dry wt	0.125	2.1	2.4	3.5	2.8	3.3
Beryllium	mg/kg dry wt	0.013	0.30	0.22	0.24	0.26	0.51
Boron	mg/kg dry wt	1.25	1.4	2.6	1.5	<1.3	1.7
Cadmium	mg/kg dry wt	0.005	0.33	0.34	0.30	0.24	0.26
Chromium	mg/kg dry wt	0.125	4.2	3.9	6.0	5.5	5.3
Copper	mg/kg dry wt	0.075	10.1	13.0	11.0	9.21	11.8
Lead	mg/kg dry wt	0.25	91.6	146	128	62.4	17.3
Mercury	mg/kg dry wt	0.025	0.030	<0.025	<0.025	<0.025	0.077
Nickel	mg/kg dry wt	0.05	4.7	2.9	5.26	4.4	4.3
Zinc	mg/kg dry wt	0.05	38.0	83.2	38.7	31.0	31.6

Heavy Metals in Soil

Client Sample ID			B02 0	B03 0	B04 0	B05 0	B06 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-166	23-16218-167	23-16218-168	23-16218-169	23-16218-170
Arsenic	mg/kg dry wt	0.125	2.1	4.2	3.1	3.2	2.4
Beryllium	mg/kg dry wt	0.013	0.25	0.63	0.27	0.46	0.25
Boron	mg/kg dry wt	1.25	1.4	2.3	1.9	3.0	1.5
Cadmium	mg/kg dry wt	0.005	0.564	0.23	0.44	0.32	0.546
Chromium	mg/kg dry wt	0.125	5.5	6.3	6.7	6.6	5.6
Copper	mg/kg dry wt	0.075	13.7	12.1	14.3	12.2	12.7
Lead	mg/kg dry wt	0.25	61.3	31.4	93.4	23.7	59.2
Mercury	mg/kg dry wt	0.025	<0.025	0.063	0.035	0.043	<0.025
Nickel	mg/kg dry wt	0.05	4.8	3.9	7.13	5.61	6.01
Zinc	mg/kg dry wt	0.05	33.4	45.1	64.3	35.4	36.9

Heavy Metals in Soil

Client Sample ID			C01 0	C02 0	C03 0	C04 0	C05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-171	23-16218-172	23-16218-173	23-16218-174	23-16218-175
Arsenic	mg/kg dry wt	0.125	2.2	4.4	2.7	2.4	2.2
Beryllium	mg/kg dry wt	0.013	0.24	0.24	0.27	0.18	0.19
Boron	mg/kg dry wt	1.25	1.4	<1.3	<1.3	<1.3	<1.3
Cadmium	mg/kg dry wt	0.005	0.29	0.29	0.19	0.28	0.25
Chromium	mg/kg dry wt	0.125	4.9	12	9.5	5.5	5.2
Copper	mg/kg dry wt	0.075	44.5	56.7	14.2	89.6	8.76
Lead	mg/kg dry wt	0.25	117	2,670	586	98.9	88.4
Mercury	mg/kg dry wt	0.025	<0.025	0.041	<0.025	<0.025	0.026
Nickel	mg/kg dry wt	0.05	5.23	5.80	5.74	5.30	4.6
Zinc	mg/kg dry wt	0.05	30.8	124	74.7	36.6	25.2

Heavy Metals in Soil

Client Sample ID			C06 0
Date Sampled			26/05/2023
Analyte	Unit	Reporting Limit	23-16218-176
Arsenic	mg/kg dry wt	0.125	4.8
Beryllium	mg/kg dry wt	0.013	0.23
Boron	mg/kg dry wt	1.25	1.3
Cadmium	mg/kg dry wt	0.005	0.33
Chromium	mg/kg dry wt	0.125	16.1
Copper	mg/kg dry wt	0.075	27.8
Lead	mg/kg dry wt	0.25	2,510
Mercury	mg/kg dry wt	0.025	0.044
Nickel	mg/kg dry wt	0.05	8.92
Zinc	mg/kg dry wt	0.05	199

Organochlorine Pesticides - Soil

Client Sample ID			Composite A (W20, W21, W22, W23)	Composite B (W17, W18, W19)	Composite C (W13, W14, W15, W16)	Composite D (W09, W10, W11, W12)	Composite E (W05, W06, W07, W08)
Date Sampled							
Analyte	Unit	Reporting Limit	23-16218-177	23-16218-178	23-16218-179	23-16218-180	23-16218-181
TCMX (Surrogate)	%	1	99	100	100	100	100
2,4'-DDD	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDE	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
2,4'-DDT	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDD	mg/kg dry wt	0.003	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
4,4'-DDE	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
4,4'-DDT	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total DDT	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
alpha-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Aldrin	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
beta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Chlordane	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
cis-Nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
delta-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Dieldrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endosulfan II	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endosulfan sulfate	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Endrin	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Endrin aldehyde	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Endrin ketone	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
gamma-BHC	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Heptachlor epoxide	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Hexachlorobenzene	mg/kg dry wt	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Methoxychlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-nonachlor	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
trans-Chlordane	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020

Organochlorine Pesticides - Soil

Client Sample ID		Composite F (W01, W02, W03, W04)	
Date Sampled			
Analyte	Unit	Reporting Limit	23-16218-182
TCMX (Surrogate)	%	1	110
2,4'-DDD	mg/kg dry wt	0.005	<0.0050
2,4'-DDE	mg/kg dry wt	0.005	<0.0050
2,4'-DDT	mg/kg dry wt	0.005	<0.0050
4,4'-DDD	mg/kg dry wt	0.003	<0.0030
4,4'-DDE	mg/kg dry wt	0.005	<0.0050
4,4'-DDT	mg/kg dry wt	0.005	<0.0050
Total DDT	mg/kg dry wt	0.02	<0.020
alpha-BHC	mg/kg dry wt	0.005	<0.0050
Aldrin	mg/kg dry wt	0.005	<0.0050
beta-BHC	mg/kg dry wt	0.005	<0.0050
cis-Chlordane	mg/kg dry wt	0.005	<0.0050
cis-Nonachlor	mg/kg dry wt	0.01	<0.010
delta-BHC	mg/kg dry wt	0.005	<0.0050
Dieldrin	mg/kg dry wt	0.05	<0.050
Endosulfan I	mg/kg dry wt	0.005	<0.0050
Endosulfan II	mg/kg dry wt	0.01	<0.010
Endosulfan sulfate	mg/kg dry wt	0.005	<0.0050
Endrin	mg/kg dry wt	0.05	<0.050
Endrin aldehyde	mg/kg dry wt	0.01	<0.010
Endrin ketone	mg/kg dry wt	0.005	<0.0050
gamma-BHC	mg/kg dry wt	0.005	<0.0050
Heptachlor	mg/kg dry wt	0.005	<0.0050
Heptachlor epoxide	mg/kg dry wt	0.005	<0.0050
Hexachlorobenzene	mg/kg dry wt	0.005	<0.0050
Methoxychlor	mg/kg dry wt	0.01	<0.010
trans-nonachlor	mg/kg dry wt	0.01	<0.010
trans-Chlordane	mg/kg dry wt	0.01	<0.010
Chlordane (sum)	mg/kg dry wt	0.02	<0.020

PCP/TCP in Soil

Client Sample ID			M01 0	M02 0	M03 0	M04 0	M06 0
Date Sampled			24/05/2023	24/05/2023	24/05/2023	24/05/2023	24/05/2023
Analyte	Unit	Reporting Limit	23-16218-78	23-16218-79	23-16218-80	23-16218-81	23-16218-83
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	78	81	80	81	75

PCP/TCP in Soil

Client Sample ID			T01 0	T02 0	T03 0	T04 0	T05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-116	23-16218-117	23-16218-118	23-16218-119	23-16218-120
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050

PCP/TCP in Soil

Client Sample ID			T01 0	T02 0	T03 0	T04 0	T05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
2,4,6-Tribromophenol (Surrogate)	%	1	79	82	77	81	80

PCP/TCP in Soil

Client Sample ID			T06 0	T07 0	T08 0	T09 0	T10 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-121	23-16218-122	23-16218-123	23-16218-124	23-16218-125
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	77	77	81	82	79

PCP/TCP in Soil

Client Sample ID			T11 0	T12 0	T13 0	T14 0	T15 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-126	23-16218-127	23-16218-128	23-16218-129	23-16218-130
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	78	88	80	74	80

PCP/TCP in Soil

Client Sample ID			T16 0	T17 0	T18 0	T19 0	T20 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-131	23-16218-132	23-16218-133	23-16218-134	23-16218-135
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	85	79	75	78	78

PCP/TCP in Soil

Client Sample ID			T21 0	T22 0	T23 0	T24 0	T25 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-136	23-16218-137	23-16218-138	23-16218-139	23-16218-140
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	76	76	73	76	81

PCP/TCP in Soil

Client Sample ID			T26 0	T27 0	T28 0	T29 0	T30 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-141	23-16218-142	23-16218-143	23-16218-144	23-16218-145
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	74	75	80	75	77

PCP/TCP in Soil

Client Sample ID			T31 0	T32 0	T33 0	T34 0	T35 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-146	23-16218-147	23-16218-148	23-16218-149	23-16218-150
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	72	74	77	73	69

PCP/TCP in Soil

Client Sample ID			T36 0	T37 0	T38 0	T39 0	T40 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-151	23-16218-152	23-16218-153	23-16218-154	23-16218-155
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	76	76	76	80	73

PCP/TCP in Soil

Client Sample ID			T41 0	T42 0	T43 0	T44 0	T45 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-156	23-16218-157	23-16218-158	23-16218-159	23-16218-160
Pentachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
2,4,6-Tribromophenol (Surrogate)	%	1	75	75	77	75	78

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			W01 0	W02 0	W03 0	W04 0	W05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-84	23-16218-85	23-16218-86	23-16218-87	23-16218-88
1-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	0.01	0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	0.01	0.010	<0.010	<0.010	<0.010	<0.010

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			W01 0	W02 0	W03 0	W04 0	W05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Benz[a]anthracene	mg/kg dry wt	0.02	0.043	<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	0.01	0.052	<0.010	0.014	<0.010	0.012
Benzo[b] & [j] fluoranthene	mg/kg dry wt	0.02	0.065	<0.020	<0.020	0.022	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	0.02	0.039	<0.020	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	0.01	0.017	<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg dry wt	0.01	0.052	<0.010	0.015	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	0.02	0.12	<0.020	0.041	<0.020	<0.020
Fluorene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	0.01	0.035	<0.010	<0.010	0.010	0.011
Naphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	0.01	0.12	<0.010	0.016	<0.010	<0.010
Pyrene	mg/kg dry wt	0.02	0.12	<0.020	0.034	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	0.03	0.080	0.030	0.030	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	0.01	0.070	<0.010	0.010	<0.010	0.010
Anthracene-d10 (Surrogate)	%	1	100	97	100	97	98

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			W06 0	W07 0	W08 0	W09 0	W10 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-89	23-16218-90	23-16218-91	23-16218-92	23-16218-93
1-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	0.030
Benzo[a]pyrene	mg/kg dry wt	0.01	0.027	<0.010	0.012	0.011	0.038
Benzo[b] & [j] fluoranthene	mg/kg dry wt	0.02	0.033	<0.020	0.020	<0.020	0.070
Benzo[g,h,i]perylene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	0.038
Benzo[k]fluoranthene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	0.018
Chrysene	mg/kg dry wt	0.01	0.021	<0.010	0.011	<0.010	0.044
Dibenz(a,h)anthracene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	0.02	0.033	<0.020	<0.020	<0.020	0.042
Fluorene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	0.01	0.017	<0.010	0.011	<0.010	0.034
Naphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	0.013
Phenanthrene	mg/kg dry wt	0.01	0.015	<0.010	<0.010	<0.010	0.015
Pyrene	mg/kg dry wt	0.02	0.032	<0.020	<0.020	<0.020	0.050
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	0.03	0.050	0.030	0.030	0.030	0.060
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	0.01	0.030	<0.010	0.020	0.010	0.050
Anthracene-d10 (Surrogate)	%	1	100	100	99	99	92

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			W11 0	W12 0	W13 0	W14 0	W15 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-94	23-16218-95	23-16218-96	23-16218-97	23-16218-98
1-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	0.02	0.095	<0.020	0.040	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	0.01	0.099	<0.010	0.037	<0.010	<0.010
Benzo[b] & [j] fluoranthene	mg/kg dry wt	0.02	0.15	<0.020	0.062	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	0.02	0.078	<0.020	0.029	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	0.01	0.052	<0.010	0.018	<0.010	<0.010
Chrysene	mg/kg dry wt	0.01	0.085	<0.010	0.041	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	0.01	0.012	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	0.02	0.14	<0.020	0.074	<0.020	<0.020
Fluorene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	0.01	0.076	<0.010	0.030	<0.010	<0.010
Naphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	0.01	0.033	<0.010	0.022	<0.010	<0.010
Pyrene	mg/kg dry wt	0.02	0.15	<0.020	0.071	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	0.03	0.15	0.030	0.060	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	0.01	0.15	<0.010	0.050	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	1	98	100	100	100	91

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			W16 0	W17 0	W18 0	W19 0	W20 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-99	23-16218-100	23-16218-101	23-16218-102	23-16218-103
1-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	0.01	<0.010	0.058	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	0.01	<0.010	0.012	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	0.01	<0.010	0.18	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	0.02	<0.020	0.46	<0.020	<0.020	0.040
Benzo[a]pyrene	mg/kg dry wt	0.01	0.015	0.32	0.015	0.014	0.034
Benzo[b] & [j] fluoranthene	mg/kg dry wt	0.02	0.024	0.42	0.023	0.024	0.040
Benzo[g,h,i]perylene	mg/kg dry wt	0.02	<0.020	0.18	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	0.01	<0.010	0.12	<0.010	<0.010	0.012
Chrysene	mg/kg dry wt	0.01	0.017	0.35	0.017	0.015	0.024
Dibenz(a,h)anthracene	mg/kg dry wt	0.01	<0.010	0.029	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	0.02	0.028	1.1	0.037	0.027	0.066
Fluorene	mg/kg dry wt	0.01	<0.010	0.036	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	0.01	0.013	0.19	0.010	0.010	0.018
Naphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	0.01	<0.010	0.66	<0.010	<0.010	<0.010
Pyrene	mg/kg dry wt	0.02	0.027	0.86	0.033	0.028	0.070
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	0.03	0.030	0.48	0.030	0.030	0.060

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			W16 0	W17 0	W18 0	W19 0	W20 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	0.01	0.020	0.48	0.020	0.020	0.050
Anthracene-d10 (Surrogate)	%	1	96	90	100	99	97

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			W21 0	W22 0	W23 0	B01 0	B02 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-104	23-16218-105	23-16218-106	23-16218-165	23-16218-166
1-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Fluorene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Pyrene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	0.03	0.030	0.030	0.030	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	1	100	100	100	100	100

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			B03 0	B04 0	B05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-167	23-16218-168	23-16218-169
1-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
2-Methylnaphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Acenaphthene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Acenaphthylene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Anthracene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Benz[a]anthracene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020
Benzo[a]pyrene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Benzo[b]&[j] fluoranthene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020
Benzo[g,h,i]perylene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020
Benzo[k]fluoranthene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Chrysene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010

Polycyclic Aromatic Hydrocarbons - Soil

Client Sample ID			B03 0	B04 0	B05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023
Dibenz(a,h)anthracene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Fluoranthene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020
Fluorene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Indeno(1,2,3-cd)pyrene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Naphthalene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Phenanthrene	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Pyrene	mg/kg dry wt	0.02	<0.020	<0.020	<0.020
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	0.03	0.030	0.030	0.030
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	0.01	<0.010	<0.010	<0.010
Anthracene-d10 (Surrogate)	%	1	100	100	100

Total Petroleum Hydrocarbons - Soil

Client Sample ID			B01 0	B02 0	B03 0	B04 0	B05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-165	23-16218-166	23-16218-167	23-16218-168	23-16218-169
C7-C9	mg/kg dry wt	10	<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	15	<15	<15	<15	<15	<15
C15-C36	mg/kg dry wt	25	326	291	167	160	285
C7-C36 (Total)	mg/kg dry wt	50	326	291	167	160	285

Moisture Content

Client Sample ID			W01 0	W02 0	W03 0	W04 0	W05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-84	23-16218-85	23-16218-86	23-16218-87	23-16218-88
Moisture Content	%	1	36	36	36	40	30

Moisture Content

Client Sample ID			W06 0	W07 0	W08 0	W09 0	W10 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-89	23-16218-90	23-16218-91	23-16218-92	23-16218-93
Moisture Content	%	1	45	36	33	38	33

Moisture Content

Client Sample ID			W11 0	W12 0	W13 0	W14 0	W15 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-94	23-16218-95	23-16218-96	23-16218-97	23-16218-98
Moisture Content	%	1	29	24	47	30	32

Moisture Content

Client Sample ID			W16 0	W17 0	W18 0	W19 0	W20 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-99	23-16218-100	23-16218-101	23-16218-102	23-16218-103
Moisture Content	%	1	24	26	35	30	31

Moisture Content

Client Sample ID			W21 0	W22 0	W23 0	B01 0	B02 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-104	23-16218-105	23-16218-106	23-16218-165	23-16218-166
Moisture Content	%	1	44	37	39	33	33

Moisture Content

Client Sample ID			B03 0	B04 0	B05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-167	23-16218-168	23-16218-169
Moisture Content	%	1	36	30	35

Soil Composite

Client Sample ID			W01 0	W02 0	W03 0	W04 0	W05 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-84	23-16218-85	23-16218-86	23-16218-87	23-16218-88
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			W06 0	W07 0	W08 0	W09 0	W10 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-89	23-16218-90	23-16218-91	23-16218-92	23-16218-93
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			W11 0	W12 0	W13 0	W14 0	W15 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-94	23-16218-95	23-16218-96	23-16218-97	23-16218-98
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

Client Sample ID			W16 0	W17 0	W18 0	W19 0	W20 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-99	23-16218-100	23-16218-101	23-16218-102	23-16218-103
Soil - Composite prep - DS			Complete	Complete	Complete	Complete	Complete

Soil Composite

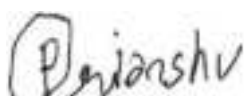
Client Sample ID			W21 0	W22 0	W23 0
Date Sampled			26/05/2023	26/05/2023	26/05/2023
Analyte	Unit	Reporting Limit	23-16218-104	23-16218-105	23-16218-106
Soil - Composite prep - DS			Complete	Complete	Complete

Method Summary

Elements in Soil	Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.
OCP in Soil	Samples are extracted with hexane, pre-concentrated then analysed by GC-MSMS. (Chlordane (sum) is calculated from the main actives in technical Chlordane: Chlordane, Nonachlor and Heptachlor). (In accordance with in-house procedure).
Total DDT	Sum of DDT, DDD and DDE (4,4' and 2,4 isomers)
Acid Herbicides in Soil	A portion of dried and sieved (<2mm) soil sample is extracted with acidified methanol and diluted with acetic acid followed by LC-MS/MS analysis. Final results in mg/kg are based on dry sieved material <2mm. In accordance with in-house procedure.
PAH in Soil	Solvent extraction, silica cleanup, followed by GC-MS analysis. Benzo[a]pyrene TEQ (LOR): The most conservative TEQ estimate, where a result is reported as less than the limit of reporting (LOR) the LOR value is used to calculate the TEQ for that PAH. Benzo[a]pyrene TEQ (Zero): The least conservative TEQ estimate, PAHs reported as less than the limit of reporting (LOR) are not included in the TEQ calculation. Benzo[a]pyrene toxic equivalence (TEQ) is calculated according to 'Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health'. Ministry for the Environment. 2011. (In accordance with in-house procedure).
TPH in Soil	Solvent extraction, silica cleanup, followed by GC-FID analysis. (C7-C36). (In accordance with in-house procedure based on US EPA 8015).
Moisture	Moisture content is determined gravimetrically by drying at 103 °C.
Soil Composite*	Analytica Laboratories is not accredited for the preparation of composite samples; however, the chemical analysis does hold IANZ accreditation. As composite analysis is conducted when requested by the sampler if they deem fit as per the NES guideline, the results of the chemical analyses still hold proper accreditation based on Analytica's methods.



Sharelle Frank, B.Sc. (Tech)
Technologist



Prianshu Chawla, B.Tech
Technologist



Derek Yang, B.Sc. (Tech)
Senior Technologist



Astra Southerwood,
Sample Preparation Team Leader



Certificate of Analysis

Geohazard Environmental Ltd
Rotorua Arts Village (2nd Floor), 1240 Hinemaru St
Rotorua 3010
Attention: Jonathan Findon
Phone: 022 4364292
Email: jonathan@geohazard.co.nz

Lab Reference: 23-16453
Submitted by: Susan
Date Received: 30/05/2023
Testing Initiated: 1/06/2023
Date Completed: 2/06/2023
Order Number:
Reference: 210606

Sampling Site: 37 Lake Rd
Description of Work: PA - 210606 - 37 Lake Rd

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Asbestos in Soil (Qualitative)

Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
23-16453-1	M01		Soil	24/05/2023	1/06/2023
23-16453-2	M02		Soil	24/05/2023	1/06/2023
23-16453-3	M03		Soil	24/05/2023	1/06/2023
23-16453-4	M04		Soil	24/05/2023	1/06/2023
23-16453-5	M06		Soil	24/05/2023	1/06/2023
23-16453-6	A01		Soil	26/05/2023	1/06/2023
23-16453-7	A02		Soil	26/05/2023	1/06/2023
23-16453-8	A03		Soil	26/05/2023	2/06/2023
23-16453-9	A04		Soil	26/05/2023	2/06/2023
23-16453-10	A05		Soil	26/05/2023	2/06/2023
23-16453-11	A06		Soil	26/05/2023	2/06/2023
23-16453-12	B01		Soil	26/05/2023	2/06/2023
23-16453-13	B02		Soil	26/05/2023	2/06/2023
23-16453-14	B03		Soil	26/05/2023	2/06/2023
23-16453-15	B04		Soil	26/05/2023	2/06/2023
23-16453-16	B05		Soil	26/05/2023	2/06/2023
23-16453-17	C01		Soil	26/05/2023	2/06/2023
23-16453-18	C02		Soil	26/05/2023	2/06/2023
23-16453-19	C03		Soil	26/05/2023	2/06/2023
23-16453-20	C04		Soil	26/05/2023	2/06/2023
23-16453-21	C05		Soil	26/05/2023	2/06/2023

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation with the exception of tests marked *, which are not accredited.
This test report shall not be reproduced except in full, without the written permission of Analytica Laboratories.

Asbestos in Soil (Qualitative)

Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
23-16453-22	T29		Soil	26/05/2023	2/06/2023
23-16453-23	T30		Soil	26/05/2023	2/06/2023
23-16453-24	T31		Soil	26/05/2023	2/06/2023

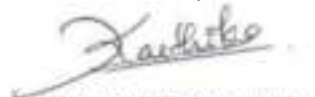
Information in the above table supplied by the client: Client Sample ID, Sample Location, Date Sampled.

Laboratory ID	Client Sample ID	Fibre Types	Trace Asbestos (Presence / Absence)	Asbestos (Presence / Absence)
Units				
23-16453-1	M01	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-2	M02	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-3	M03	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-4	M04	Asbestos NOT Detected. Organic Fibres Synthetic Mineral Fibres	Absent	Absent
23-16453-5	M06	Asbestos NOT Detected. Organic Fibres Synthetic Mineral Fibres	Absent	Absent
23-16453-6	A01	Chrysotile (White Asbestos) Organic Fibres	Absent	Present
23-16453-7	A02	Asbestos NOT Detected. Organic Fibres Synthetic Mineral Fibres	Absent	Absent
23-16453-8	A03	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-9	A04	Amosite (Brown Asbestos) Organic Fibres	Absent	Present
23-16453-10	A05	Asbestos NOT Detected. Organic Fibres Synthetic Mineral Fibres	Absent	Absent
23-16453-11	A06	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-12	B01	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-13	B02	Asbestos NOT Detected. Organic Fibres Synthetic Mineral Fibres	Absent	Absent
23-16453-14	B03	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-15	B04	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-16	B05	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-17	C01	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-18	C02	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-19	C03	Chrysotile (White Asbestos) Organic Fibres	Absent	Present
23-16453-20	C04	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-21	C05	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-22	T29	Asbestos NOT Detected. Organic Fibres	Absent	Absent
23-16453-23	T30	Asbestos NOT Detected. Organic Fibres	Absent	Absent

Laboratory ID	Client Sample ID	Fibre Types	Trace Asbestos (Presence / Absence)	Asbestos (Presence / Absence)
<i>Units</i>				
23-16453-24	T31	Asbestos NOT Detected. Organic Fibres Synthetic Mineral Fibres	Absent	Absent

Information in the above table supplied by the client: Client Sample ID.

Asbestos in Soil (Qualitative) Approver:


Karthika Unnikrishnan, M.Sc.
Technician

Method Summary

Asbestos Fibres in Soil (Qualitative)

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in bulk samples.

Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

Note 2: Trace asbestos is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased on site. This is not the sole indicator for the friable nature of the asbestos present.

Note 3: If mineral fibres of unknown type are detected, by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

Note 4: The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description.



Certificate of Analysis

Geohazard Environmental Ltd
Rotorua Arts Village (2nd Floor), 1240 Hinemaru St
Rotorua 3010
Attention: Jonathan Findon
Phone: 022 4364292
Email: jonathan@geohazard.co.nz

Lab Reference: 23-17633
Submitted by: Susan
Date Received: 12/06/2023
Testing Initiated: 13/06/2023
Date Completed: 13/06/2023
Order Number:
Reference: 210606

Sampling Site: 37 Lake Rd
Description of Work: Soil - 210606

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Asbestos in Soil (Semi-Quantitative)

Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
23-17633-1	A01		Soil	25/05/2023	13/06/2023
23-17633-2	A04		Soil	25/05/2023	13/06/2023
23-17633-3	C03		Soil	25/05/2023	13/06/2023

Information in the above table supplied by the client: Client Sample ID, Sample Location, Date Sampled

Analysis Results (Summary)

Laboratory ID	Client Sample ID	Asbestos	Sample Weight as Received	Moisture Content	Trace Asbestos (Presence / Absence)	Asbestos (Presence / Absence)
Units			g	%		
23-17633-1	A01	Chrysotile (White Asbestos) Amosite (Brown Asbestos) Organic Fibres	531.7	28.7	Absent	Present
23-17633-2	A04	Asbestos NOT Detected. Organic Fibres	492.5	32.4	Absent	Absent
23-17633-3	C03	Chrysotile (White Asbestos) Organic Fibres	511.2	19.7	Absent	Present

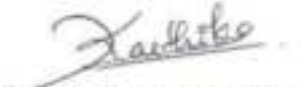
Information in the above table supplied by the client: Client Sample ID

Analysis Results (Size Fraction Breakdown)

Laboratory ID	Client Sample ID	Fraction Size	Fraction Weight*	AF/FA Weight*	ACM Weight*	ACM Content*	Asbestos Matrix	Asbestos Weight*	W/W% Asbestos*
Units Reporting Limit			g 0	g 0	g 0	%		g 0	
23-17633-1	A01	>10mm	21.16	0.0000	0.0000	0	No Asbestos Detected	0.0000	<0.001 (ACM) 0.098 (AF/FA)
		2-10mm	53.85	0.3697	-	-	Fibre Bundle	0.3697	
		<2mm	303.81	0.0005	-	-	Free Fibres Fibre Bundle	0.0015	
23-17633-2	A04	>10mm	12.89	0.0000	0.0000	0	No Asbestos Detected	0.0000	<0.001 (ACM) <0.001 (AF/FA)
		2-10mm	39.19	0.0000	-	-	No Asbestos Detected	0.0000	
		<2mm	280.76	0.0000	-	-	No Asbestos Detected	0.0000	
23-17633-3	C03	>10mm	29.63	0.0000	0.0000	0	No Asbestos Detected	0.0000	<0.001 (ACM) 0.006 (AF/FA)
		2-10mm	62.24	0.0261	-	-	Free Fibres Fibre Bundle	0.0261	
		<2mm	318.43	0.0000	-	-	No Asbestos Detected	0.0000	

Information in the above table supplied by the client: Client Sample ID

Asbestos in Soil (Semi-Quantitative) Approver:



Karthika Unnikrishnan, M.Sc.
 Technician

Method Summary

Asbestos Fibres in Soil (Semi-Quantitative)

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in soil samples.

Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

Note 2: Trace asbestos is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased on site. This is not the sole indicator for the friable nature of the asbestos present.

Note 3: If mineral fibres of unknown type are detected, by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

Note 4: The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description.



Certificate of Analysis

Geohazard Environmental Ltd
Rotorua Arts Village (2nd Floor), 1240 Hinemaru St
Rotorua 3010
Attention: Jonathan Findon
Phone: 0210769753
Email: jonathan@geohazard.co.nz

Lab Reference: 20-25264
Submitted by: Nikki
Date Received: 10/07/2020
Testing Initiated: 14/07/2020
Date Completed: 14/07/2020
Order Number: N/A
Reference: N/A

Sampling Site: Mangakino Multi-Site (3 Karmau Street)
Description of Work: Mangakino Multi-site (3 Karamu Street)

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.
Specific testing dates are available on request.

Asbestos in Soil (Qualitative)

Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
<i>Units</i>					
20-25264-1	3K-01 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-2	3K-02 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-3	3K-03 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-4	3K-04 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-5	3K-05 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-6	3K-06 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-7	3K-07 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-8	3K-08 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-9	3K-09 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-10	3K-10 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-11	3K-11 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-12	3K-12 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-13	3K-13 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-14	3K-14 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-15	3K-15 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-16	3K-16 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-17	3K-17 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-18	3K-18 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-19	3K-19 0.0m	N/A	Soil	9/07/2020	14/07/2020

Asbestos in Soil (Qualitative)

Sample Details

Laboratory ID	Client Sample ID	Sample Location	Sample Description	Date Sampled	Date Analysed
<i>Units</i>					
20-25264-20	3K-20 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-21	3K-21 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-22	3K-22 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-23	3K-23 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-24	3K-24 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-25	3K-25 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-26	3K-26 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-27	3K-27 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-28	3K-28 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-29	3K-29 0.0m	N/A	Soil	9/07/2020	14/07/2020
20-25264-30	3K-30 0.0m	N/A	Soil	9/07/2020	14/07/2020

Information in the above table supplied by the client: Client Sample ID, Sample Location, Date Sampled.

Analysis Results

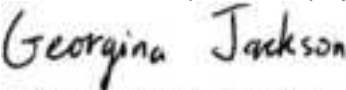
Laboratory ID	Client Sample ID	ACM Weight*	ACM Types*	Fibre Types	Trace Asbestos (Presence / Absence)	Asbestos (Presence / Absence)
<i>Units</i>		g				
20-25264-1	3K-01 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-2	3K-02 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-3	3K-03 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-4	3K-04 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-5	3K-05 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-6	3K-06 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-7	3K-07 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-8	3K-08 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-9	3K-09 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-10	3K-10 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-11	3K-11 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-12	3K-12 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-13	3K-13 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-14	3K-14 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-15	3K-15 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-16	3K-16 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-17	3K-17 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-18	3K-18 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent

Analysis Results

Laboratory ID	Client Sample ID	ACM Weight*	ACM Types*	Fibre Types	Trace Asbestos (Presence / Absence)	Asbestos (Presence / Absence)
Units		g				
20-25264-19	3K-19 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-20	3K-20 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-21	3K-21 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-22	3K-22 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-23	3K-23 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-24	3K-24 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-25	3K-25 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-26	3K-26 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-27	3K-27 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-28	3K-28 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-29	3K-29 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent
20-25264-30	3K-30 0.0m	0.0000	No Asbestos Detected	Asbestos NOT Detected. Organic Fibres	Absent	Absent

Information in the above table supplied by the client: Client Sample ID.

Asbestos in Soil (Qualitative) Approver:


 Georgina Jackson, PGDipSci.
 Technician

Method Summary

Asbestos Fibres in Soil (Qualitative)

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with AS4964-2004 Method for the qualitative identification of asbestos in bulk samples.

Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

Note 2: Trace asbestos is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased on site. This is not the sole indicator for the friable nature of the asbestos present.

Note 3: If mineral fibres of unknown type are detected, by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

Note 4: The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description.



Certificate of Analysis

Geohazard Environmental Ltd
Rotorua Arts Village (2nd Floor), 1240 Hinemaru St
Rotorua 3010

Attention: Jonathan Findon
Phone: 0210769753
Email: Nikki@geohazard.co.nz

Lab Reference: 20-25277
Submitted by: Nikki
Date Received: 11/07/2020
Testing Initiated: 11/07/2020
Date Completed: 14/07/2020
Order Number: N/A
Reference: Mangakino Multi

Sampling Site: Mangakino Multi-Site (3 Karamu Street)

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report. Specific testing dates are available on request.

Heavy Metals in Soil

Client Sample ID			3K-01 0.0m	3K-02 0.0m	3K-03 0.0m	3K-04 0.0m	3K-05 0.0m
Date Sampled			9/07/2020	9/07/2020	9/07/2020	9/07/2020	9/07/2020
Analyte	Unit	Reporting Limit	20-25277-1	20-25277-2	20-25277-3	20-25277-4	20-25277-5
Arsenic	mg/kg dry wt	0.125	2.7	2.7	2.6	3.4	2.2
Beryllium	mg/kg dry wt	0.013	0.34	0.27	0.30	0.35	0.17
Boron	mg/kg dry wt	1.25	2.3	1.7	3.1	2.0	1.4
Cadmium	mg/kg dry wt	0.005	0.19	0.30	0.33	0.31	0.33
Chromium	mg/kg dry wt	0.125	3.6	4.1	6.0	5.6	6.1
Copper	mg/kg dry wt	0.075	17.0	11.1	26.3	17.9	42.9
Lead	mg/kg dry wt	0.25	48.7	91.1	47.6	29.8	30.9
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	0.028	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	2.6	2.5	4.0	4.3	6.03
Zinc	mg/kg dry wt	0.05	44.4	47.7	48.6	46.3	33.0

Heavy Metals in Soil

Client Sample ID			3K-06 0.0m	3K-07 0.0m	3K-08 0.0m	3K-09 0.0m	3K-10 0.0m
Date Sampled			9/07/2020	9/07/2020	9/07/2020	9/07/2020	9/07/2020
Analyte	Unit	Reporting Limit	20-25277-6	20-25277-7	20-25277-8	20-25277-9	20-25277-10
Arsenic	mg/kg dry wt	0.125	2.3	2.6	2.4	4.1	2.8
Beryllium	mg/kg dry wt	0.013	0.23	0.27	0.29	0.67	0.43
Boron	mg/kg dry wt	1.25	2.4	2.2	2.5	2.9	1.8
Cadmium	mg/kg dry wt	0.005	0.34	0.30	0.29	0.34	0.26



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

Heavy Metals in Soil

Client Sample ID			3K-06 0.0m	3K-07 0.0m	3K-08 0.0m	3K-09 0.0m	3K-10 0.0m
Date Sampled			9/07/2020	9/07/2020	9/07/2020	9/07/2020	9/07/2020
Chromium	mg/kg dry wt	0.125	5.2	4.0	4.8	7.0	6.4
Copper	mg/kg dry wt	0.075	39.2	15.1	34.2	17.4	32.5
Lead	mg/kg dry wt	0.25	74.5	144	37.4	22.5	66.5
Mercury	mg/kg dry wt	0.025	<0.025	<0.025	<0.025	0.060	<0.025
Nickel	mg/kg dry wt	0.05	5.47	2.6	3.5	6.52	4.2
Zinc	mg/kg dry wt	0.05	42.3	68.8	35.5	38.9	46.4

Heavy Metals in Soil

Client Sample ID			3K-11 0.0m	3K-12 0.0m	3K-13 0.0m	3K-14 0.0m	3K-15 0.0m
Date Sampled			9/07/2020	9/07/2020	9/07/2020	9/07/2020	9/07/2020
Analyte	Unit	Reporting Limit	20-25277-11	20-25277-12	20-25277-13	20-25277-14	20-25277-15
Arsenic	mg/kg dry wt	0.125	2.2	3.0	3.0	3.7	3.1
Beryllium	mg/kg dry wt	0.013	0.23	0.27	0.36	0.59	0.36
Boron	mg/kg dry wt	1.25	3.1	3.2	3.3	2.1	2.3
Cadmium	mg/kg dry wt	0.005	0.39	0.36	0.33	0.29	0.33
Chromium	mg/kg dry wt	0.125	6.6	5.7	5.1	5.9	6.1
Copper	mg/kg dry wt	0.075	21.6	27.4	79.8	13.1	26.0
Lead	mg/kg dry wt	0.25	47.9	185	79.4	17.2	95.5
Mercury	mg/kg dry wt	0.025	0.026	0.032	0.040	0.063	0.031
Nickel	mg/kg dry wt	0.05	4.6	4.1	4.1	3.6	4.5
Zinc	mg/kg dry wt	0.05	44.3	66.1	46.2	37.0	52.6

Heavy Metals in Soil

Client Sample ID			3K-16 0.0m	3K-17 0.0m	3K-18 0.0m	3K-19 0.0m	3K-20 0.0m
Date Sampled			9/07/2020	9/07/2020	9/07/2020	9/07/2020	9/07/2020
Analyte	Unit	Reporting Limit	20-25277-16	20-25277-17	20-25277-18	20-25277-19	20-25277-20
Arsenic	mg/kg dry wt	0.125	2.2	3.5	2.4	2.1	2.4
Beryllium	mg/kg dry wt	0.013	0.21	0.34	0.27	0.20	0.23
Boron	mg/kg dry wt	1.25	2.0	1.9	2.6	1.6	2.5
Cadmium	mg/kg dry wt	0.005	0.38	0.34	0.30	0.35	0.33
Chromium	mg/kg dry wt	0.125	5.5	5.8	4.6	5.1	4.3
Copper	mg/kg dry wt	0.075	44.9	30.1	28.3	23.6	23.2
Lead	mg/kg dry wt	0.25	37.1	76.0	35.7	12.0	50.9
Mercury	mg/kg dry wt	0.025	<0.025	0.033	<0.025	<0.025	<0.025
Nickel	mg/kg dry wt	0.05	5.26	3.2	4.1	5.14	4.2
Zinc	mg/kg dry wt	0.05	31.3	62.2	38.2	28.2	37.5

Heavy Metals in Soil

Client Sample ID			3K-21 0.0m	3K-22 0.0m	3K-23 0.0m	3K-24 0.0m	3K-25 0.0m
Date Sampled			9/07/2020	9/07/2020	9/07/2020	9/07/2020	9/07/2020
Analyte	Unit	Reporting Limit	20-25277-21	20-25277-22	20-25277-23	20-25277-24	20-25277-25
Arsenic	mg/kg dry wt	0.125	2.9	2.8	2.6	3.2	2.6
Beryllium	mg/kg dry wt	0.013	0.28	0.31	0.31	0.44	0.32
Boron	mg/kg dry wt	1.25	2.8	3.1	1.8	3.0	2.9
Cadmium	mg/kg dry wt	0.005	0.40	0.38	0.33	0.37	0.38
Chromium	mg/kg dry wt	0.125	5.7	5.6	6.1	6.3	6.8
Copper	mg/kg dry wt	0.075	32.1	33.7	21.4	42.0	54.2

Heavy Metals in Soil

Client Sample ID			3K-21 0.0m	3K-22 0.0m	3K-23 0.0m	3K-24 0.0m	3K-25 0.0m
Date Sampled			9/07/2020	9/07/2020	9/07/2020	9/07/2020	9/07/2020
Lead	mg/kg dry wt	0.25	117	73.0	30.2	57.7	69.9
Mercury	mg/kg dry wt	0.025	0.032	0.034	0.026	0.048	0.030
Nickel	mg/kg dry wt	0.05	4.9	5.0	5.02	5.27	5.00
Zinc	mg/kg dry wt	0.05	54.6	50.8	36.5	38.4	43.7

Heavy Metals in Soil

Client Sample ID			3K-26 0.0m	3K-27 0.0m	3K-28 0.0m	3K-29 0.0m	3K-30 0.0m
Date Sampled			9/07/2020	9/07/2020	9/07/2020	9/07/2020	9/07/2020
Analyte	Unit	Reporting Limit	20-25277-26	20-25277-27	20-25277-28	20-25277-29	20-25277-30
Arsenic	mg/kg dry wt	0.125	2.8	2.2	2.3	2.1	2.5
Beryllium	mg/kg dry wt	0.013	0.29	0.23	0.23	0.21	0.27
Boron	mg/kg dry wt	1.25	3.1	2.1	2.0	1.4	2.1
Cadmium	mg/kg dry wt	0.005	0.40	0.40	0.38	0.17	0.33
Chromium	mg/kg dry wt	0.125	6.2	5.9	9.8	3.0	5.0
Copper	mg/kg dry wt	0.075	77.0	42.2	53.0	7.96	16.8
Lead	mg/kg dry wt	0.25	73.5	26.2	39.8	36.5	71.4
Mercury	mg/kg dry wt	0.025	0.030	<0.025	<0.025	0.030	0.028
Nickel	mg/kg dry wt	0.05	8.16	5.69	6.93	2.8	3.5
Zinc	mg/kg dry wt	0.05	54.9	28.7	35.5	26.6	54.5

Method Summary

Elements in Soil

Samples dried and passed through a 2 mm sieve followed by acid digestion and analysis by ICP-MS. In accordance with in-house procedure based on US EPA method 200.8.



Emily Hanna, B.Sc.
Trace Elements Team Leader

APPENDIX C

UCL Results

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.114/06/2023 9:35:15 am								
5	From File			WorkSheet.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Zinc											
12												
13	General Statistics											
14	Total Number of Observations				23		Number of Distinct Observations				22	
15							Number of Missing Observations				0	
16	Minimum				23.5		Mean				93.28	
17	Maximum				491		Median				77.9	
18	SD				94.02		Std. Error of Mean				19.6	
19	Coefficient of Variation				1.008		Skewness				3.704	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.573		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value				0.914		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.266		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.18		Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL				126.9		95% Adjusted-CLT UCL (Chen-1995)				141.7	
31							95% Modified-t UCL (Johnson-1978)				129.5	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				0.798		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.754		Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.161		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.184		Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				2.104		k star (bias corrected MLE)				1.859	
42	Theta hat (MLE)				44.33		Theta star (bias corrected MLE)				50.18	
43	nu hat (MLE)				96.79		nu star (bias corrected)				85.5	
44	MLE Mean (bias corrected)				93.28		MLE Sd (bias corrected)				68.42	
45							Approximate Chi Square Value (0.05)				65.19	
46	Adjusted Level of Significance				0.0389		Adjusted Chi Square Value				63.9	
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50)				122.3		95% Adjusted Gamma UCL (use when n<50)				124.8	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.947		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value				0.914		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic				0.105		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value				0.18		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
56	Data appear Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				3.157		Mean of logged Data				4.28	
60	Maximum of Logged Data				6.196		SD of logged Data				0.672	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				122.8		90% Chebyshev (MVUE) UCL				129.5	
64	95% Chebyshev (MVUE) UCL				147.7		97.5% Chebyshev (MVUE) UCL				172.9	
65	99% Chebyshev (MVUE) UCL				222.4							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				125.5		95% Jackknife UCL				126.9	
72	95% Standard Bootstrap UCL				125.3		95% Bootstrap-t UCL				168.4	
73	95% Hall's Bootstrap UCL				261.1		95% Percentile Bootstrap UCL				128.7	
74	95% BCA Bootstrap UCL				149							
75	90% Chebyshev(Mean, Sd) UCL				152.1		95% Chebyshev(Mean, Sd) UCL				178.7	
76	97.5% Chebyshev(Mean, Sd) UCL				215.7		99% Chebyshev(Mean, Sd) UCL				288.3	
77												
78	Suggested UCL to Use											
79	95% Adjusted Gamma UCL				124.8							
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												

19 May 2026

PROPOSED RESIDENTIAL DEVELOPMENT

35, 37 & 57 LAKE ROAD, MANGAKINO

GEOTECHNICAL INVESTIGATION REPORT

Wairarapa Moana ki Pouākani Incorporation

TGA2023-0106AC Rev 1

TGA2023-0106AC		
Date	Revision	Comments
08 September 2023	A	Initial draft for internal review
26 September 2023	0	Final issue to support Land Use Plan Change Application
19 May 2026	1	Revised to included NHRA (Appendix D)

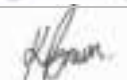
	Name	Signature	Position
Prepared by	Lilly Fitch		Project Engineering Geologist
Reviewed by	Kirstin Brown		Associate Geotechnical Engineer CMEngNZ, CPEng
Authorised by	Robert Taylor		Principal Geotechnical Engineer CMEngNZ, CPEng



TABLE OF CONTENTS

1	INTRODUCTION	1
2	SITE DESCRIPTION	1
2.1	Site Location	1
2.2	Landform	1
2.3	Site History.....	2
3	PROPOSED DEVELOPMENT	3
4	FIELD INVESTIGATION.....	3
5	GROUND MODEL	4
5.1	Published Geology	4
5.2	Stratigraphic Units.....	4
5.3	Groundwater	5
5.4	Permeability Testing	5
6	GEOHAZARDS ASSESSMENT	5
6.1	Context	5
6.2	Seismicity.....	6
6.3	Fault Rupture	6
6.4	Geothermal Activity.....	6
6.5	Liquefaction and Lateral Spread.....	7
6.6	Slope Stability	7
6.7	Erosion	8
6.8	Tomo Hazard	8
6.9	Static Settlement	8
7	DEVELOPMENT CONSIDERATIONS.....	9
7.1	Seismic Site Subsoil Category.....	9
7.2	Slope Stability Management	9
7.2.1	Natural Slopes.....	9
7.2.2	Cut / Fill Batter Design	9
7.3	Static Settlement Mitigation	10
7.4	Foundations.....	10
7.5	Earthworks.....	10
7.6	Stormwater Management	11
7.7	Civil Works	12
8	FURTHER WORK	12

9	CLOSURE	12
---	---------------	----

APPENDICES

Appendix A: Drawings

Appendix B: Hand Auger Borehole Logs

Appendix C: Permeability Test Results

Appendix D: CPT Investigation Results

Appendix E: Preliminary Static Settlement Analyses

Appendix D: Natural Hazards Risk Assessment

1 INTRODUCTION

CMW Geosciences (CMW) was engaged by Wairarapa Moana ki Pouākani Incorporation to carry out a geotechnical investigation for a proposed land use plan change at 35, 37 & 57 Lake Road, Mangakino. The Plan Change proposed is to rezone this parcel of land from rural to residential.

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced 2023-0106AA, Rev1 dated 12 July 2023.

This report provides a summary of the geological conditions, identifies potential geotechnical risks and constraints and provides geotechnical recommendations for future development within the Plan Change area. It is intended that this report will support a land use plan change application to is to Taupo District Council (TDC).

2 SITE DESCRIPTION

2.1 Site Location

The site comprises an area of approximately 15ha and is located on Lake Road, adjacent to Lake Maraetai as shown on Figure 1 below.



Figure 1: Site Location (Ref. TDC GIS Mapi)

2.2 Landform

The current general landform, together with associated features located within and adjacent to the site is presented on the attached Geotechnical Investigation & Geomorphological Plan as **Drawing 01**.

The site is situated across a board elevated terrace which slopes from approximately RL215m (Moturiki Datum) at Lake Road to approximately RL205m at the crest of a moderately steep to steep escarpment above Lake Maraetai with the toe of the escarpment at approximately RL190m. The escarpment generally has gradients of between 20 and 25 degrees, with localise areas up to 45 degrees.

Soil creep was observed along the north-eastern escarpment, likely attributed to over steepened slopes associated with historic earthworks.

In the western portion of the site the landform rises gently from to RL215m to RL219m, with hummocky topography observed along the eastern slopes during the site walkover.

A 10m high, roughly south-north trending narrow and steeply incised gully feature is located within the north western portion of the site. During our site walkover an overland flow path was observed within the gully, connecting to Lake Maraetai.

A series of erosional features were observed across the site which appear to be associated with concentrated stormwater flows.

The site is bound to the north by Lake Maraetai, to the south by Lake Road, to the east by existing residential properties and to the west by existing rural properties.

2.3 Site History

Based on our review of the historical aerial photographs¹, the landform appears to have undergone modification, with the following land changes noted:

- The 1945 (earliest available image) shows the majority of the site to be undeveloped and in vegetation with a large building identified to be a sawmill in the eastern portion of the site and a timber storage area in the southern portion of the site. Some earthworks have been undertaken to form a level storage area and access roads;
- By 1953, most of the vegetation has been removed and the timber storage area extended across the majority of the site, as shown in Figure 2 below. Buildings have been constructed along the southern boundary and there appears to be a large stockpile of material in the northern portion of the site;
- In 1963 the sawmill appears to have been removed with the timber storage area and buildings along the southern boundary still present. The large stockpile in the northern portion of the site has extended to the east and west. The approximate extend of the stockpile is shown on **Drawing 01**;
- By 1976, the site is vacant with exception to a small building in the southwestern portion of the site;
- The site was then partially converted to pasture between 1976 and 1983 and appears largely unchanged until present day expect for the removal of the small building within the southwestern portion of the site and the construction of a series of buildings in the northeastern corner of the site.



Figure 2: 1953 Historic Aerial Image (Ref. Retrolens / Geohazard Environmental Report #210606, 2 September 2021)

¹ Retrolens website, Sourced from <http://retrolens.nz> and licensed by LINZ CC-BY 3.0

3 PROPOSED DEVELOPMENT

It is currently proposed to change the current land zoning from Rural to Residential.

No scheme plans have been provided at this stage, and it is understood that the findings from this report will also be used to support a feasibility assessment with regards to developing the site for future residential development.

Specific details for disposal of concentrated stormwater flows from roads and future lots are yet to be confirmed. However, it is understood stormwater will need to be disposed of onsite and may include a stormwater pond, raingardens and / or individual soakage systems.

We understand that wastewater will likely be connect to the existing reticulated council system.

4 FIELD INVESTIGATION

Following a dial before you dig search, and onsite service location, the field investigation was carried out on 7 and 9 August 2023. All fieldwork was carried out under the direction of CMW Geosciences in general accordance with the NZGS specifications² and logged in accordance with NZGS guidance³. The scope of fieldwork completed was as follows:

- Site walkover by a Senior Engineering Geologist to assess the general landform and prevailing site conditions;
- Nine hand auger boreholes, denoted HA01 to HA07, HA07b and HA08 were drilled using a 50mm diameter auger to target depths of up to 5m below existing ground levels to visually observe the near surface soil profile and to vane shear strength testing. Engineering logs of the hand auger boreholes, together with peak and remoulded vane shear strengths are presented in **Appendix B**
- Dynamic cone (Scala) penetrometer (DCP) tests were carried out during advancement of hand auger borehole to depths of up to 5m to provide soil density profiles, for use as a comparison with the CPT data and to provide a subgrade CBR value for pavement design purposes. Graphical results of the DCP testing are presented on the borehole logs in **Appendix B**;
- Six Cone Penetrometer Tests (CPT), denoted CPT01 to CPT06, were pushed to depths between 4m to 20m to define the ground model and to assist in liquefaction and static settlement assessments. All CPTs excluding 05 refused early on account of high tip resistance. CPT Results of the CPT's, presented as traces of tip resistance (qc), friction resistance (fs) and pore pressure (u2) are presented in **Appendix D**;
- In-situ falling head permeability tests, denoted S01 to S03 were completed to depths between 2m to 3m. The testing was carried out by reaming the hand auger boreholes out to 100mm diameter. A slotted PVC pipe was installed, and the holes were pre-soaked. The boreholes were then filled with water and the rate of water level fall over time was recorded. Results of the permeability tests are presented in **Appendix C**;

The approximate locations of the respective investigation sites referred to above are shown on **Drawing 01**. Test locations were measured from site features. Elevations were inferred from Council lidar data.

² NZ Geotechnical Society (2017) NZ Ground Investigation Specification, Volume 1 – Master Specification

³ NZ Geotechnical Society (2005), Field Description of Soil and Rock, Guideline for the field classification and description of soil and rock for engineering purposes.

5 GROUND MODEL

5.1 Published Geology

Published geological maps⁴ for the area depict the site as being located within the Mangakino Caldera with the regional geology comprising Late Pleistocene-aged deposits of the Hinuera Formation River deposits (Q3a) containing 'Cross-bedded pumice sand, silt and gravel with interbedded peat', overlying 'variably welded, crystal-rich, columnar jointed ignimbrite' of the Whakamaru Group (Q9w), as illustrated in Figure 3 below.

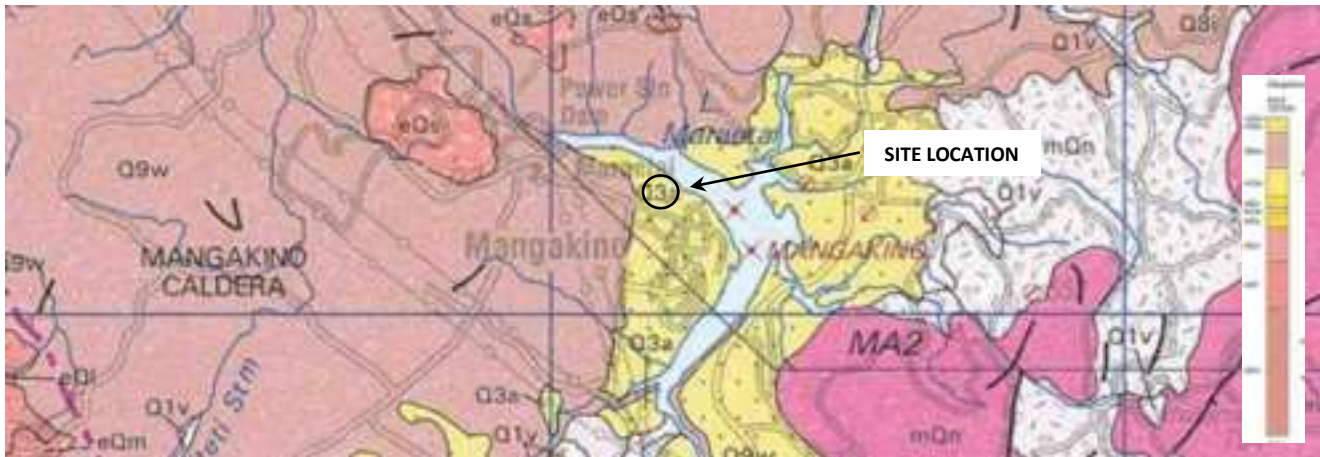


Figure 3: Regional Geology (ref: GNS Geological Map of New Zealand)

Based on the known history of the site and surrounding land levels, some extensive fill depths are anticipated.

5.2 Stratigraphic Units

The ground conditions encountered and inferred from the investigation were considered to be generally consistent with the published geology for the area and can be generalised according to the following subsurface sequences presented below in 1 below.

Table 1: Summary of Strata Encountered					
Unit	Depth to base (m)		Thickness (m)*		Average qc (MPa)
	Min	Max	Min	Max	
Topsoil – Organic silt	0.1	0.4	0.1	0.4	-
Colluvium – silty sand	1.3		0.6		-
Fill – organic silt, sand, silty sand and sawdust	0.2	2.8	0.1	2.7	1-2
Volcanic Ash – pumiceous medium dense sands and stiff to very stiff silt	2.2	3.9	2.1	4.0	2-4
Hinuera Formation – interbedded stiff silts and medium dense sand	7.0	>20.0	3.0	>16.0	6-10

⁴ GNS Science. (2012). Geological Map of New Zealand [Data set]. GNS Science. <https://doi.org/10.21420/QF82-7D42>

Table 1: Summary of Strata Encountered

Unit	Depth to base (m)		Thickness (m)*		Average qc (MPa)
	Min	Max	Min	Max	
Inferred weathered ignimbrite – very dense sand	>3.0	>20	>3.0		>20
Notes: *Thickness only recorded where base of strata has been confirmed.					

Previous earthworks appear to have removed some soil units across the site.

5.3 Groundwater

Groundwater was not encountered during our investigation, suggesting the groundwater table is below RL195m. Given the site topography and close proximity to the lake, the groundwater level is expected to be slightly elevated above the water level within Lake Maraetai which appears to be at approximately RL 190m.

Given the presence of a variable soil profile, it is possible that perched groundwater may occur during and following periods of rainfall.

5.4 Permeability Testing

Results of the permeability testing are presented in **Appendix D** and are summarised in Table 2 below. The results have been assessed based on the CIRIA 113⁵ analysis method.

Table 2: Permeability Rates

Soakage Test No.	S01	S02	S03
Depth of test (m)	2.0	3.0	3.0
Permeability Rate (m/day)	14.36	13.71	9.37
Permeability Rate (m/sec)	1.66×10^{-4}	1.59×10^{-4}	1.08×10^{-4}

6 GEOHAZARDS ASSESSMENT

6.1 Context

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land or structures (consequence).

The following sections of this report provide an assessment of the geohazards relevant to the Plan Change area in accordance with the National Policy Statement for Natural Hazards 2025 and provides the basis for the Natural Hazards Risk Assessment presented in **Appendix D**.

⁵ CIRIA 113: Somerville (1986), Control of groundwater for temporary works, CIRIA Report 113, Appendix 4

6.2 Seismicity

A seismic assessment has been carried out in general accordance with NZGS guidance⁶. The ultimate limit state (ULS) and serviceability limit state (SLS) peak ground accelerations (PGAs) were assessed based on a 50-year design life and importance level (IL) 2 structures in accordance with the New Zealand Building Code⁷.

The recommended PGA values for geotechnical assessment at this site are present in Table 3 below.

Table 3: Design Peak Ground Acceleration (PGA) for Various Limit States				
Limit State	AEP	R	PGA(g)	Magnitude _{eff}
SLS	1/25	0.25	0.08	6.0
ULS	1/500	1.0	0.32	6.0

Note: SLS = serviceability limit state; ULS = ultimate limit state; AEP = annual exceedance probability

6.3 Fault Rupture

This site is located adjacent to the western extent of the Taupo Volcanic Zone (TVZ), an area of tectonic extension. This Zone is characterized by a fault system, known as the Taupo Rift, typically comprising closely spaced NNE-SSW to NE-SW trending normal faults.

The Institute of Geology and Nuclear Sciences (GNS) active faults database⁸ identifies the nearest known active fault to the site is the Thorpe - Poplar Fault (Ref No. #77909) located approximately 24km east of the site.

This distance to the nearest known active fault suggests a low risk of fault rupture exists for the site.

6.4 Geothermal Activity

The closest known geothermal field is the Mangakino Geothermal System located approximately 500m west of the site, as shown on Figure 4 below.

There were no visible signs of geothermal activity noted during a site walkover and the CPTs reached depths of up to 20m below existing ground levels with no elevated ground temperature readings obtained (40 degrees being the CPT equipment threshold). Therefore, the risk of onsite geothermal activity is considered low.

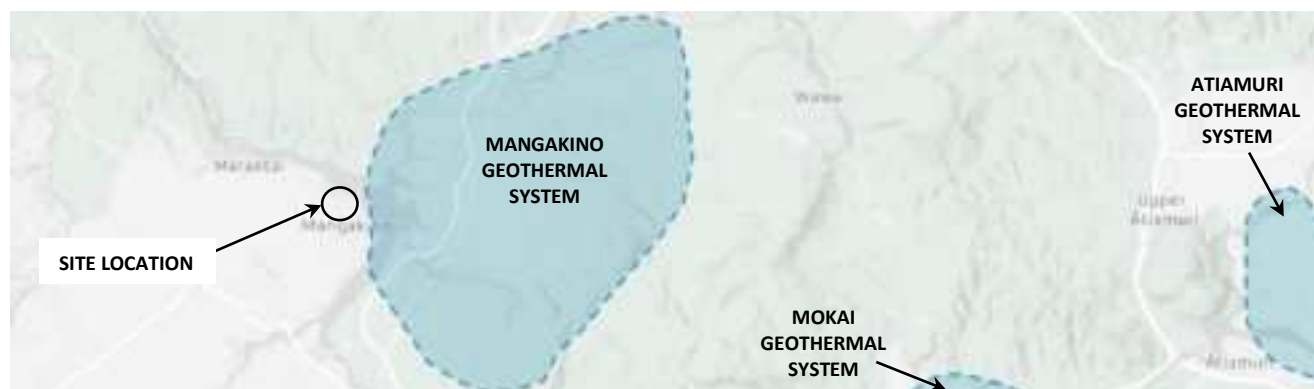


Figure 4: Geothermal Areas (Image obtained from Waikato Regional Hazards Portal)

⁶ NZ Geotechnical Society publication "Earthquake geotechnical engineering practice, Module 1: Overview of the standards", (December 2021)

⁷ Ministry of Business, Innovation and Employment (1992) NZ Building Code Handbook, Third Edition, Amendment 13 (effective from 14 February 2014)

⁸ New Zealand Active Faults Database <https://data.gns.cri.nz/af/>

6.5 Liquefaction and Lateral Spread

Liquefaction occurs in loose saturated cohesionless soils that are subject to cyclic shear loading during an earthquake. This process leads to pore pressure build-up, soil grains moving into suspension and temporary loss of strength causing vertical and lateral ground deformation.

A review of the Waikato Regional Hazard Portal⁹ liquefaction hazard maps indicate the site has been classified as “possible” as shown in Figure 5 below.

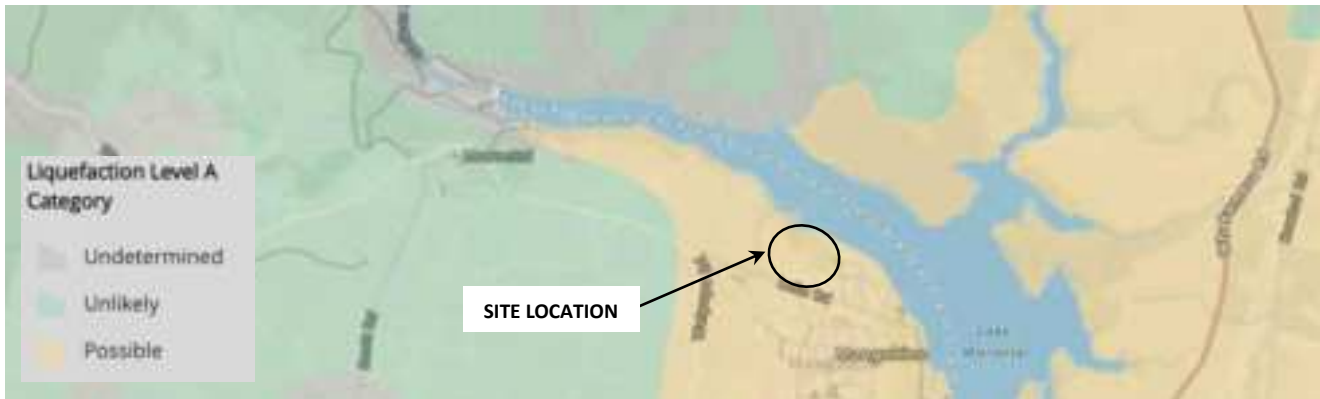


Figure 5: Liquefaction Hazard Categories (Image obtained from Waikato Regional Hazards Portal)

Reference is made to Ishihara¹⁰ with respect to assessing the contribution of a non-liquifiable crust and the risk of surface manifestation. This suggests a 7m thick non-liquefiable crust is adequate to prevent liquefaction induced ground damage for a ULS seismic event and an IL2 building.

Based on the existing ground levels and the deep groundwater table beneath the site, the risk of significant damage as a result of liquefaction and/or lateral spreading is considered low for the site and current ground levels.

6.6 Slope Stability

The existing slopes across the site and immediately beyond the northern boundary appear to have formed as a result of progressive erosion and shallow slumping as well as being modified by historic earthworks.

The natural steep slopes are considered relatively stable in their current condition, however, are unlikely to provide adequate slope stability factors of safety with respect to the NZ Building Code. Based on our experience modelling similar slopes within the Manakino area, natural slopes within the underlying ignimbrite typically achieve requisite factors of safety for residential buildings at gradients equivalent to a 1(V):1.5(H) to 1(V):2.5(H) projection line from the toe to the slope.

As such, a slope stability hazard zone has been nominated for these areas of the site, described in Section 7.2 below.

In areas where historic filling has occurred near the natural slopes soil creep was observed, this is likely due to the uncontrolled placement of this material and variable composition. Refer to Section 7.2 for preliminary recommendations pertaining to this area of site.

⁹ <https://waikatoregion.maps.arcgis.com/apps/MapSeries/index.html?appid=f2b48398f93146e8a5cf0aa3fddce92c>

¹⁰ Ishihara, K., (1985) “Stability of Natural Deposits During Earthquakes”, Proc. Of the Eleventh International Conference on Soil Mechanics and Foundation Engineering, San Francisco, 12 – 16th August 1985, Vol. 1, Theme Lectures Conferences, pp321-376.

6.7 Erosion

The sloping topography underlain by free draining pumiceous sands naturally lend themselves to soil erosion, as such appropriate erosion protection measures will be critical to the ongoing performance of the natural slopes during and following earthworks. The highly permeable pumiceous soils are susceptible to rapid infiltration of surface water that could compromise downslope stability conditions.

The pumiceous soils have infrequent silt, gravel and dense sand layers which could result in the development of preferential subsurface flow paths which in turn would lead to piping erosion and instability where discharges of concentrated stormwater are not managed appropriately.

Earthworks recommendations for the highly erodible pumice soils are discussed in Section 7.5.

6.8 Tomo Hazard

The site is underlain by layers of highly permeable pumiceous soils which can be susceptible to rapid infiltration of surface water and internal erosion. Voids / tomos (less than 1m) were observed at shallow depths within the soil profile.

The identified erosional cavities which exist within the pumice soil profile may warrant further investigation to quantify where and at what depth these occur, particularly for structures located in cut. Should evidence of voids / tomos be noted during bulk earthworks and construction, possible mitigation measures may include deepening of foundations, engineering shallow foundations to 'bridge' voids or grout filling of voids.

Alternatively, specific investigation such as test pitting and / or geophysical methods can be undertaken prior to construction to identify the extent of erosional cavities and to provide recommendations for future development.

Earthworks recommendations for the tomo hazard is discussed in Section 7.

6.9 Static Settlement

Load-induced static settlements occur in subsoils that are subject to static loading (eg. by filling and / or building loads) where the magnitude of settlement is governed by the soil stiffness and the load applied.

Settlement analyses have been undertaken using the proprietary software CPeT-IT software which calculates the change in vertical stress based on Boussinesq distribution, with the 1-D constrained modulus estimated from CPT tip resistance (q_c).

Settlement analyses have been carried out for typical residential building loads based at existing ground levels as well as considering loads from an assumed 2m high fill embankment to demonstrate expected settlements where areas are subject to earthworks.

Results of the settlement analyses are presented in **Appendix E** and presented below.

Table 4: Foundation Settlement Estimates	
Foundation Configuration	Settlement (mm)
Widespread uniformly distributed load of 10kPa based on existing ground levels	5-10
Widespread uniformly distributed load of 10kPa including 2m fill (assuming locally sourced borrow material with a unit weight of 16kN/m ³)	5-25

Based on the sandy nature of the natural soil, the load induced static settlements are anticipated to be predominantly elastic (immediate) and therefore largely built out during construction.

At these magnitudes of total settlement, differential settlements are therefore anticipated to be within building code limits of 1 in 240 (i.e. less than 25mm over a distance of 6m).

The existing non-engineered fill encountered during the field investigation appears to be highly variable with a high organic content (including saw dust) which will likely induce significant settlements to those reporting above. As such, any non-engineered fill encountered during site development earthworks shall be removed from any proposed fill areas of future building platforms in accordance with Section 7.5 below.

7 DEVELOPMENT CONSIDERATIONS

7.1 Seismic Site Subsoil Category

The geological strata encountered beneath the site comprises soil strength materials, which with respect to the seismic site subsoil category defined in Section 3.1.3 of NZS1170.5, is defined as having an unconfined compressive strength (USC) of less than 1MPa. The depth to bedrock at this location has not been confirmed. The ignimbrites in the area are typically underlain or interbedded by sedimentary deposits due to the complex geological history of the area. On this basis it is anticipated bedrock will be encountered at depths greater than 60m.

Based on the ground conditions encountered and our knowledge of the study area, in accordance with NZS1170.5 a seismic site subsoil category of Class D (deep soil site) is considered appropriate.

7.2 Slope Stability Management

7.2.1 Natural Slopes

As detailed in Section 6.6 above, based on a conservative 1(V):2.5(H) projection from the toe of the slope, a minimum offset to future residential buildings of 6.5m from the crest of the steep northern escarpments is recommended. Should future development be proposed within 6.5m of the slope crest, this must be subject to specific geotechnical investigation and slope stability analyses by a Chartered Professional Geotechnical Engineer.

The natural slopes considered at risk to instability have been identified in Slope Stability Hazard zones shown on **Drawing 01**.

For preliminary planning purposes all structures requiring building consent should be located entirely upslope of the slope stability hazard zone unless supported by further geotechnical investigation and/or assessment by a Chartered Professional Geotechnical Engineer.

7.2.2 Cut / Fill Batter Design

For preliminary design purposes, fill embankment gradients of up to 1(V):2.5(H) are considered appropriate. Steeper gradients may be considered appropriate subject to specific geotechnical investigation and design. Overfilling and trimming back of fill embankments is recommended to ensure that a tightly compacted embankment face is achieved to reduce the effects of scour.

Cut batter configurations (i.e. heights and gradients) are generally dictated by stratigraphic units exposed and groundwater conditions. Within these soil units, cut batters void of any groundwater seepage or springs are expected to perform well to an overall gradient of approximately 1(V):2(H) to 1(V):2.5(H). Where dense pumice sands and ignimbrite are encountered, batter gradients may be able to be steepened to as much as 1(V):1(V).

The above recommendations are subject to detail investigation and specific slope stability analyses once the design ground levels are known.

7.3 Static Settlement Mitigation

within areas where existing uncontrolled fill is identified, to mitigate excessive static settlements over these areas it is recommended the uncontrolled fill is excavated and replaced with engineered fill. Alternatively, the use of pile foundations may be considered, with the piles extending into the underlying natural ground.

7.4 Foundations

The results of the field investigation suggest volcanic ash comprising stiff to very stiff silt and medium dense sand is expected below the topsoil and uncontrolled fill which is likely to meet the requirements of 'Good Ground' in accordance with NZS3604. Within these natural soils or engineered fills, a preliminary geotechnical ultimate bearing pressure of 300kPa should be available for shallow strip and pad foundations designed in accordance with NZS3604.

The hand auger investigations indicate there are likely to be some areas where localised variations in shear strength within the top 1.0m of the natural ashes occur. Subject to earthworks testing and post-construction testing, within these areas a reduced geotechnical bearing capacity of 210kPa may be adopted or undercut and replaced with engineered fill during bulk earthworks.

The identified potential for erosional cavities to exist within the pumice soil profile requires further investigation to quantify where and at what depth these occur. Should voids be encountered within the proximity of building foundations, mitigation measures may include:

- Potentially affected areas may be subject to earthworks (cutting and filling) to ensure any near-surface voids are backfilled;
- For voids less than 1.0m diameter, a TC2 or equivalent raft foundation may be sufficient to cantilever or bridge across such zones;
- Where large, extensive voids are identified, foundations may be piled to intercept competent soil/rock deposits at depth, which are proven to be free of voids, or the cavities filled with injection grouting or similar.

7.5 Earthworks

Given the variable topography across the site and the presence of existing uncontrolled fill, bulk earthworks will be required to create a landform suitable to construct residential building platforms and road formations. Earthworks must be carried out in general accordance with the requirements of the Taupo District Council Code of Practice for Development of Land (2009) and NZS 4431 under the guidance of a Chartered Professional Geotechnical Engineer.

As the development is currently in the early planning stages and scheme plans are yet to be developed, the following general recommendations are provided:

- Most of the on-site natural soils should be suitable for reuse as engineered fill. Soil textures and moisture contents will however vary widely, and careful management, conditioning and compaction control will be required.
- The existing fill encountered across the site is highly variable with a high organic content (and saw dust) and therefore is not considered suitable for reuse as engineered fill. This material must be cut to waste.
- Under no circumstances should spoil be tipped directly over or beyond the crest of any steep slopes due to slope stability considerations.

- Earthworks operations, including the stripping of existing topsoil and undercutting of existing filling, must be subject to observation and testing by the project geotechnical engineer to ensure that all unsuitable materials have been removed.
- Exposure of high permeable pumice soils at design subgrade level will elevate the piping and rilling erosion susceptibility, as already seen through overland flow paths and tomos onsite. Earthworks will therefore need to be carefully managed to ensure that stormwater infiltration into exposed pumice soils is minimised. Such techniques could include:
 - Limiting the lateral extent of earthworks exposing pumice soils at any one time;
 - Shaping the profile to encourage sheet flow rather than concentrated flows;
 - Diverting stormwater away from exposed areas of pumice soil during construction;
 - Immediately placing nominally 150mm of hardfill as a protective surface once subgrade is exposed; and
 - Installing flow path barriers during construction such as baffles or fences.
- The source and / or type of material used for engineered fill will dictate the type of quality control testing undertaken. Earthfill must be placed, spread and compacted in controlled lifts under the supervision of a geotechnical engineer. The fill may comprise either granular or cohesive material subject to being free of any organic material and having no particles greater than 150mm diameter.
- For granular (sand and gravel) fill materials, testing following compaction should be principally in terms of 95% of the maximum dry density within the appropriate water content range as determined from a laboratory compaction curve test. This density may be calibrated with a dynamic cone (Scala) penetrometer test with the penetrometer then used as the primary testing measure. Where the source or quality of fill changes, re-calibration will be required.
- Where silts and clays are used as filling, an alternative test criteria using minimum required vane shear strength and maximum permissible air voids should be used, with the criteria verified with laboratory compaction curve tests.
- The proposed earthworks and source of the fill should be discussed with and approved by the project geotechnical engineer to verify its appropriateness and quality control testing requirements.

7.6 Stormwater Management

The ground conditions across the site generally comprise free draining pumiceous sands, which have high coefficients of permeability as demonstrated in Section 5.4. However, the addition of concentrated water into these deposits and its effects on slope stability and internal erosion needs to be considered.

The use of deep soakholes (up to approximately 10m depth) is relatively common in the Taupo region and may be considered suitable within some areas of the site, dependent on further geotechnical investigations (including deep permeability testing and geophysical survey) and analyses with consideration to design landform and proximity to natural escarpments. Soakage to ground is unlikely to be considered suitable for future lots within close proximity to steep natural slopes, as well as cut batters to avoid potential instability due to saturation of the slope face. Subject to further geotechnical investigation and analyses, the view would be to establish setbacks from slopes in which deep soakholes may be considered suitable.

An above ground stormwater disposal method, such as a lined stormwater pond and/or series of lined swales are considered appropriate, provided outlet structures are designed to prevent erosion and consideration is given to slope instability. Additionally onsite attenuation may be considered for future lots with stormwater collected in a raintank with outlets from the tank attenuated and discharge to an appropriate area of site (such as kerb and channel).

7.7 Civil Works

Most of the internal roads and pavements are expected to be formed across natural medium dense to dense pumice sand subgrades. Following earthworks and subgrade trimming, a natural CBR of between 6% and 8% is anticipated for the sands, with a CBR of between 3% and 5% for the silts. Where subgrades are moisture conditioned to close to Optimum Moisture Content and compacted to within 95% of MDD using conventional earthwork machinery (ie 10-tonne flat drum roller) based on our experience the sand subgrade CBR may be able to be improved to 10% to 12%, however shall be verified through laboratory soaked CBR testing.

We recommend that a programme of penetration resistance testing is carried out when the roads and pavement areas are being formed to their final levels to confirm actual CBR values.

The existing uncontrolled fill is not considered suitable as a subgrade for road pavements due to the presence of highly variable fill with high organic content.

8 FURTHER WORK

Following the land use plan change, recommended further work to advance development plans and resource consent application may include, but not limited to:

- Further intrusive investigations including machine boreholes, test pits, hand auger boreholes, and Cone Penetrometer Tests (CPTs) to assist in refining the ground model for the site;
- Deep permeability to assist in assessing suitability of deep soakholes;
- Geophysics investigations to assist in assessing scale and extent of tomos;
- Refine the geotechnical analyses based on proposed development levels and layout, including slope stability, bearing capacity and static settlement;
- Preparation of a Geotechnical Investigation Report with recommendations supporting the proposed development and a resource consent application to Taupo District Council.

9 CLOSURE

Additional important information regarding the use of your CMW report is provided in the 'Using your CMW Report' document attached to this report.

This report has been prepared for use by Wairarapa Moana ki Pouākani Incorporation in relation to the 35, 37 & 57 Lake Road, Mangakino project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Wairarapa Moana ki Pouākani Incorporation seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

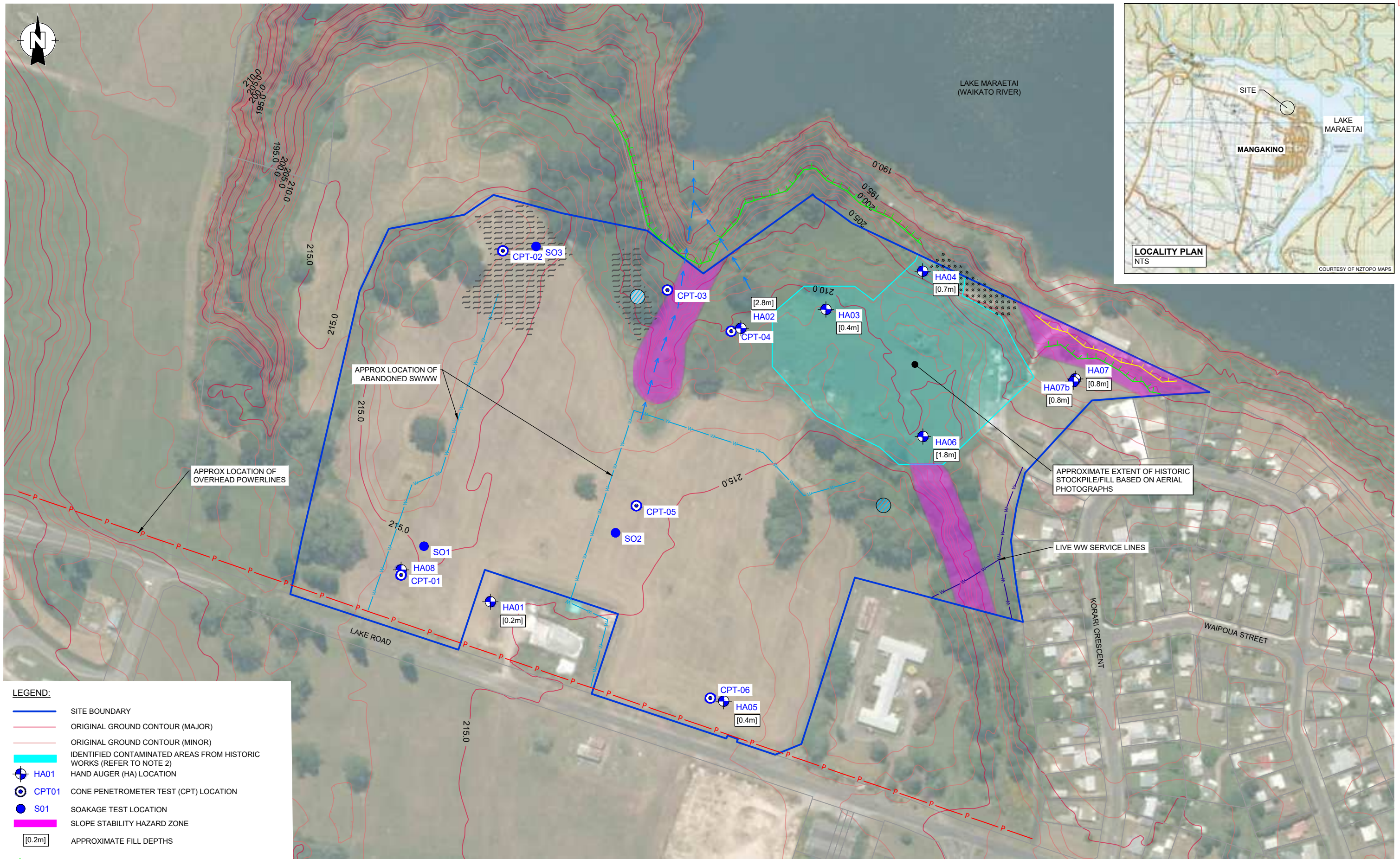
Environmental Matters Are Not Covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

APPENDIX A: DRAWINGS

Title	Reference No.	Date	Revision
Geotechnical Investigation and Geomorphological Plan	01	21/09/2023	0

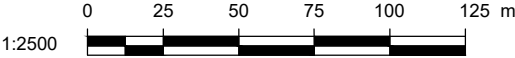


LEGEND:

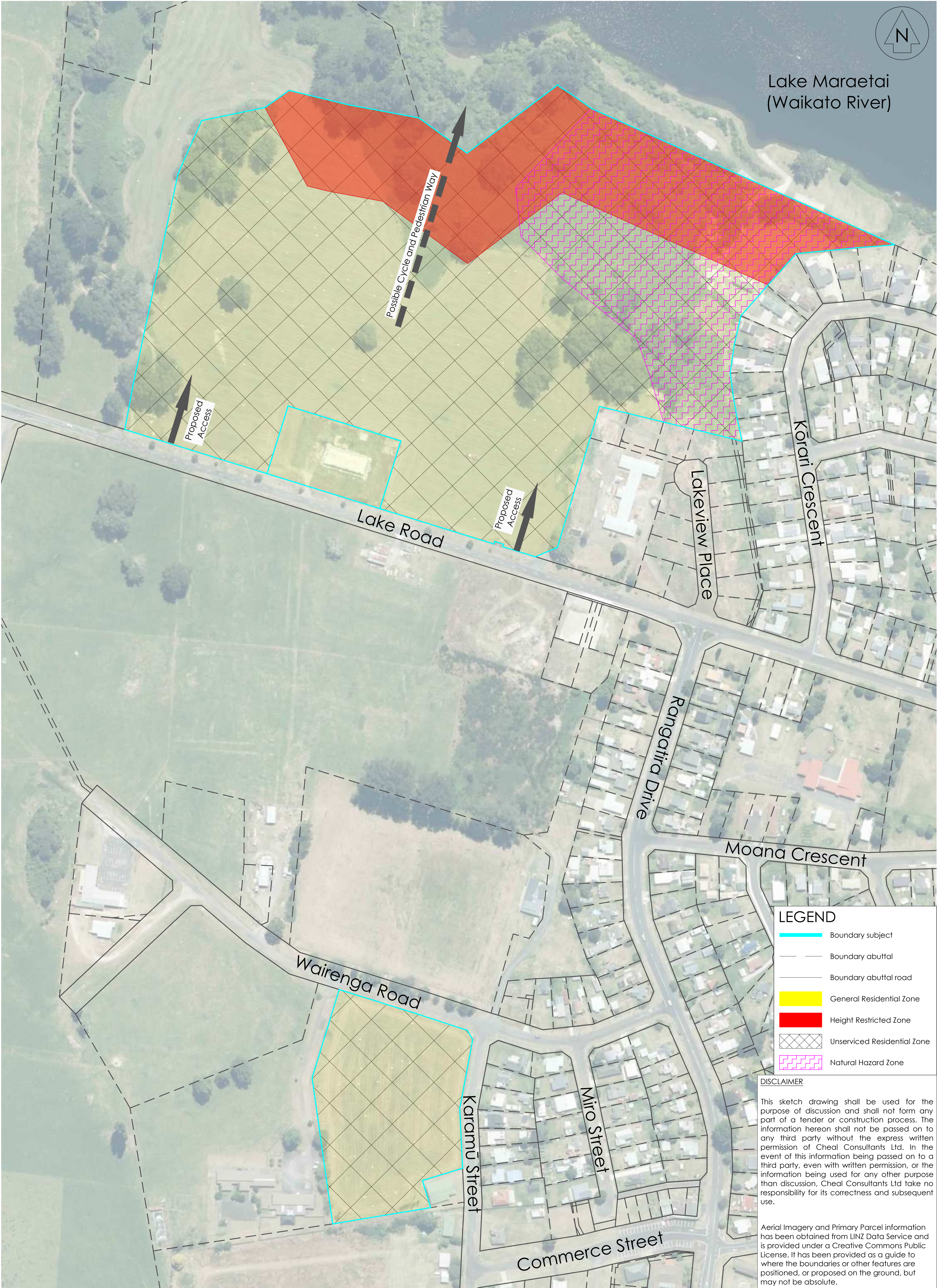
- SITE BOUNDARY
- ORIGINAL GROUND CONTOUR (MAJOR)
- ORIGINAL GROUND CONTOUR (MINOR)
- IDENTIFIED CONTAMINATED AREAS FROM HISTORIC WORKS (REFER TO NOTE 2)
- HA01 HAND AUGER (HA) LOCATION
- CPT01 CONE PENETROMETER TEST (CPT) LOCATION
- S01 SOAKAGE TEST LOCATION
- SLOPE STABILITY HAZARD ZONE
- [0.2m] APPROXIMATE FILL DEPTHS
- CREST OF SLOPE
- MINOR SLOPE BREAK
- HUMOCKY GROUND
- OVERLAND FLOW PATH
- SOIL CREEP
- TOMO / PIPING EROSION

NOTES:

- AERIAL IMAGE COURTESY OF LINZ WAIKATO 0.5m RURAL AERIAL PHOTOS (2012-2013).
- IDENTIFIED CONTAMINATED AREAS INFERRED FROM GEOHAZARD ENVIRONMENTAL 37 LAKE RD MANGAKINO SITE FEATURE PLAN, DRG NO. 001, DATED 02/09/2021, JOB NO. 210606.
- EXISTING GROUND CONTOURS ADAPTED FROM TAUPŌ NORTHERN BAYS 2009 LIDAR 0.5m CONTOURS. CONTOURS SHOWN IN 1.0m INTERVALS.
- CRS: NZTM. MOTURIKI VERTICAL DATUM 1953.
- TEST LOCATIONS ARE INDICATIVE ONLY.



CLIENT:	WAIRARAPA MOANA KI POUAKANI INCORPORATION		DRAWN:	IW	PROJECT:	TGA2023-0106
PROJECT:	LAKE ROAD, MANGAKINO		CHECKED:	JW	DRAWING:	01
TITLE:	GEOTECHNICAL INVESTIGATION & GEOMORPHOLOGICAL PLAN		REVISION:	0	SCALE:	1:2500
			DATE:	26/09/2023	SHEET:	A3 L



Status **INFORMATION**

Scale A1
A3 1:3000

Drawing Number
200723-SK003

A3

Rev

B

Rev	Date	Amendment	By	Chk	App
B	15/05/26	Added/Extended Zones	JLM	MR	CE
A	11/05/26	First Issue	JLM	MR	CE

Project Title
Wairarapa Moana ki Pouakani
Incorporation
37 Lake Road, Mangakino

Drawing Title
Proposed Zones
of 37 Lake Road
and 3 Karamu Street

Surveyed	-	-	-
Designed	-	-	-
Drawn	JL Morrison	11/05/26	JLM
Checked	M. Ryder	11/05/26	MR
Approved	C. Eagles	12/05/26	CE

cheal

www.cheal.co.nz

APPENDIX B: HAND AUGER BOREHOLE LOGS

Sheet 1 of 1

Survey Source: pLog Tablet

Datum: Moturiki

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

HAND AUGER BOREHOLE LOG - HA02

Client: Wairarapa Moana Ki Pouakani Incorporation

Project: Mangakino Plan Change

Site Location: Mangakino

Project No.: TGA2023-0106

Date: 07/08/2023

Borehole Location: Refer Drawing 01

Logged by: AZ

Checked by: LF

Scale: 1:25

Sheet 1 of 1



Position: 339301.8mE; 733170.2mN

Projection: BOP2000

Elevation: 210.00m

Datum: Moturiki

Survey Source: pLog Tablet

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
			210.0			OL: Sandy Organic SILT: with minor rootlets; dark brown. sand, fine to medium. (Topsoil)					
			209.9			ML: Clayey SILT: with minor sand; orange brown. Low plasticity, sand, fine to medium. (Fill)					
			209.7			SP: Silty Fine to medium SAND: with some organic silt, with minor gravel; dark brown mottled light brown. Poorly graded, gravel, fine. (Fill)					3
						... at 0.60m, becoming mottled orange-brown.	D	L			3
											3
											2
											2
											2
											1
											1
											1
			208.7			SP: Silty Fine to medium SAND: light yellowish brown. Poorly graded, pumiceous. (Fill)					1
											2
						... at 1.80m, becoming light grey, contains trace gravel.					3
											4
						... at 2.00m, becoming dark grey, contains minor moderately decomposed wood.					2
											4
											4
											1
											2
											3
											4
											4
											3
											3
											3
											2
											2
											2
											2
											2
											2
											3
											3
											3
											4
											5
											4
											5
											4
						Borehole terminated at 5.0 m					

Termination Reason: Target depth

Shear Vane No: DCP No: 20

Remarks: Groundwater not encountered.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

Sheet 1 of 1

Survey Source: pLog Tablet

Datum: Moturiki

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

Sheet 1 of 1

Survey Source: pLog Tablet

Datum: Moturiki

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

Sheet 1 of 1

Survey Source: pLog Tablet

Datum: Moturiki

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

HAND AUGER BOREHOLE LOG - HA06

Client: Wairarapa Moana Ki Pouakani Incorporation

Project: Mangakino Plan Change

Site Location: Mangakino

Project No.: TGA2023-0106

Date: 07/08/2023

Borehole Location: Refer Drawing 01

Logged by: ME

Checked by: LF

Scale: 1:25

Sheet 1 of 1



Position: 339297.2mE; 733026.4mN

Projection: BOP2000

Elevation: 211.00m

Datum: Moturiki

Survey Source: pLog Tablet

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)		
	Depth	Type & Results							5	10	15
	0.3	Peak = 37kPa Residual = 14kPa	211.0			OL: Organic SILT: with some sand; dark brown. No plasticity, Sand, fine to coarse. (Fill)					
			210.6			Sawdust: dark brown wood waste. (Fill)					
				1			M				
			209.2			SP: Fine to medium SAND: with minor gravel; light brown. Poorly graded, Gravel, fine, pumiceous. (Volcanic Ash)		MD			7
			208.9			SW: Fine to coarse SAND: grey. Well graded, subangular. (Volcanic Ash)					4
			208.6			SW: Fine to coarse SAND: with minor gravel; light brown. Well graded, Gravel, fine, pumiceous. (Volcanic Ash)		D			11
											8
											9
											11
			208.1			ML: SILT: with trace sand; brown. Low plasticity, Sand, fine to coarse natty. (Volcanic Ash)	D to M	L			12
				3							2
											0
											1
											0
											0
											1
											0
	3.6	Peak = 115kPa Residual = 35kPa									
	4.0	Peak = 184kPa Residual = 52kPa		4				VSt			
	4.4	Peak = >201kPa									
	4.8	Peak = >201kPa					M				
				5		Borehole terminated at 5.0 m					

Termination Reason: Target depth

Shear Vane No: 2156 - 19mm Blade DCP No: 14

Remarks: Groundwater not encountered.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

Sheet 1 of 1

Survey Source: pLog Tablet

Datum: Moturiki

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

Sheet 1 of 1

Survey Source: pLog Tablet

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

Client: Wairarapa Moana Ki Pouakani Incorporation
Project: Mangakino Plan Change
Site Location: Mangakino
Project No.: TGA2023-0106
Date: 07/08/2023
Borehole Location: Refer Drawing 01



Sheet 1 of 1

Position: 339113.0mE; 732961.6mN
Elevation: 215.00m

Projection: BOP2000
Datum: Moturiki

Logged by: ME Checked by: LF Scale: 1:25

Survey Source: pLog Tablet

Termination Reason: Target depth

Shear Vane No: 2156 - 19mm Blade DCP No: 14

Remarks: Groundwater not encountered.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 4 - April 2023.

APPENDIX C: PERMEABILITY TEST RESULTS

	CLIENT: Wairarapa Moana	DESIGNER: RM
	PROJECT: Taniwha Street, Mangakino	CHECKED: LF
	TITLE: Falling Head Permeability Test (S01)	REVISION: 4
		DATE: 20/09/2023
	PROJECT: TGA2023-0106	

Specifications - Open-Ended Tube

Length L_1 : 2 m

Diameter: 90 mm

Non-Perm L_2 : 0 m

Above Gnd L_3 : 0.06 m

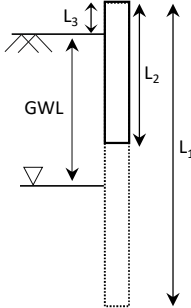
Ground Conditions

GWL: m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: **1.94 m BGL**



Hydraulic Conductivity (k)

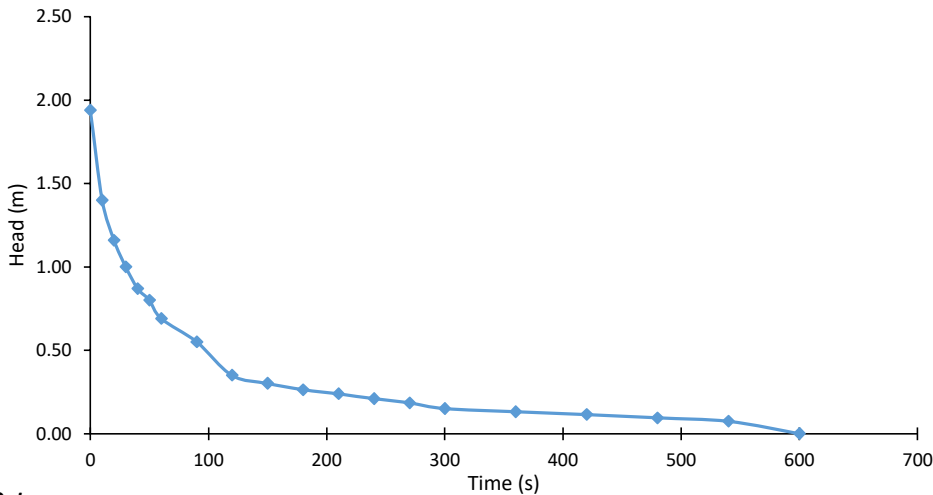
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works*, CIRIA Report 113, Appendix 4

$$k = \left(\log \frac{h_1}{h_2} - \log \frac{2h_1 + d}{2h_2 + d} \right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} = 1.66\text{E-}04 \text{ ms}^{-1} = 14.36 \text{ m/day}$$

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations*, Fig 18, p49

$$k = \frac{d^2 \ln \left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d} \right)^2 + 1} \right)}{\ln \frac{H_1}{H_2}} = 4.03\text{E-}05 \text{ ms}^{-1} = 3.48 \text{ m/day}$$



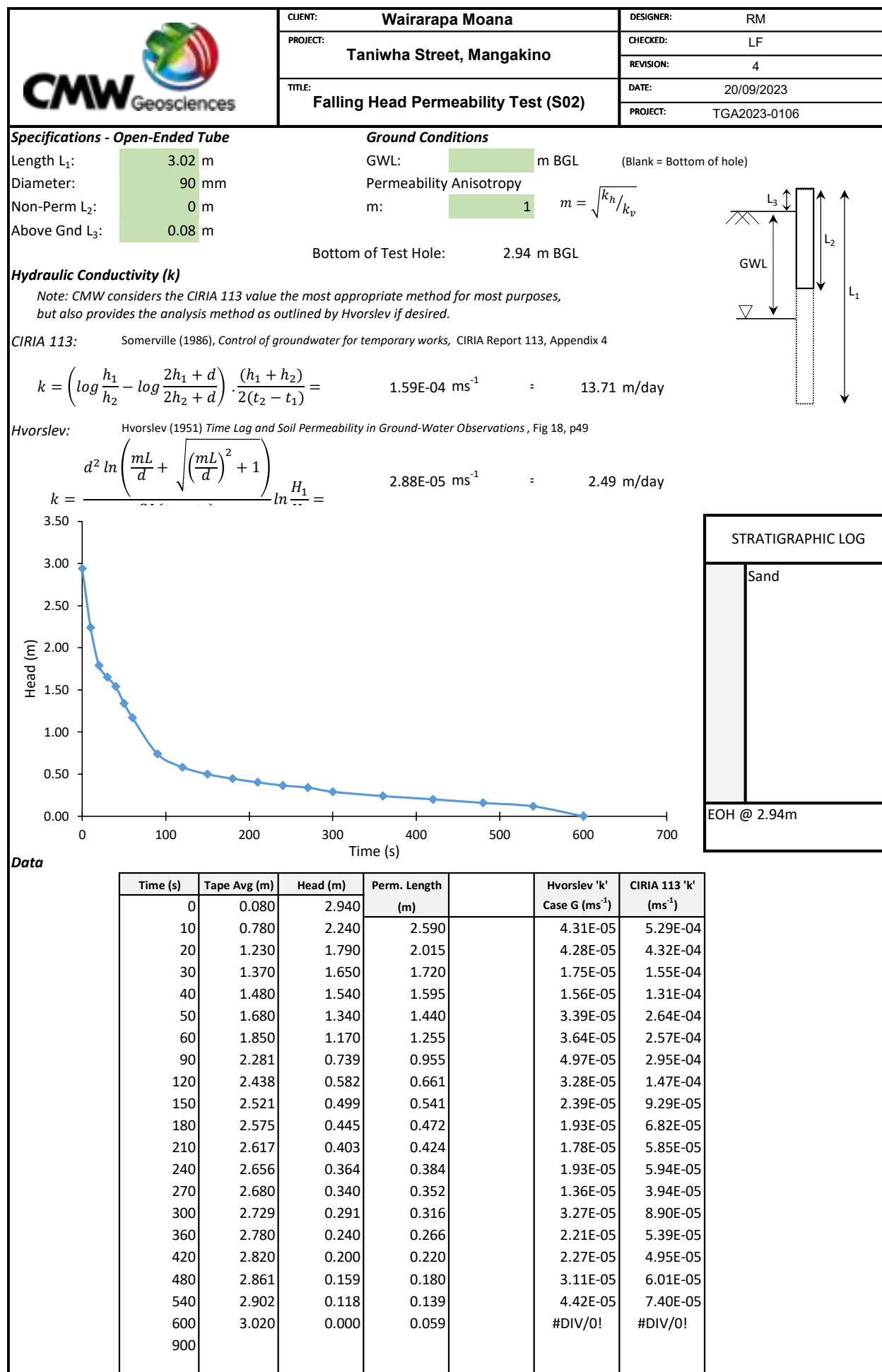
STRATIGRAPHIC LOG

Fill

EOH @ 1.94m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)	Hvorslev 'k' Case G (ms ⁻¹)	CIRIA 113 'k' (ms ⁻¹)
0	0.060	1.940			
10	0.600	1.400	1.670	7.15E-05	6.31E-04
20	0.840	1.160	1.280	4.98E-05	3.57E-04
30	1.000	1.000	1.080	4.42E-05	2.79E-04
40	1.130	0.870	0.935	4.58E-05	2.60E-04
50	1.200	0.800	0.835	2.97E-05	1.56E-04
60	1.310	0.690	0.745	5.65E-05	2.74E-04
90	1.450	0.550	0.620	3.24E-05	1.39E-04
120	1.650	0.350	0.450	7.84E-05	2.76E-04
150	1.698	0.302	0.326	3.05E-05	8.47E-05
180	1.736	0.264	0.283	2.99E-05	7.58E-05
210	1.761	0.239	0.252	2.34E-05	5.50E-05
240	1.790	0.210	0.225	3.20E-05	7.03E-05
270	1.815	0.185	0.198	3.31E-05	6.74E-05
300	1.849	0.151	0.168	5.64E-05	1.05E-04
360	1.868	0.132	0.142	1.98E-05	3.33E-05
420	1.885	0.115	0.124	2.11E-05	3.30E-05
480	1.905	0.095	0.105	3.05E-05	4.37E-05
540	1.925	0.075	0.085	3.95E-05	5.06E-05
600	2.000	0.000	0.038	#DIV/0!	#DIV/0!
900					





CLIENT:	Wairarapa Moana	DESIGNER:	RM
PROJECT:	Taniwha Street, Mangakino	CHECKED:	LF
TITLE:	Falling Head Permeability Test (S03)	REVISION:	4
		DATE:	20/09/2023
		PROJECT:	TGA2023-0106

Specifications - Open-Ended Tube

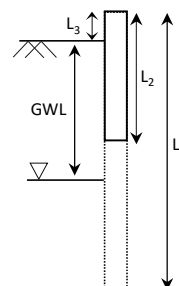
Length L_1 : 3.01 m
 Diameter: 90 mm
 Non-Perm L_2 : 0 m
 Above Gnd L_3 : 0.55 m

Ground Conditions

GWL: m BGL (Blank = Bottom of hole)

Permeability Anisotropy
 $m = \sqrt{k_h/k_v}$
 m: 1

Bottom of Test Hole: 2.46 m BGL



Hydraulic Conductivity (k)

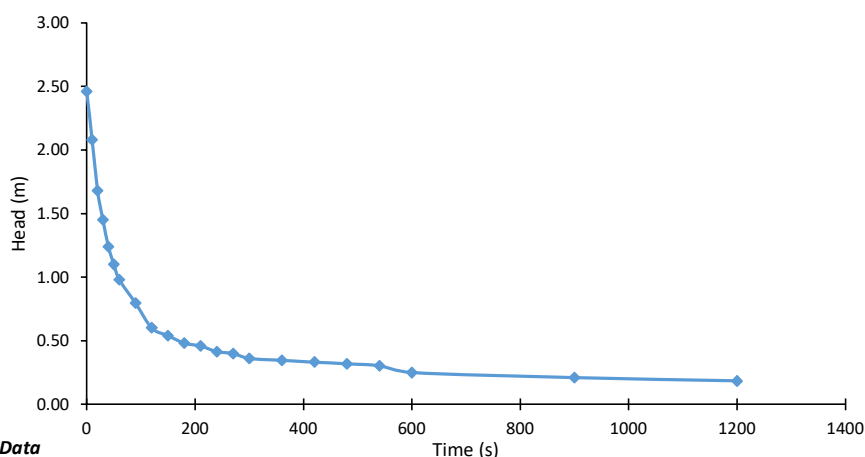
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), Control of groundwater for temporary works, CIRIA Report 113, Appendix 4

$$k = \left(\log \frac{h_1}{h_2} - \log \frac{2h_1 + d}{2h_2 + d} \right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} = 1.08\text{E-}04 \text{ ms}^{-1} = 9.37 \text{ m/day}$$

Hvorslev: Hvorslev (1951) Time Lag and Soil Permeability in Ground-Water Observations, Fig 18, p49

$$k = \frac{d^2 \ln \left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d} \right)^2 + 1} \right)}{\ln \frac{H_1}{H_2}} = 1.81\text{E-}05 \text{ ms}^{-1} = 1.57 \text{ m/day}$$



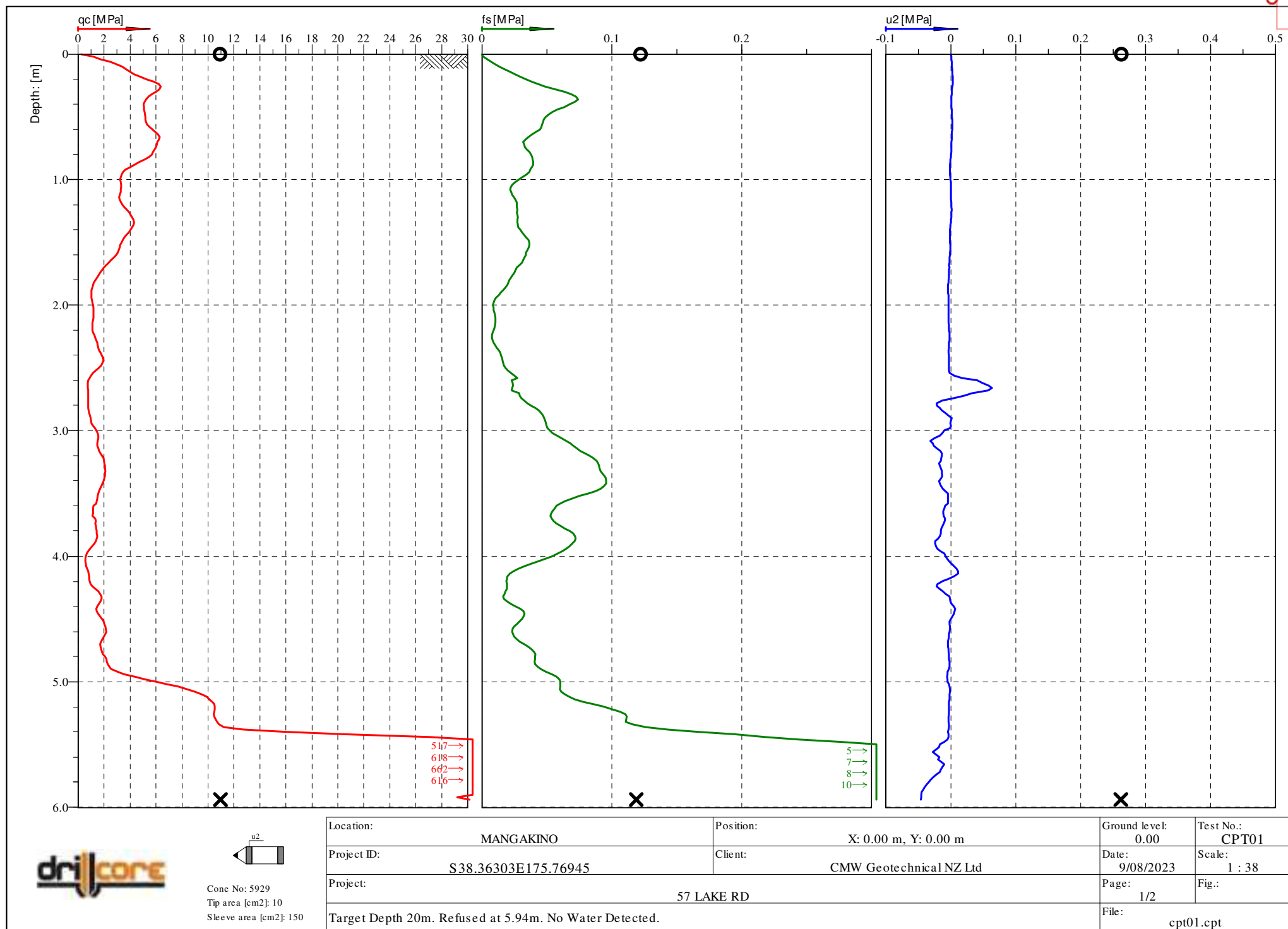
Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)	Hvorslev 'k' Case G (ms ⁻¹)	CIRIA 113 'k' (ms ⁻¹)
0	0.550	2.460			
10	0.930	2.080	2.270	2.93E-05	3.23E-04
20	1.330	1.680	1.880	4.29E-05	4.11E-04
30	1.560	1.450	1.565	3.38E-05	2.81E-04
40	1.771	1.239	1.345	4.02E-05	2.99E-04
50	1.910	1.100	1.170	3.36E-05	2.24E-04
60	2.030	0.980	1.040	3.53E-05	2.17E-04
90	2.215	0.795	0.888	2.37E-05	1.31E-04
120	2.409	0.601	0.698	3.71E-05	1.73E-04
150	2.470	0.540	0.571	1.61E-05	6.47E-05
180	2.529	0.481	0.511	1.86E-05	6.94E-05
210	2.551	0.459	0.470	7.92E-06	2.78E-05
240	2.597	0.413	0.436	1.86E-05	6.25E-05
270	2.611	0.399	0.406	6.34E-06	2.02E-05
300	2.649	0.361	0.380	1.91E-05	5.84E-05
360	2.665	0.345	0.353	4.50E-06	1.31E-05
420	2.678	0.332	0.339	3.90E-06	1.10E-05
480	2.691	0.319	0.326	4.14E-06	1.14E-05
540	2.706	0.304	0.312	5.10E-06	1.37E-05
600	2.761	0.249	0.277	2.24E-05	5.62E-05
900	2.799	0.211	0.230	4.05E-06	9.05E-06
1200	2.826	0.184	0.198	3.57E-06	7.28E-06
1500	2.847	0.163	0.174	3.33E-06	6.28E-06
1800	2.865	0.145	0.154	3.35E-06	5.91E-06
2100	2.880				

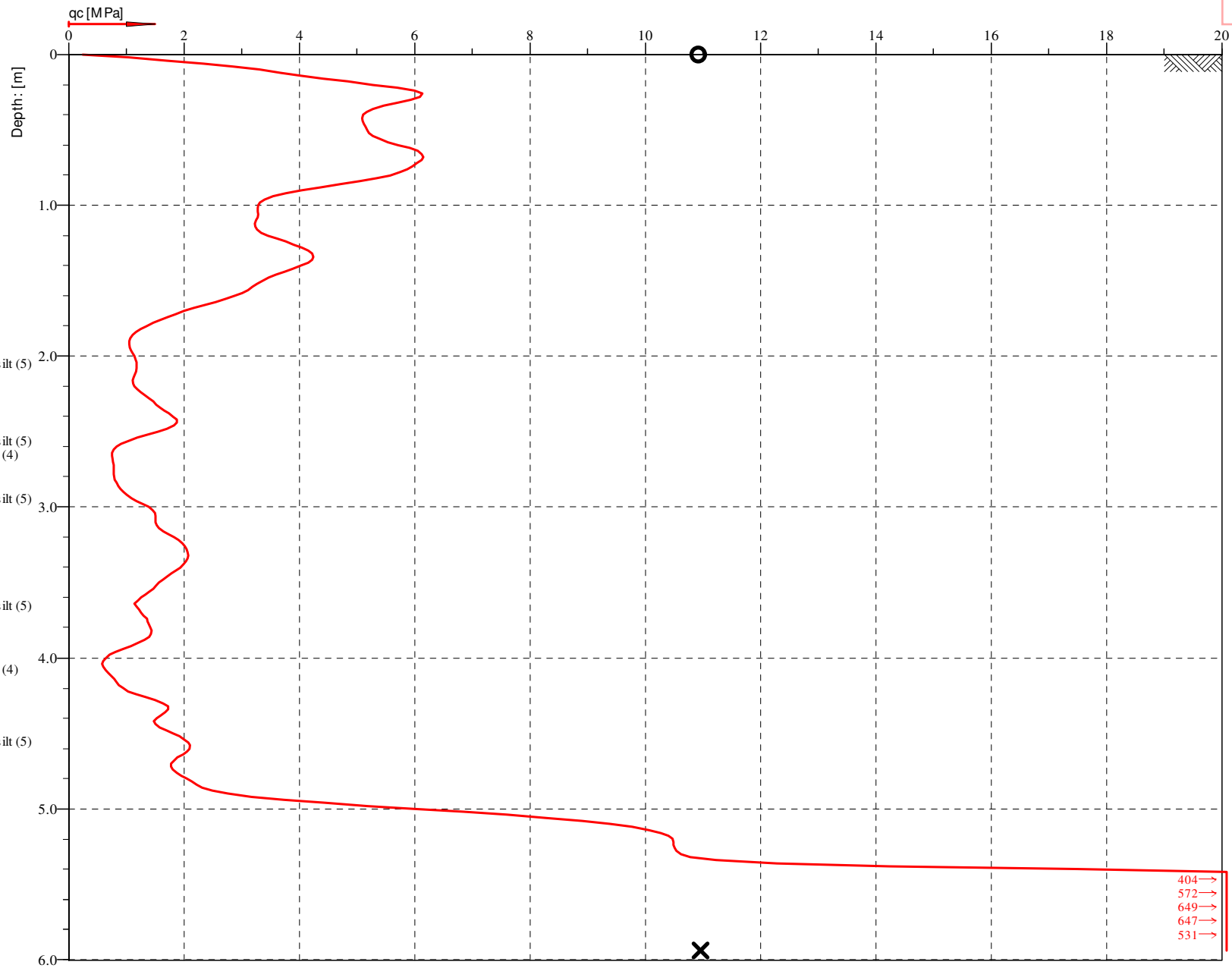
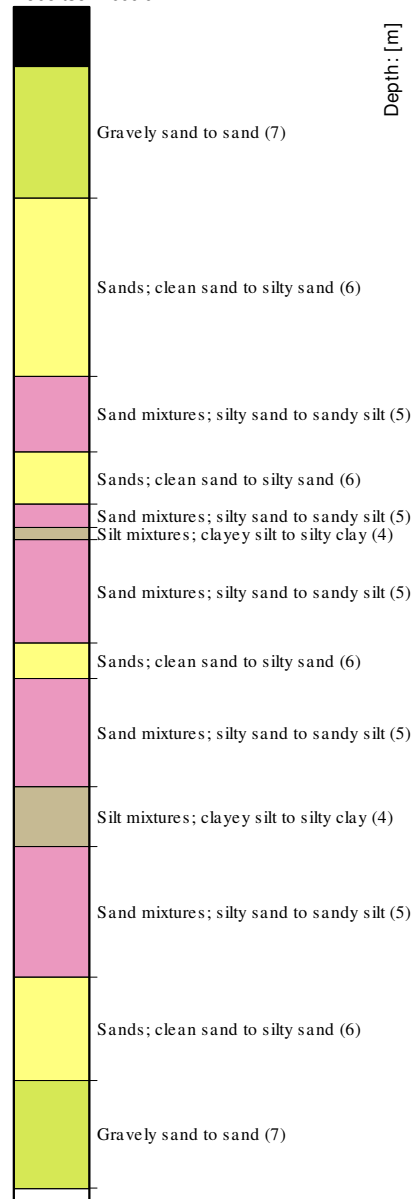
STRATIGRAPHIC LOG

Sand
Clay
Sand
EOH @ 2.46m

APPENDIX D: CPT INVESTIGATION RESULTS



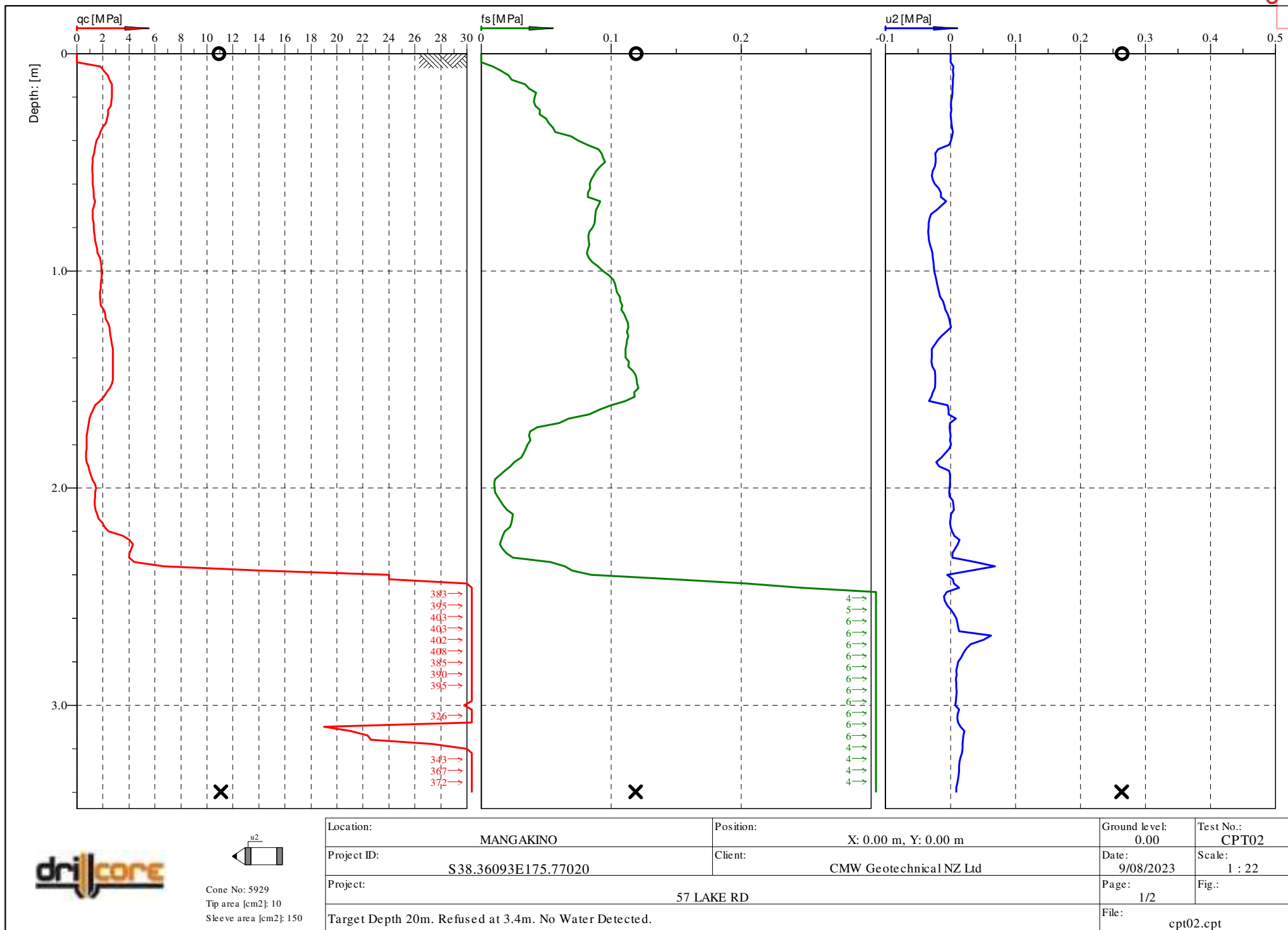
Classification by
Robertson 1990 b



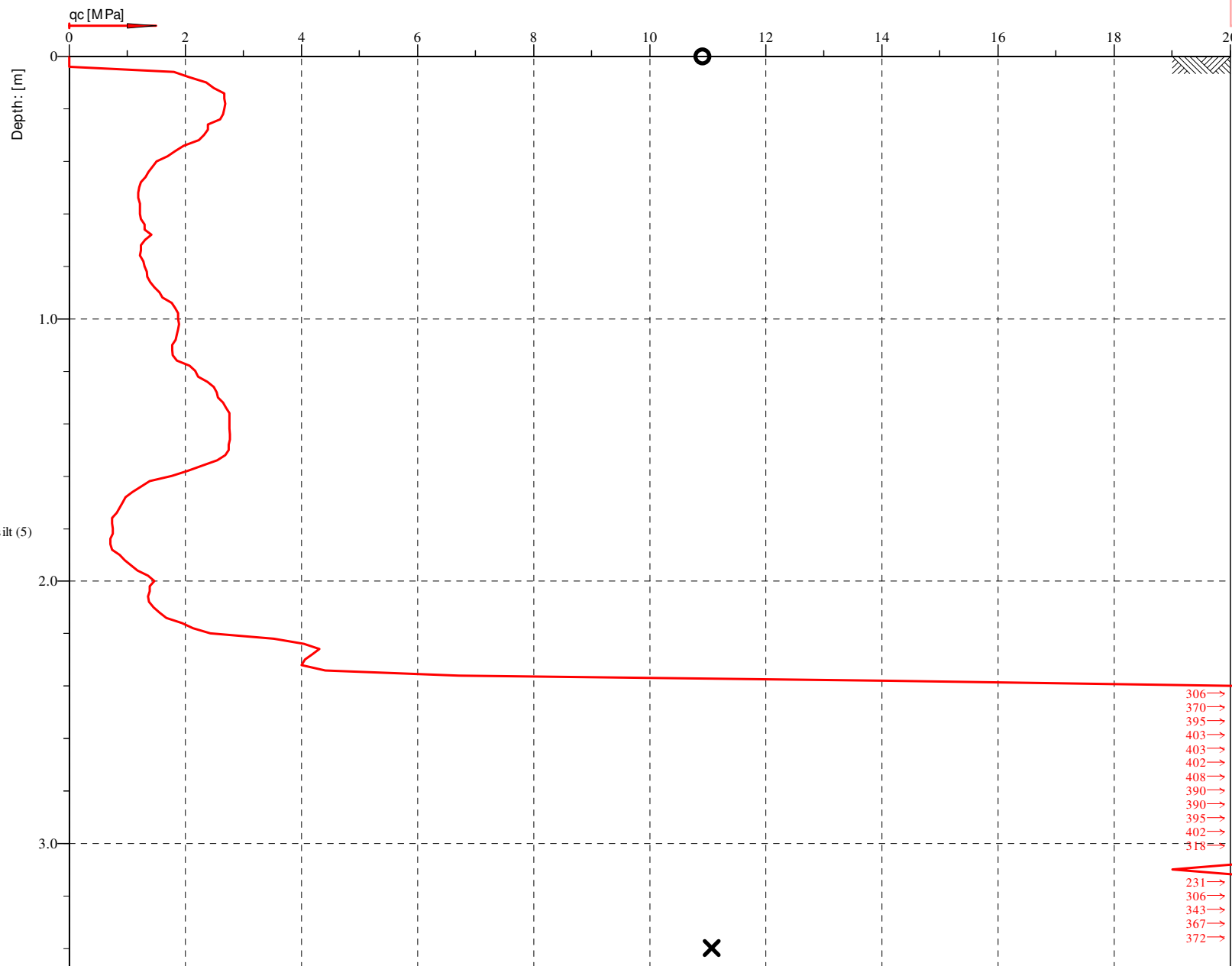
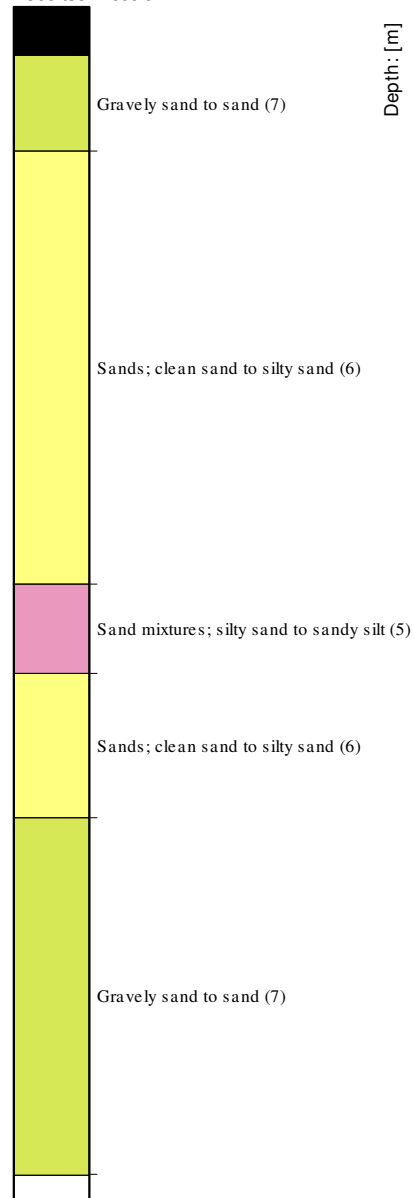
Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150



Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT01
Project ID:	S38.36303E175.76945	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 38
Project:	57 LAKE RD				Page:	2/2	Fig.:
Target Depth 20m. Refused at 5.94m. No Water Detected.					File:	cpt01.cpt	

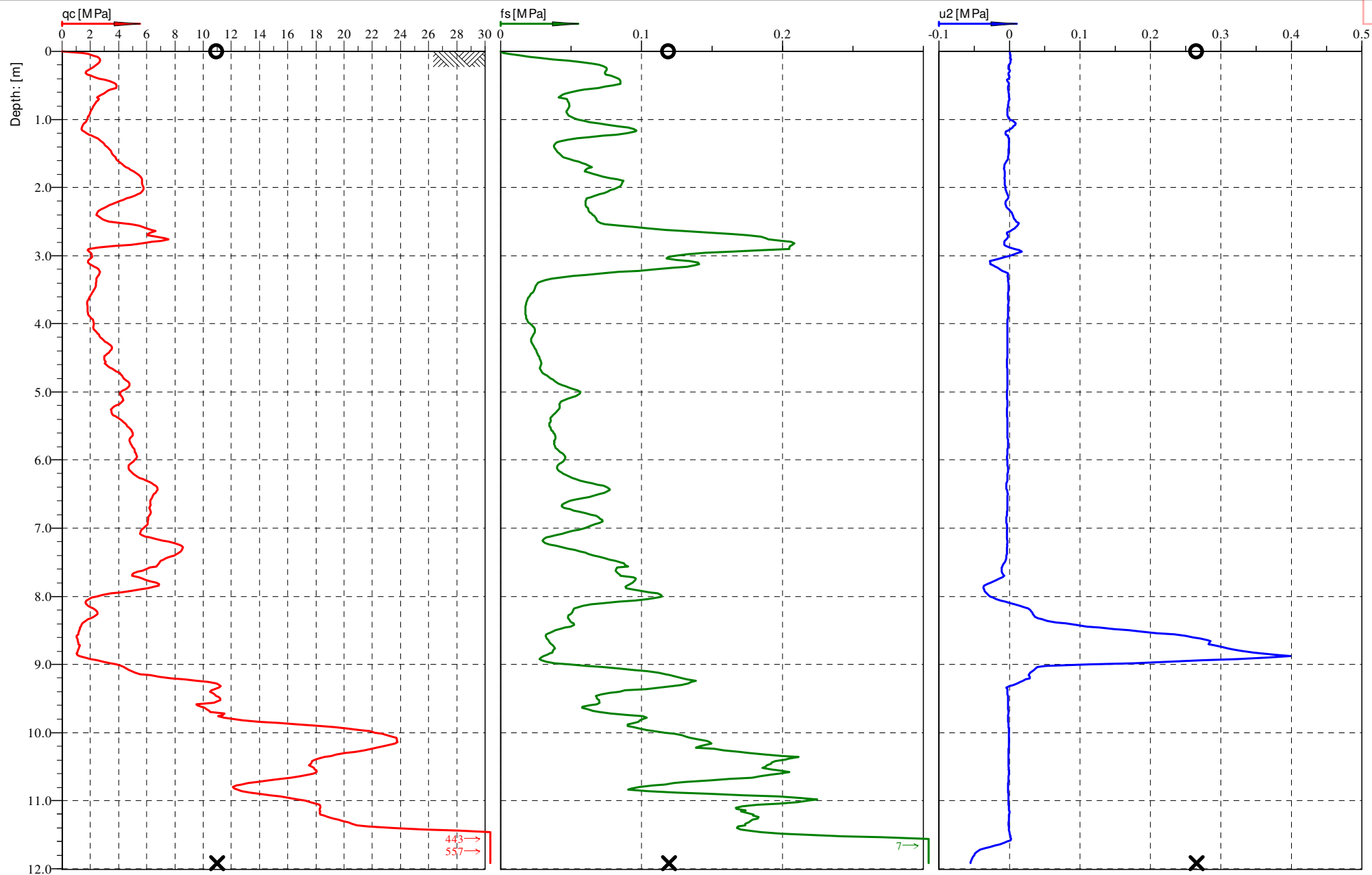


Classification by
Robertson 1990 b



Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150

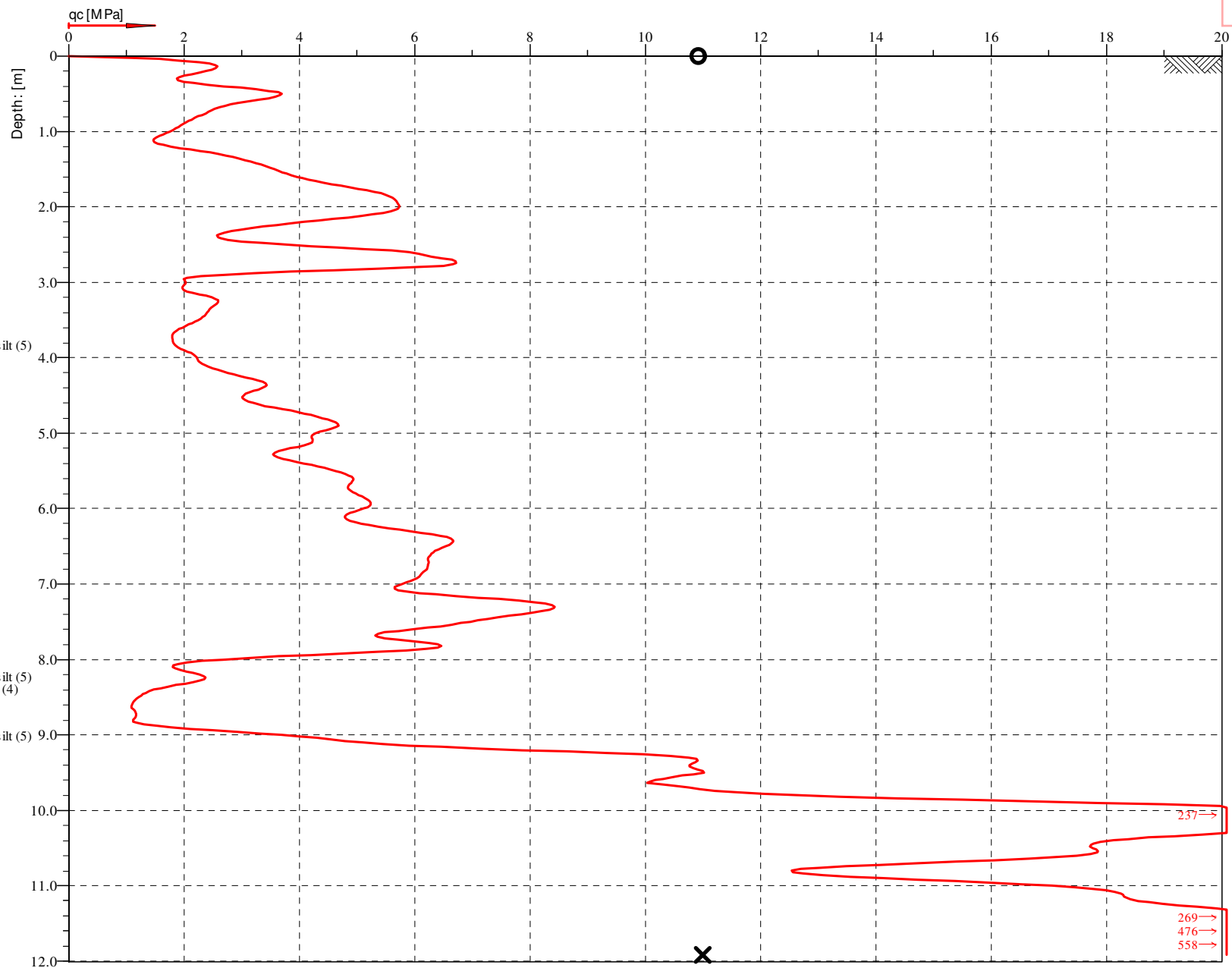
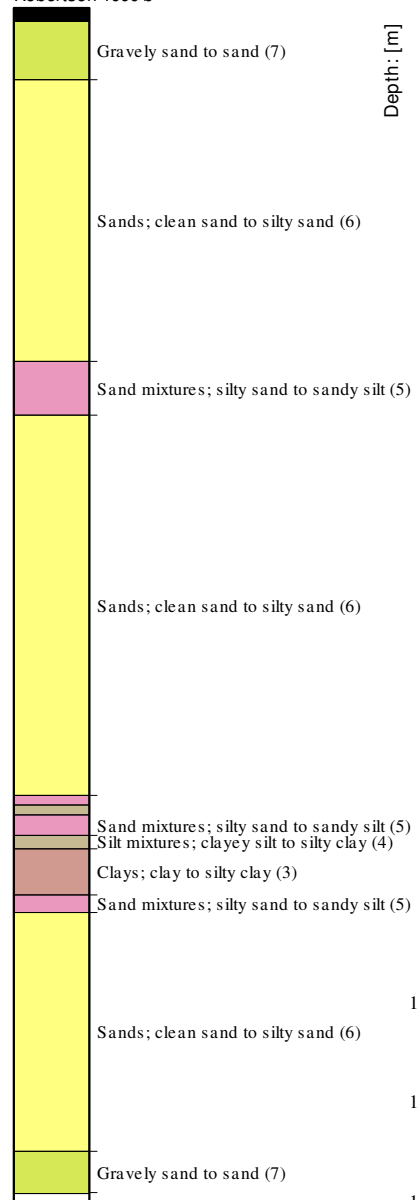
Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT02
Project ID:	S38.36093E175.77020	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 22
Project:	57 LAKE RD				Page:	2/2	Fig.:
Target Depth 20m. Refused at 3.4m. No Water Detected.					File:	cpt02.cpt	



Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150

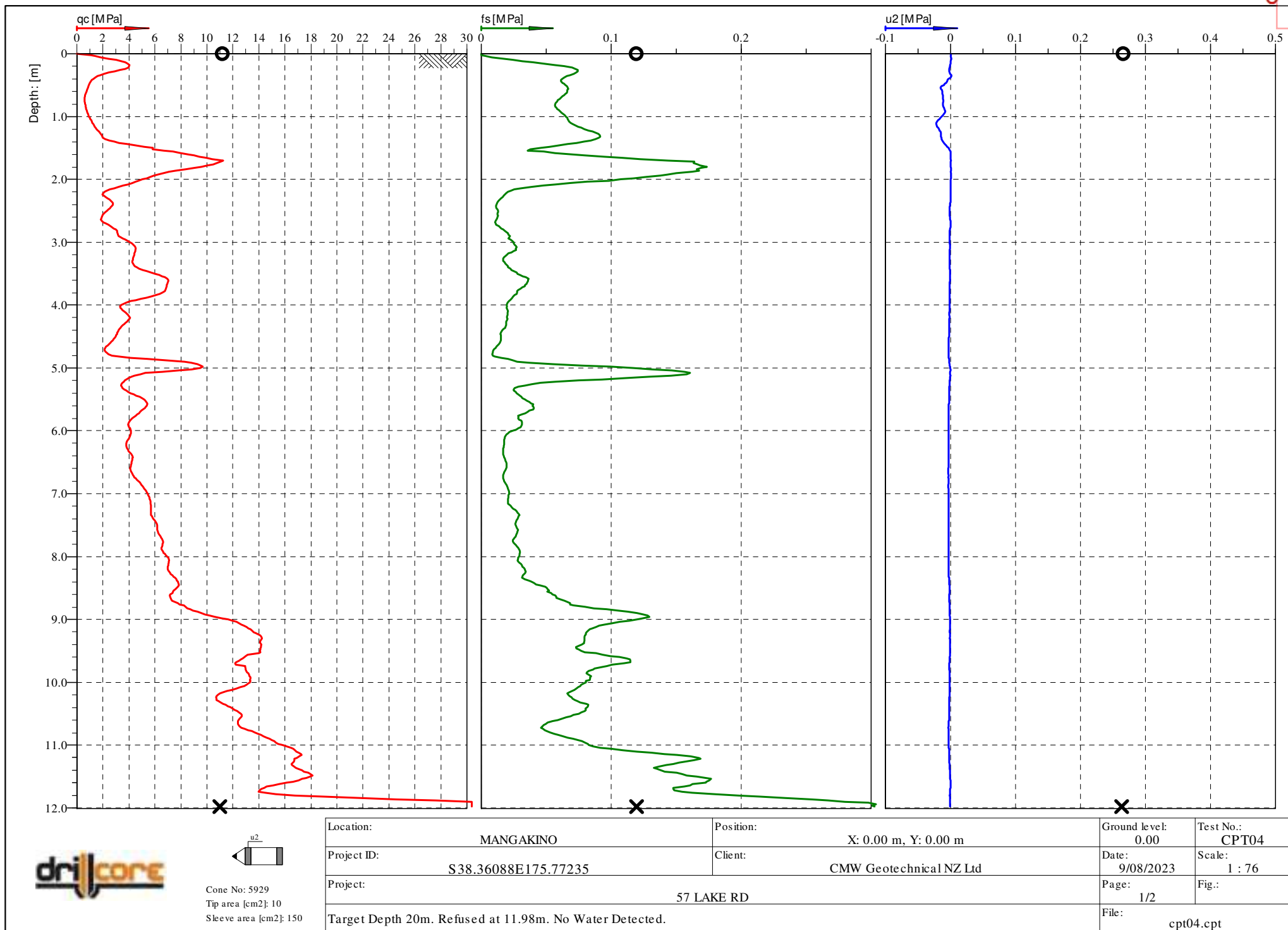
Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT03
Project ID:	S38.36115E175.77155	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 76
Project:	57 LAKE RD	Page:	1/2	Fig.:			
Target Depth 20m. Refused at 11.92m. No Water Detected.				File:	cpt03.cpt		

Classification by
Robertson 1990 b

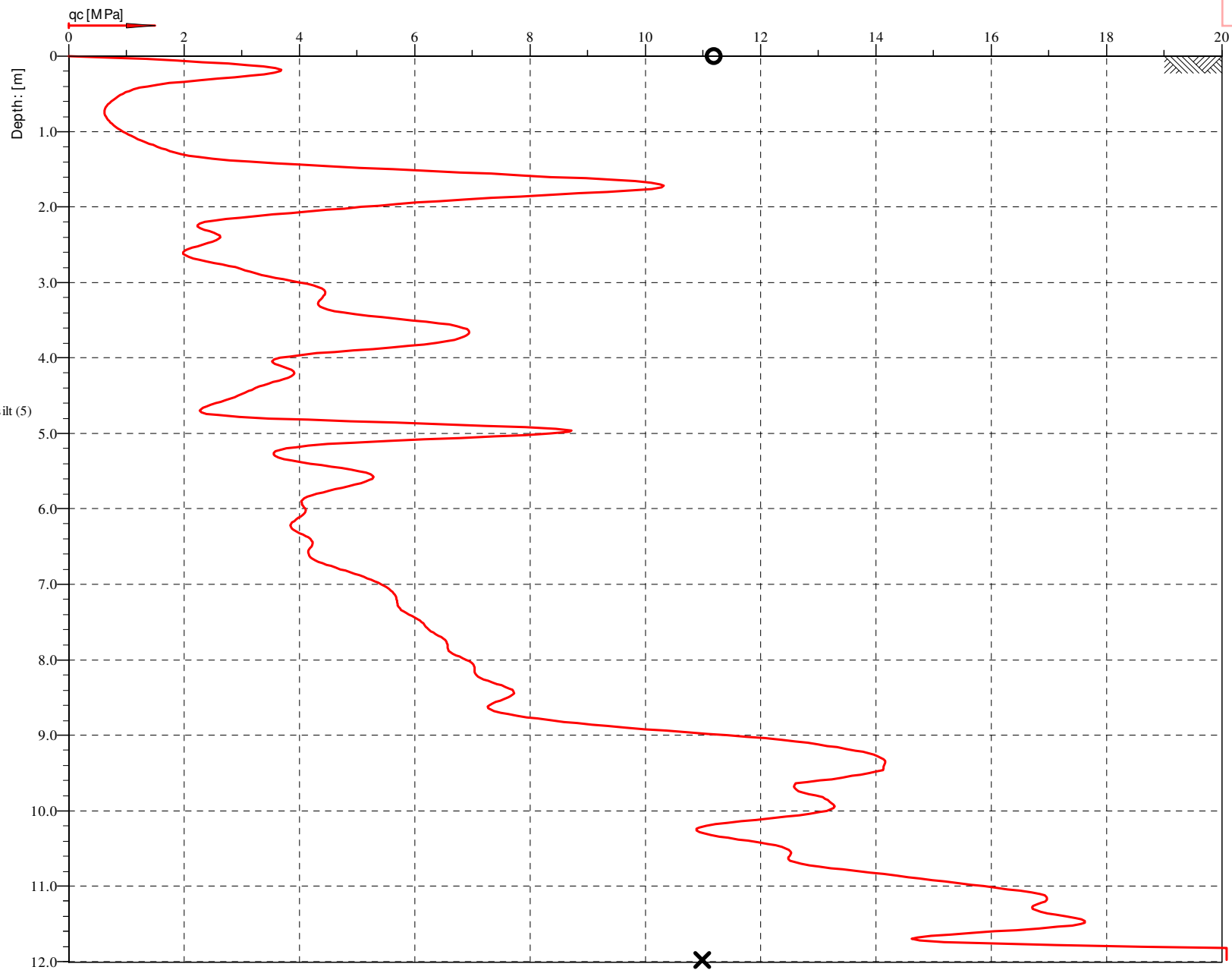
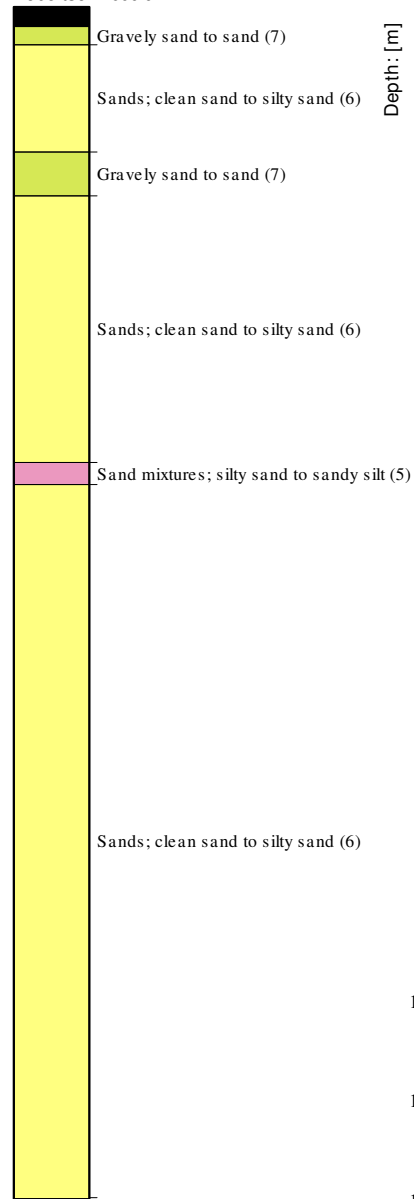


Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150

Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT03
Project ID:	S38.36115E175.77155	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 76
Project:	57 LAKE RD			Page:	2/2	Fig.:	
Target Depth 20m. Refused at 11.92m. No Water Detected.				File:	cpt03.cpt		

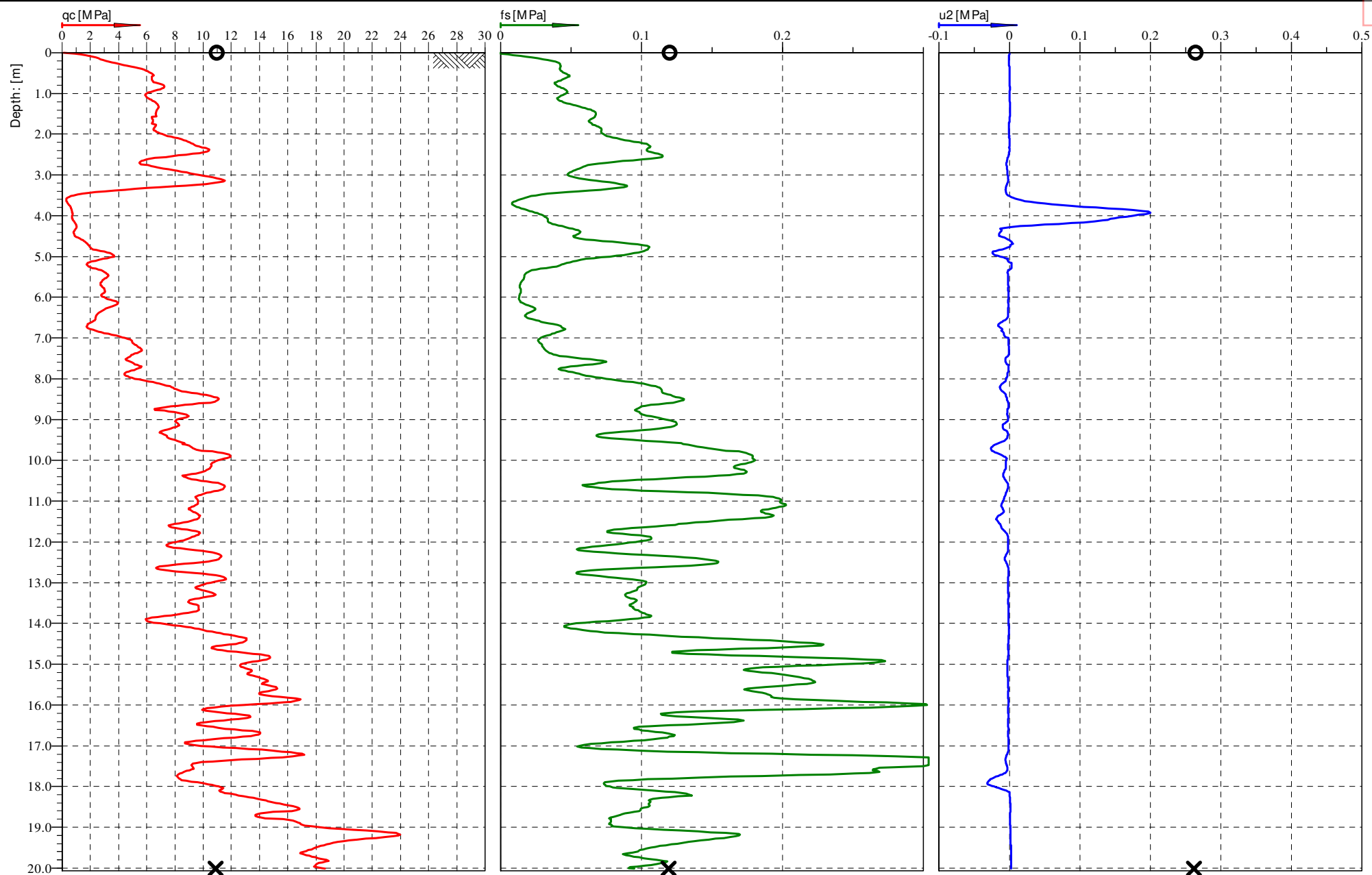


Classification by
Robertson 1990 b



Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150

Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT04
Project ID:	S38.36088E175.77235	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 76
Project:	57 LAKE RD				Page:	2/2	Fig.:
Target Depth 20m. Refused at 11.98m. No Water Detected.					File:	cpt04.cpt	

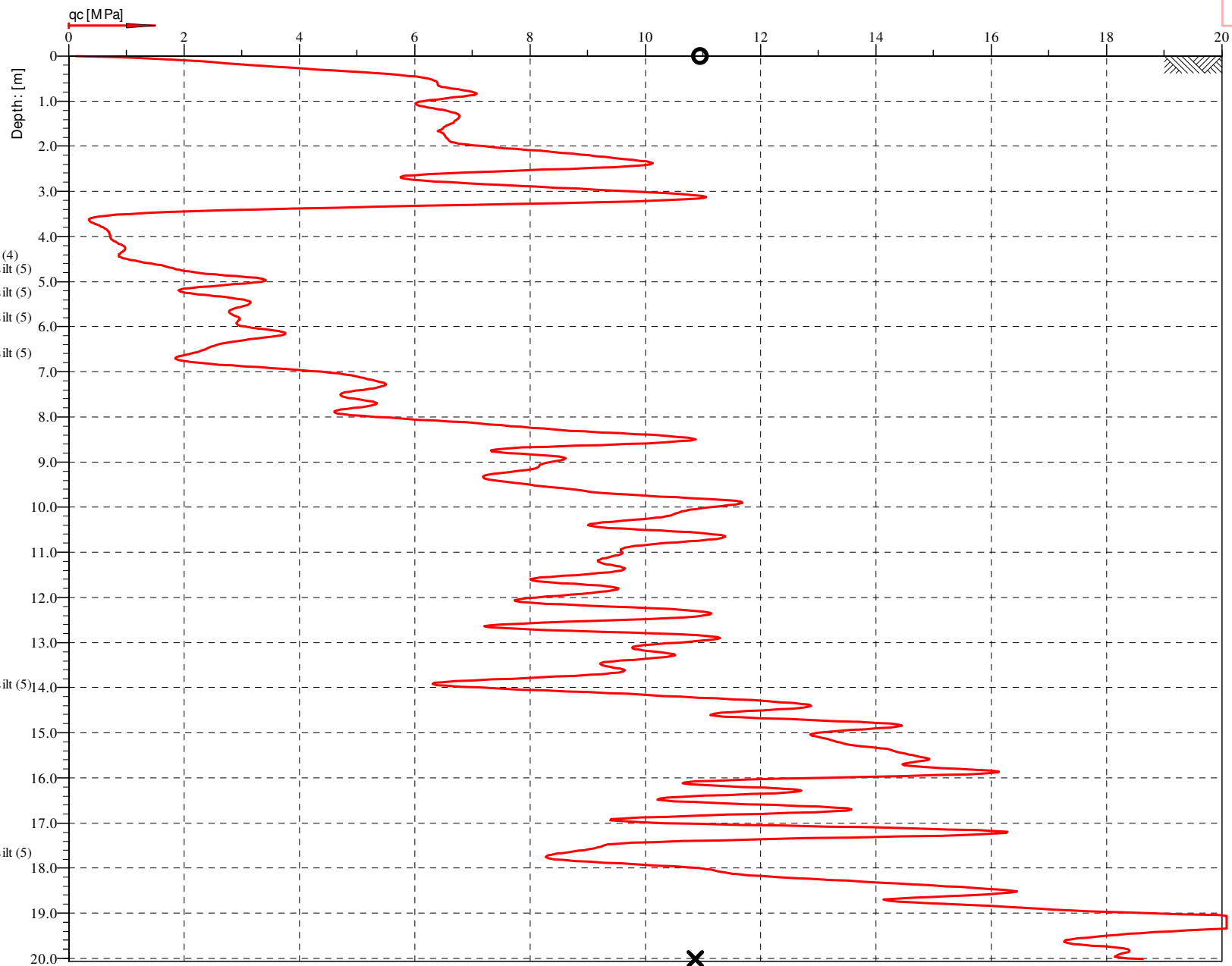
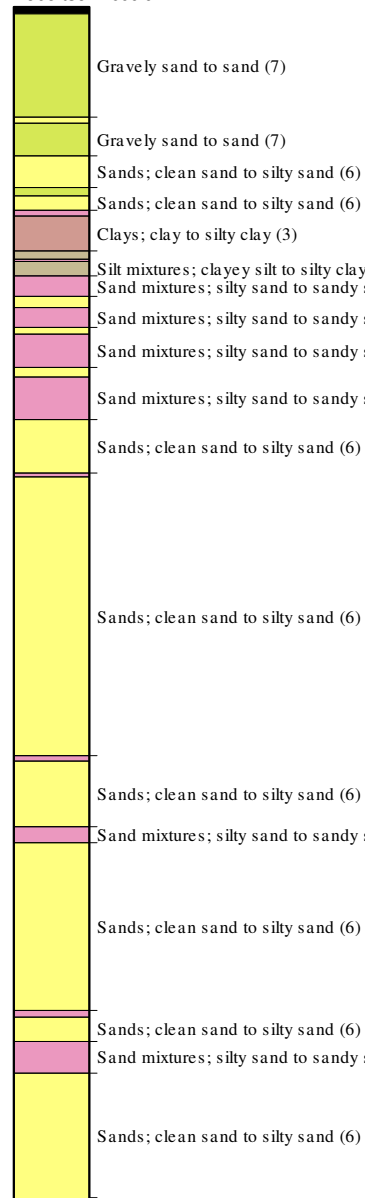


Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150



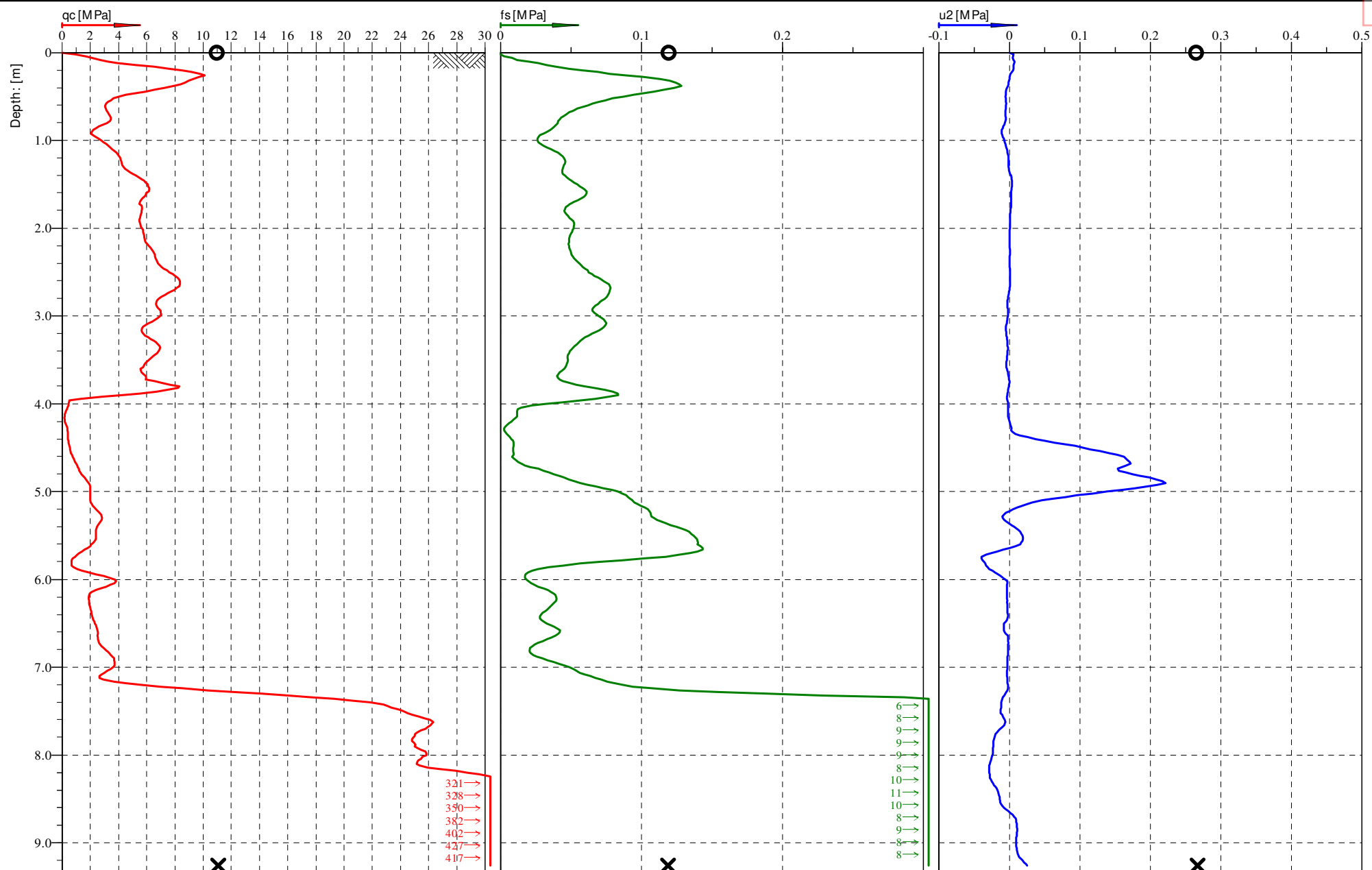
Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT05
Project ID:	S38.36254E175.77135	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 127
Project:	57 LAKE RD			Page:	1/2	Fig.:	
Target Depth 20m. No Water Detected.				File:	cpt05.cpt		

Classification by
Robertson 1990 b



Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150

Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT05
Project ID:	S38.36254E175.77135	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 127
Project:	57 LAKE RD			Page:	2/2	Fig.:	
Target Depth 20m. No Water Detected.				File:	cpt05.cpt		

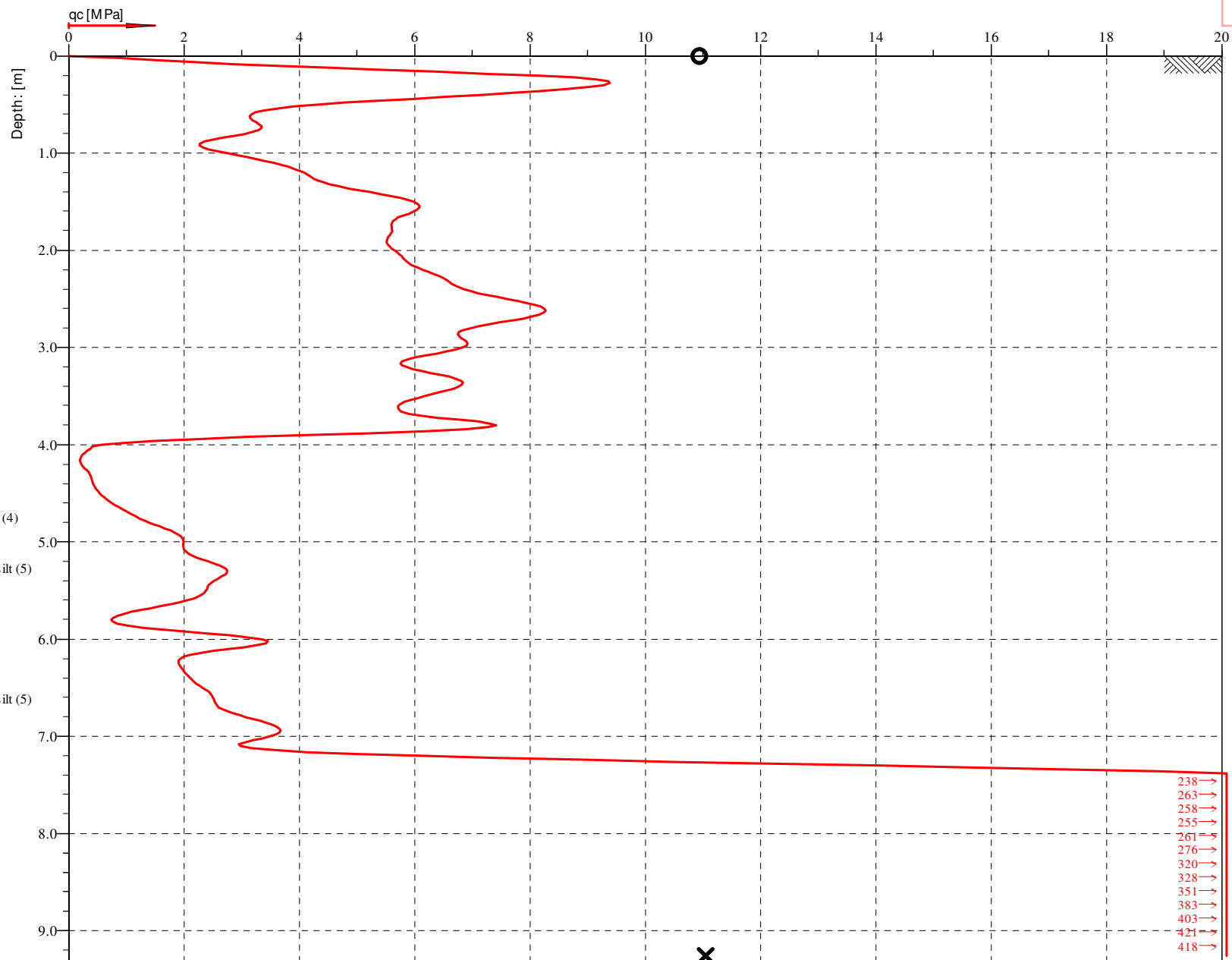
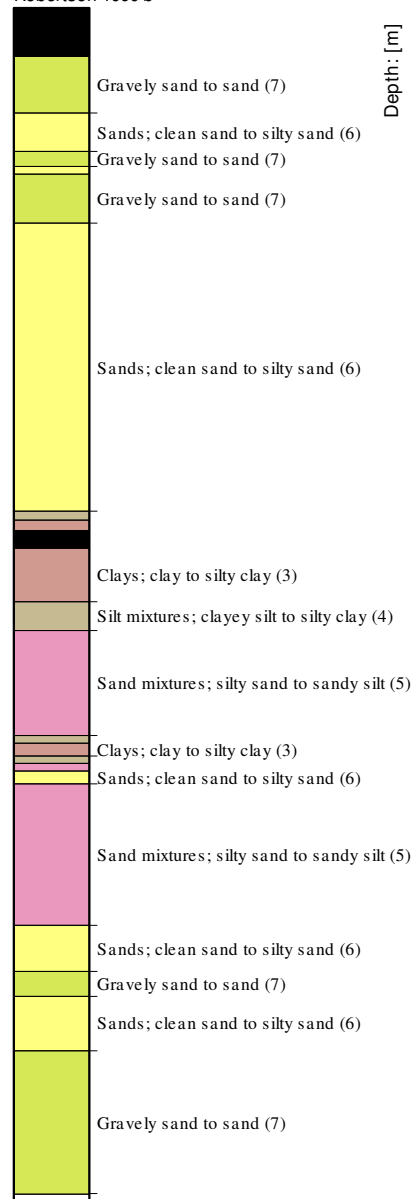


Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150



Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT06
Project ID:	S38.36376E175.77200	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 59
Project:	57 LAKE RD				Page:	1/2	Fig.:
Target Depth 20m. Refused at 9.26m. No Water Detetced.					File:	cpt06.cpt	

Classification by
Robertson 1990 b



Cone No: 5929
Tip area [cm²]: 10
Sleeve area [cm²]: 150

Location:	MANGAKINO	Position:	X: 0.00 m, Y: 0.00 m	Ground level:	0.00	Test No.:	CPT06
Project ID:	S38.36376E175.77200	Client:	CMW Geotechnical NZ Ltd	Date:	9/08/2023	Scale:	1 : 59
Project:	57 LAKE RD				Page:	2/2	Fig.:
Target Depth 20m. Refused at 9.26m. No Water Detetced.					File:	cpt06.cpt	

APPENDIX E: PRELIMINARY STATIC SETTLEMENT ANALYSES



Geologismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT01 BLD Lake Rd

Total depth: 5.86 m, Date: 7/09/2023

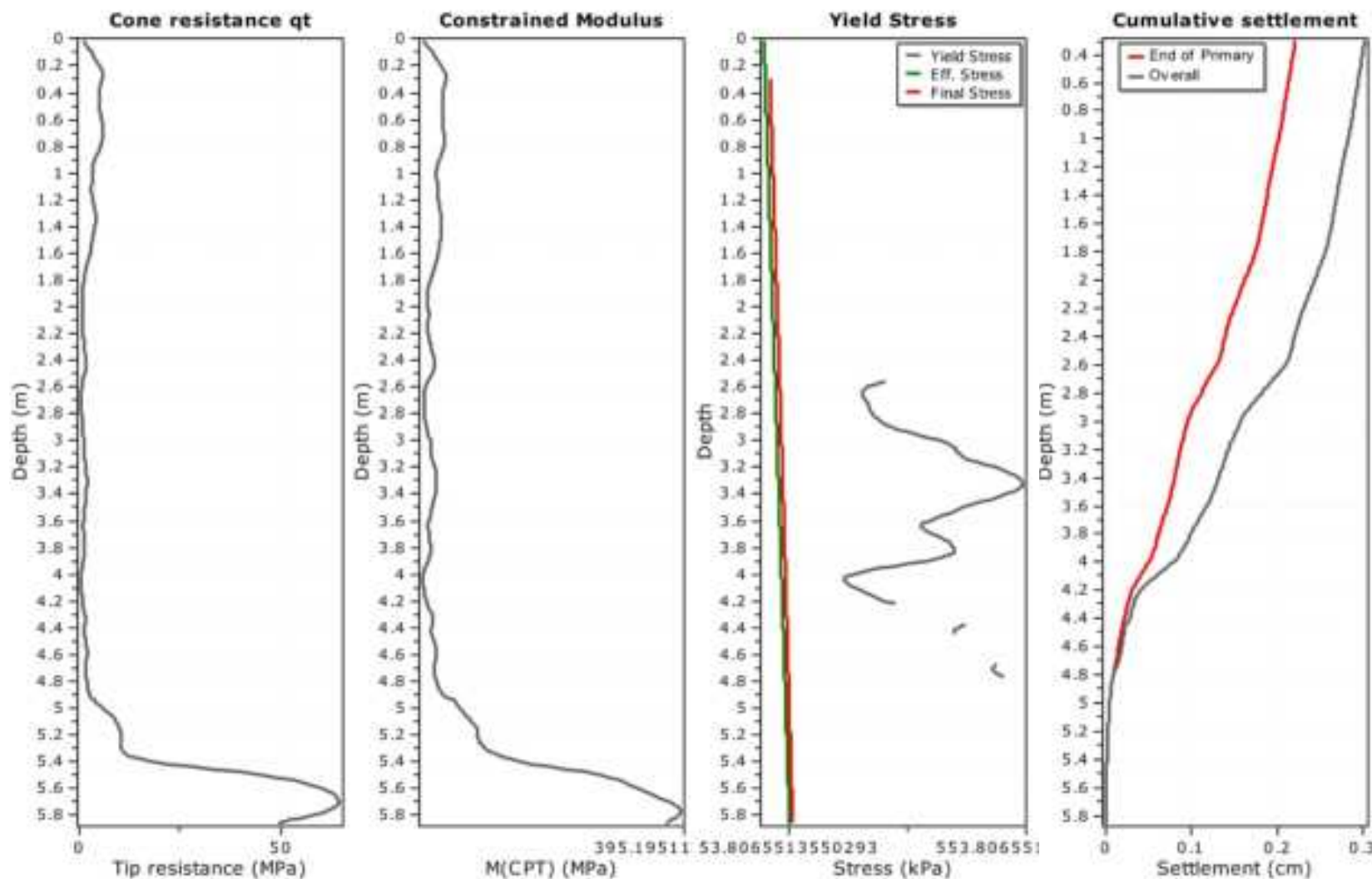
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.30 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



GeoLogismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT01 (BLD+2m Fill) Lake Rd

Total depth: 5.86 m, Date: 7/09/2023

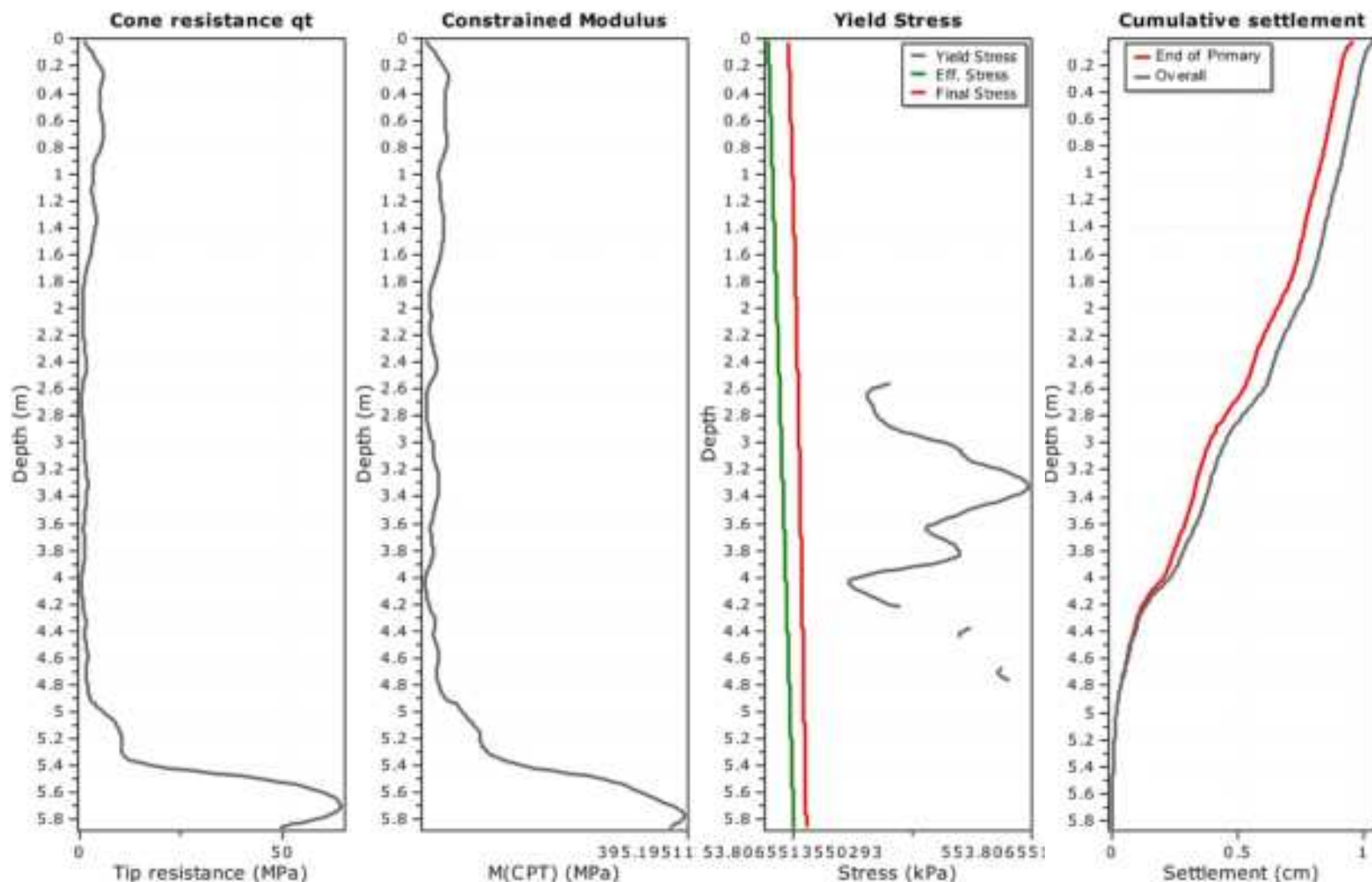
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 42.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



Geologismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT02 BLD Lake Rd

Total depth: 3.36 m, Date: 7/09/2023

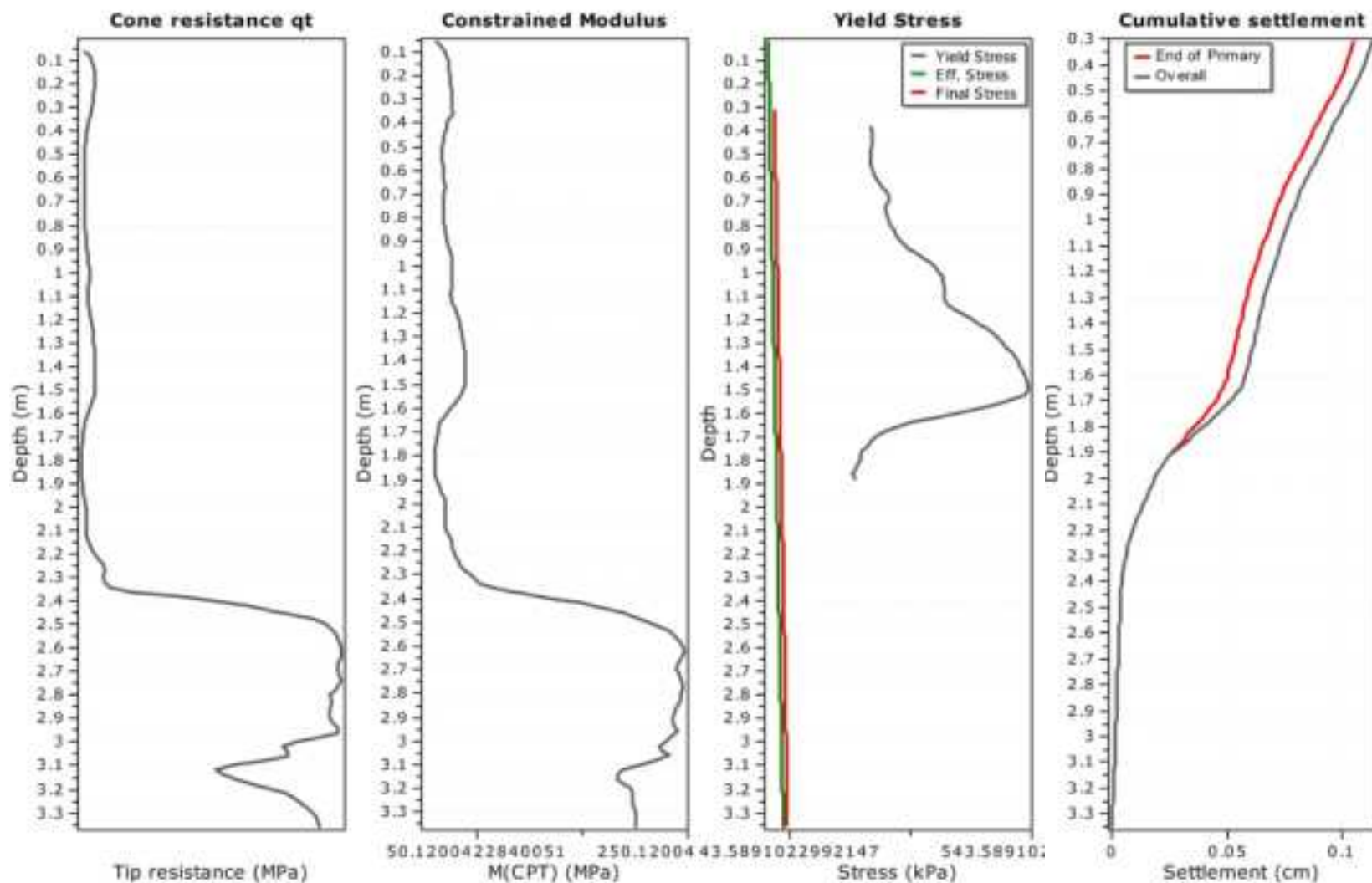
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.30 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



GeoLogismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT02(BLD+2m Fill) Lake Rd

Total depth: 3.36 m, Date: 7/09/2023

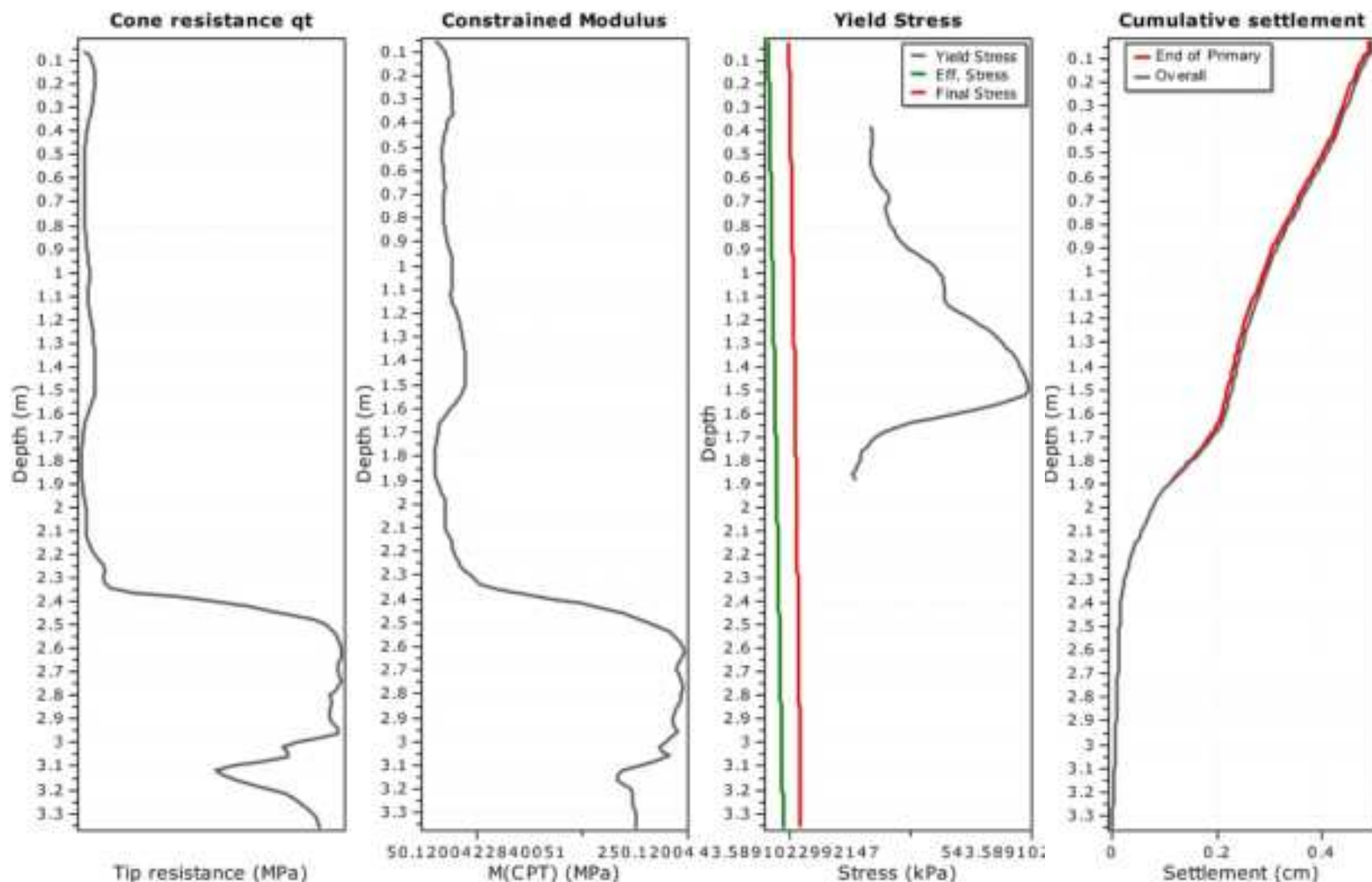
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 42.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{secondary} = S_{primary} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



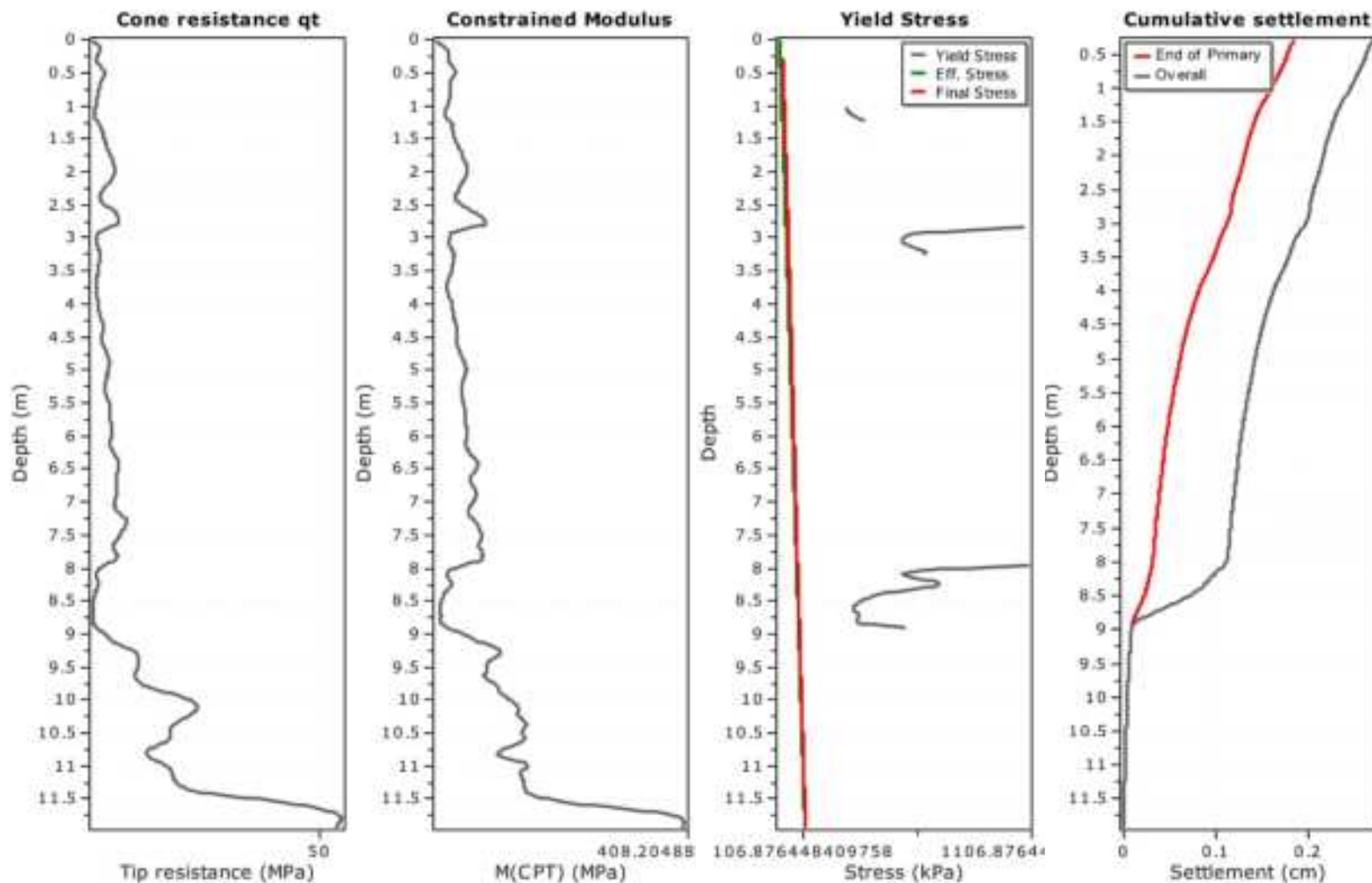
GeoLogismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT03 BLD Lake Rd

Total depth: 11.92 m, Date: 7/09/2023
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.30 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



GeoLogismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT03 (BLD+2m Fill) Lake Rd

Total depth: 11.92 m, Date: 7/09/2023

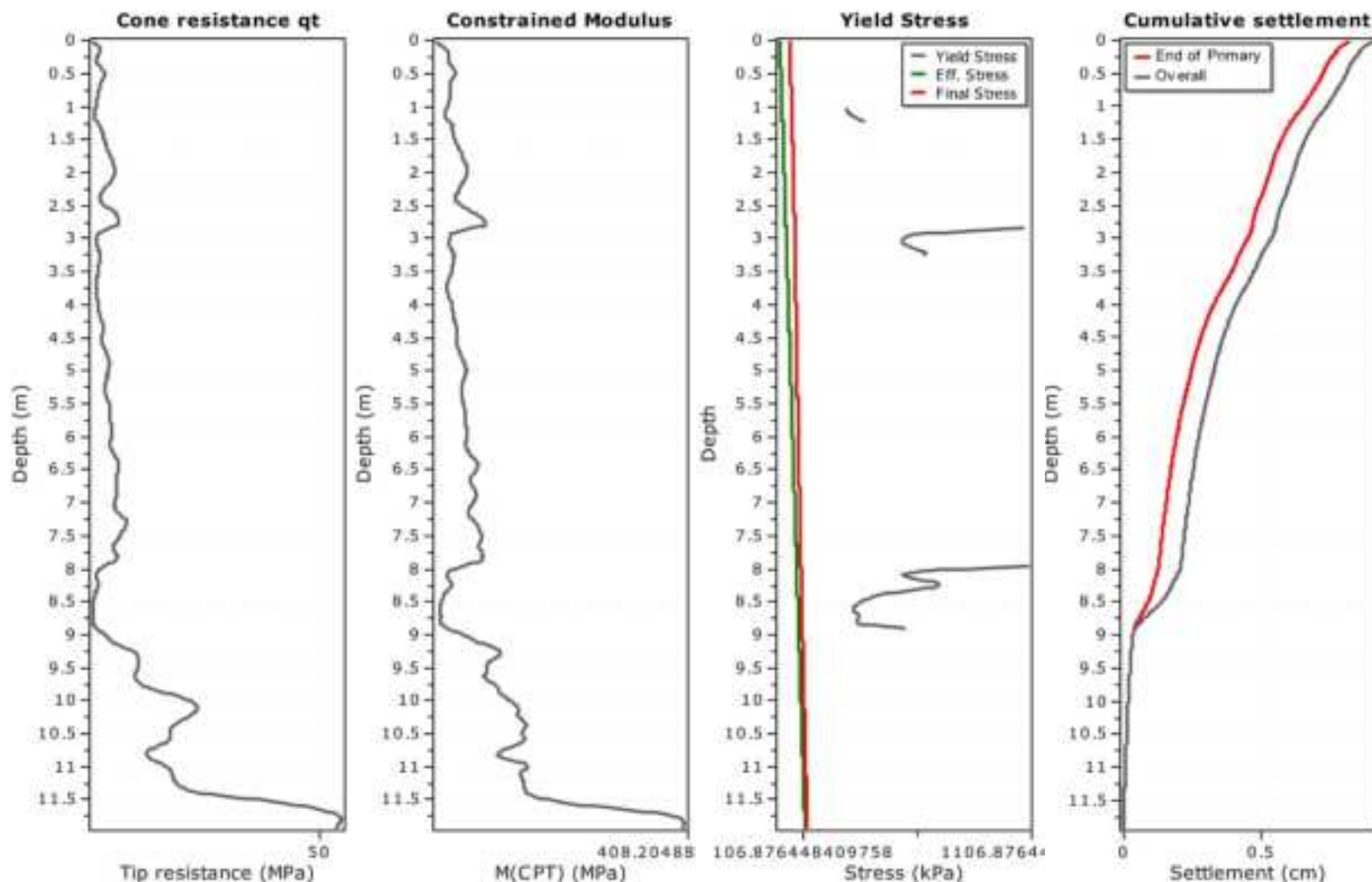
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 42.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{secondary} = S_{primary} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



Geologismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT04 BLD Lake Rd

Total depth: 11.98 m, Date: 7/09/2023

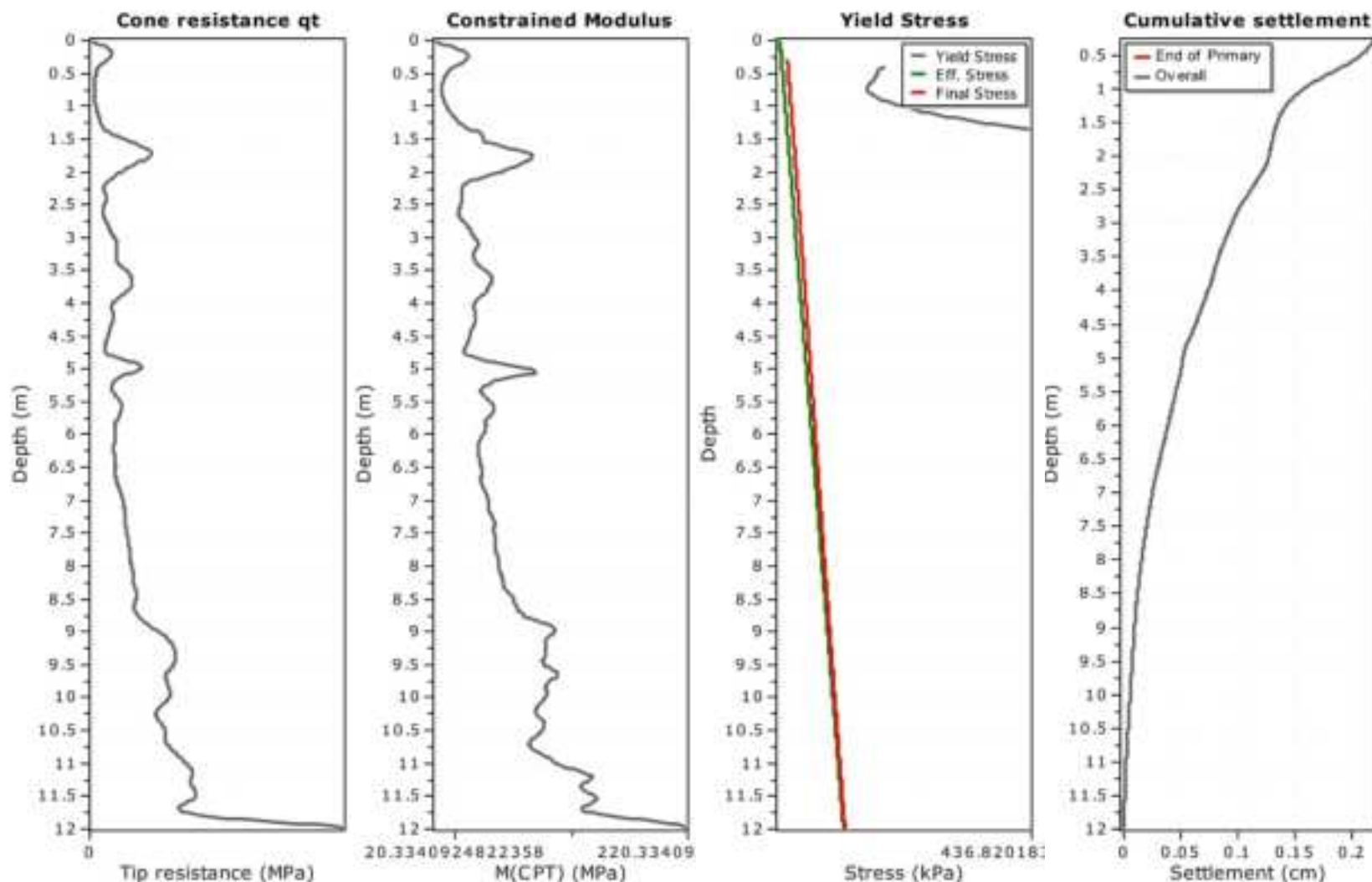
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.30 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



Geologismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT04 (BLD+2m Fill) Lake Rd

Total depth: 11.98 m, Date: 7/09/2023

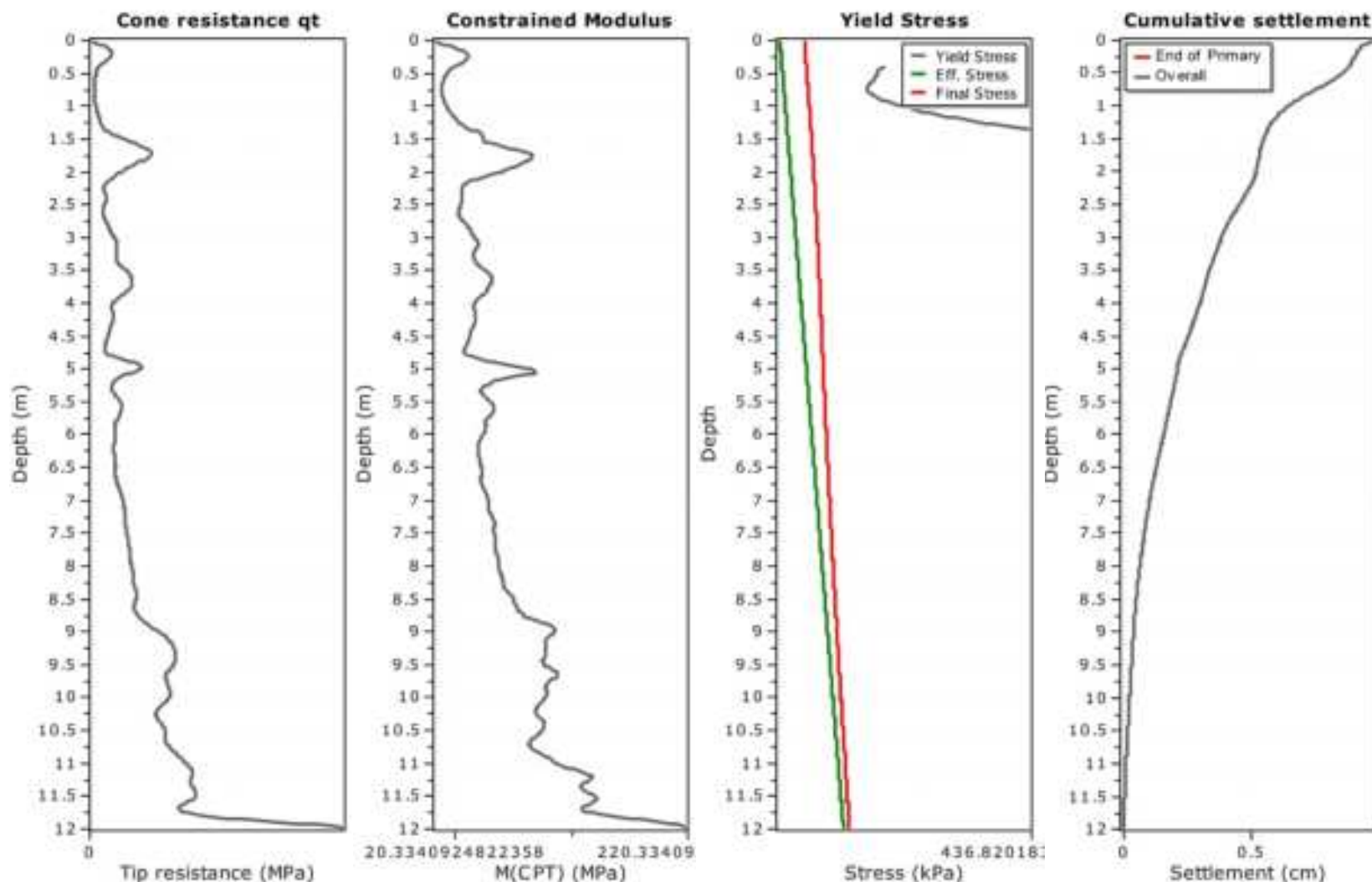
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 42.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



Geologismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT05 BLD Lake Rd

Total depth: 19.90 m, Date: 7/09/2023

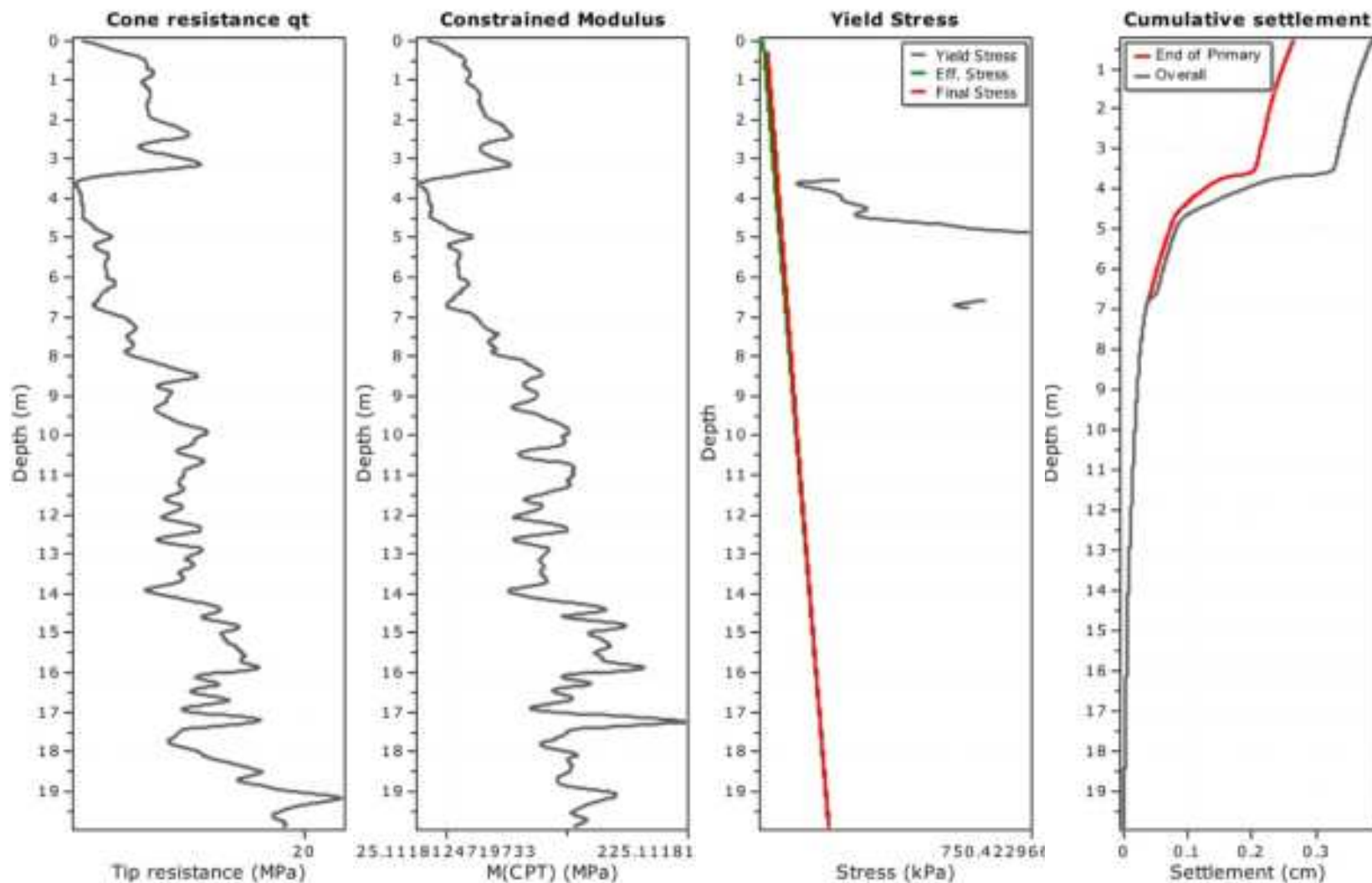
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.30 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



Geologismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT05 (BLD+2m Fill) Lake Rd

Total depth: 19.90 m, Date: 7/09/2023

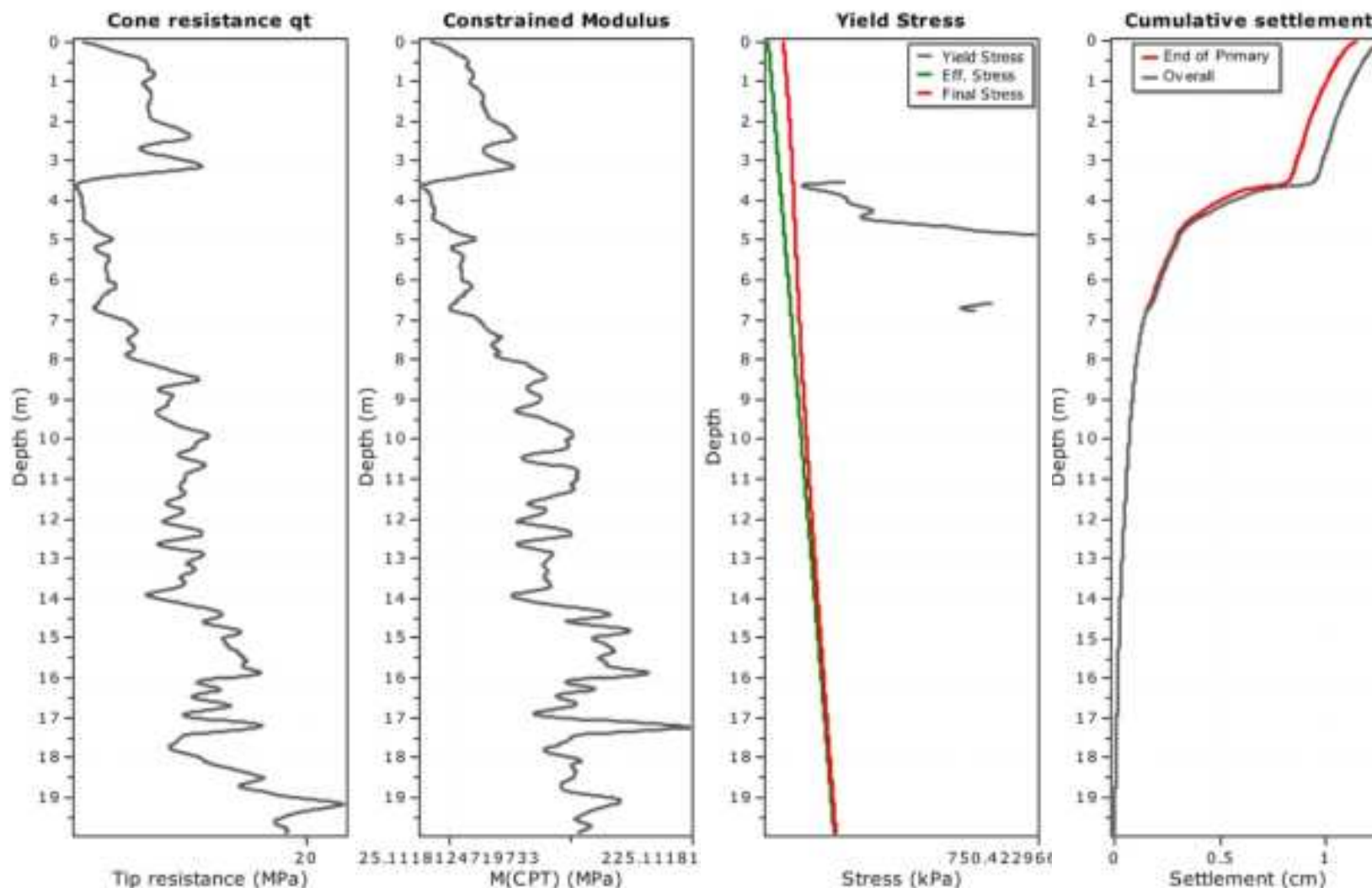
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 42.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



Geologismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT06 BLD Lake Rd

Total depth: 9.26 m, Date: 7/09/2023

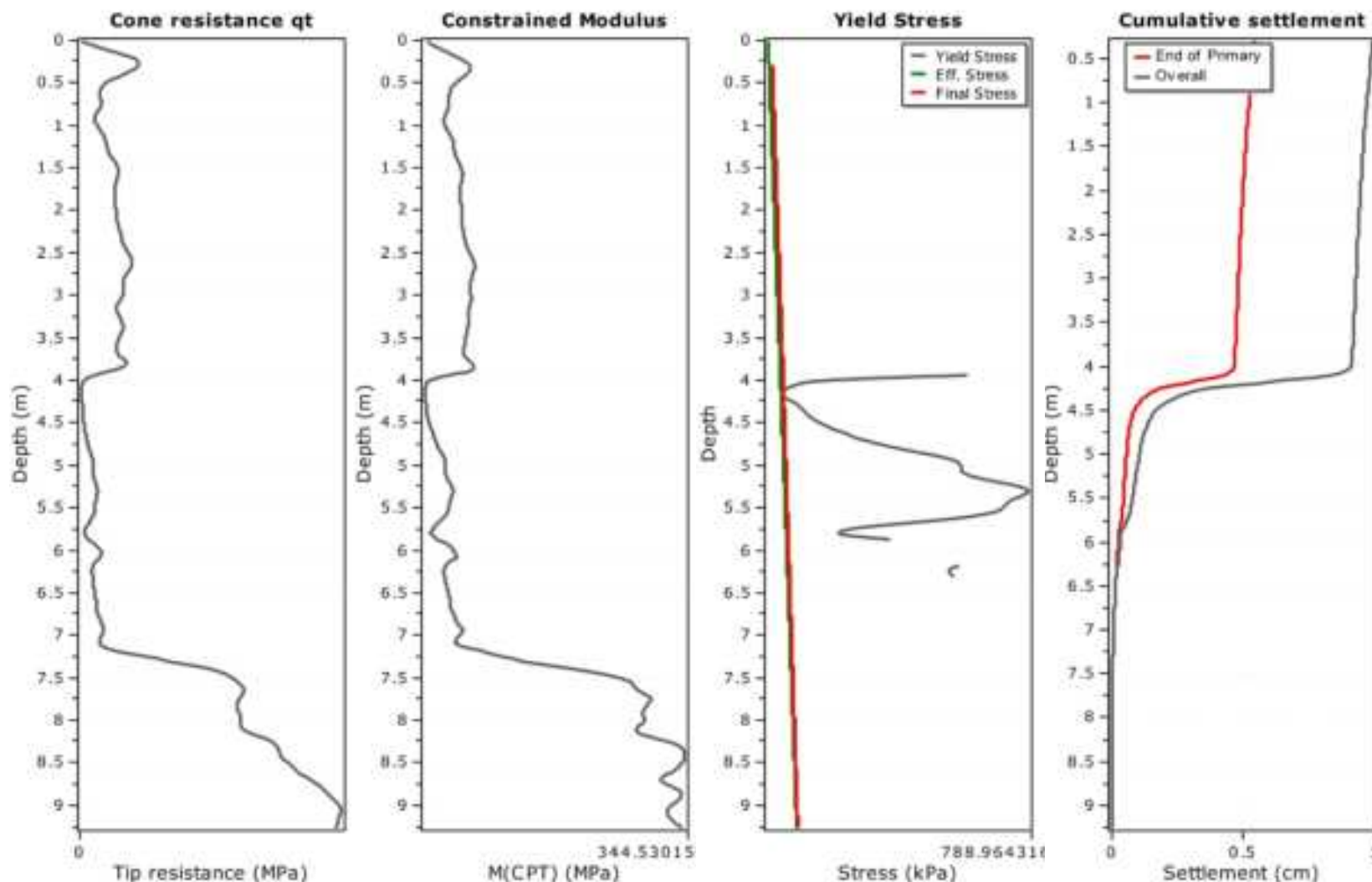
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 10.00 (kPa)
Embedment depth: 0.30 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation



Geologismiki
Geotechnical Engineers
Merarhias 56
<http://www.geologismiki.gr>

Project:
Location:

CPT: CPT06 (BLD+2m Fill) Lake Rd

Total depth: 9.26 m, Date: 7/09/2023

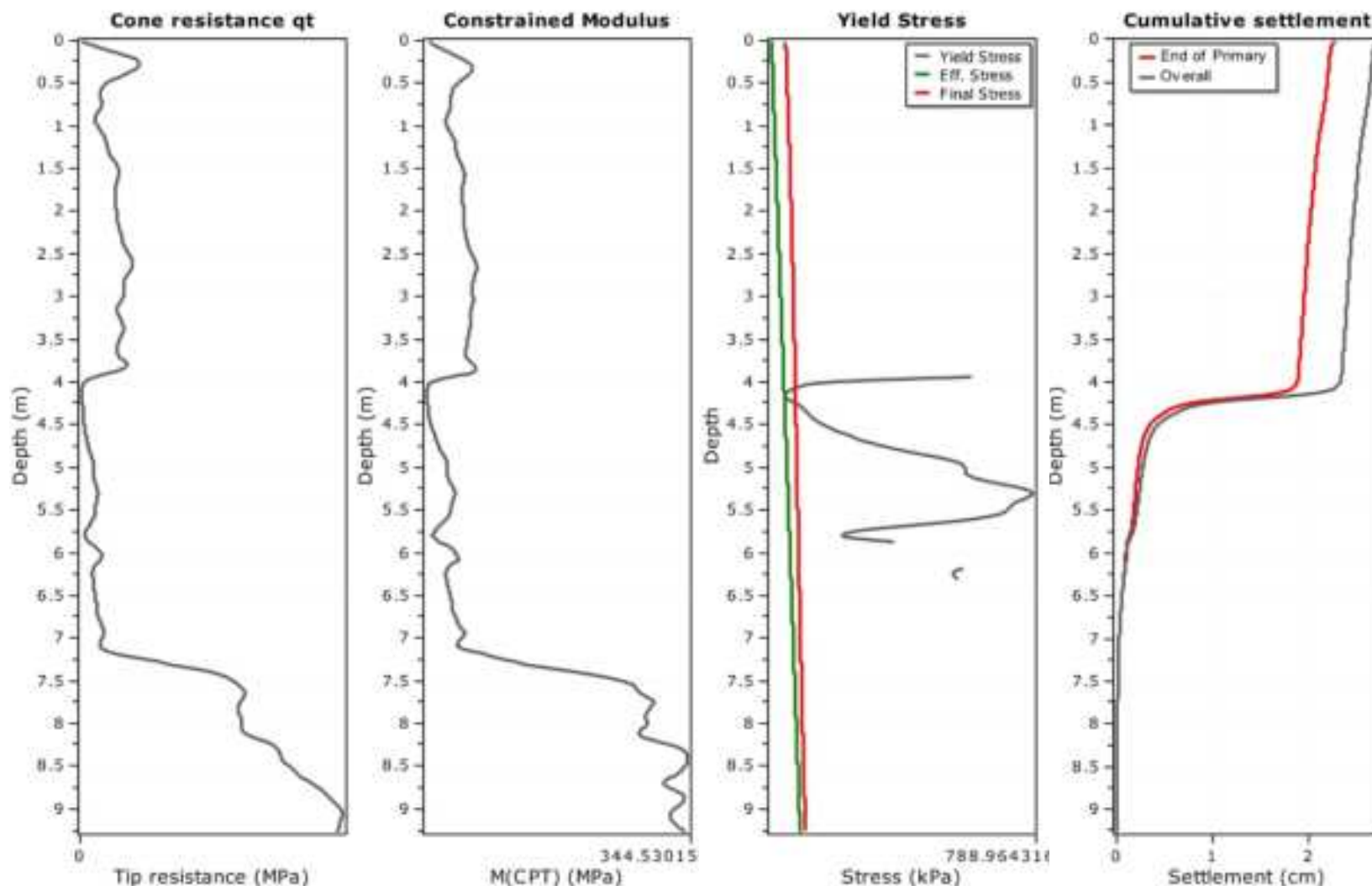
Surface Elevation: 0.00 m

Coords: X:0.00, Y:0.00

Cone Type:

Cone Operator:

Settlements calculation according to theory of elasticity *



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 1.0
Footing pressure: 42.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: No
Remove excavation load: No
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 600 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

APPENDIX D: NATURAL HAZARDS RISK ASSESSMENT

NATURAL HAZARDS RISK ASSESSMENT FOR LANDUSE CHANGE

PLAN USE CHANGE, 35, 37 & 57 LAKE ROAD, MANGAKINO

1 CONTEXT

This appendix to CMW report reference TGA2023-0106AC Rev 1 sets out the criteria for and presents the results of an assessment of the geotechnical-related natural hazards associated with this proposed subdivision development.

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land, other land, or structures (consequence).

Section 2 of the RMA defines natural hazards as any atmospheric or earth or water related occurrence (including earthquake, tsunamis, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

The National Policy Statement for Natural Hazards 2025 (NPS-NH) provides direction under the Resource Management Act 1991 for assessing the risk associated with natural hazards for subdivision, use and development.

2 BASIS OF ASSESSMENT

2.1 Risk Classification

The occurrence of natural hazards and their potential impacts on the proposed subdivision development is assessed in terms of risk significance, which is based on likelihood and consequence factors. A risk matrix is used to assess the likelihood and consequence factors, the form of which used by CMW for this project is presented in Table B1 which is derived from Appendix 1 of the NPS-NH.

Table B1: Risk Matrix

	Almost certain Up to 10 AEP 10% or more	Very Likely 10-20 10% to 5%	Likely 20 – 50 5% to 2%	Possible 50 – 100 2% to 1%	Unlikely 100 – 500 1% to 0.2%	Rare 500 – 5000 0.2% to 0.02%	Very rare >5000 <0.02%
Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
Major	Very High	Very High	High	High	Medium	Medium	Medium
Moderate	High	High	High	Medium	Medium	Low	Low
Minor	Medium	Medium	Medium	Medium	Low	Low	Low
Negligible	Low	Low	Low	Low	Low	Low	Low

2.2 Likelihood

With respect to assessing the likelihood or chance of the risk occurring, the qualitative definitions used by CMW for this project are provided in Table B2 for each likelihood classification, which is derived from Appendix 1 of the NPS-NH.

Table B2: Likelihood Classification (extract from NPS-NH)

Likelihood level	Annual exceedance probability (AEP)	Average recurrence interval (ARI) or 'return period'
Almost certain	10% or more	Up to and including 10 years
Very likely	10% to 5%	Over 10 and up to and including 20 years
Likely	5% to 2%	Over 20 and up to and including 50 years
Possible	2% to 1%	Over 50 and up to and including 100 years
Unlikely	1% to 0.2%	Over 100 and up to and including 500 years
Rare	0.2% to 0.02%	Over 500 and up to and including 5,000 years
Very rare	Less than 0.02%	More than 5,000 years

2.3 Consequence

In terms of determining the consequence or severity of the natural hazard occurring, the qualitative definitions used by CMW for this project are provided in Table B3 for each consequence classification, which is derived from Appendix 1 of the NPS-NH.

Table B3: Consequence Table (extract from NPS-NH)

Consequence Level	Damage to Property	Potential for Injury or Fatalities
Catastrophic	Severe damage to land and building(s), potential for collapse or total destruction of structures. Building(s) need to be demolished, rebuilt or relocated.	High threat to life safety, with probable fatalities and/or critical injuries.
Major	Major damage to land and building(s), including structural damage. Loss of use and substantial repair required.	Unsafe for people, with potential for many injuries, or critical injuries and/or fatalities.
Moderate	Some damage to land and non-structural damage to building(s). Limited loss of use, repairs required.	Unsafe for people, with potential for injuries, although expected to be minor.
Minor	Minor damage to land and building(s). No loss of use, minimal repairs required.	Isolated minor injuries possible.
Negligible	No loss of use, no building repairs required.	No injuries.

2.4 Proportionate Management of Natural Hazard Risk

It is recognised that the natural hazard risk assessment provided herein is qualitative and, due to the wide range of possible geohazards that could occur, is somewhat subjective. Decision-makers must consider the scale and detail of information necessary to assess the risk by having regard to the anticipated level of risk.

Other methods are available to quantitatively assess an acceptable level of geotechnical related natural hazard risk, such as defining an acceptable factor of safety with respect to slope stability or acceptable differential ground settlements with respect to recommended building code limits.

When managing natural hazard risk associated with subdivision, use and development, decision-makers must apply mitigation measures, including location and design, for the purposes of ensuring that:

- (a) very high natural hazard risk is avoided;
- (b) high or medium natural hazard risk is avoided or mitigated proportionate to the level of risk; and
- (c) any creation of, or increase in, significant natural hazard risk on other sites is avoided or mitigated proportionate to the level of natural hazard risk.

3 RISK ASSESSMENT

The natural hazards relevant to this proposed subdivision development and adjacent, potentially affected land have been assessed with respect to the criteria outlined above.

Assessment is based on proposed post development ground conditions with and without any geotechnical controls. The latent risk was first assessed with the site in its proposed developed state to consider the risks to the development and surrounding land, including assessment of land modifications from the pre-existing natural state, without any implemented geotechnical controls. The specific geotechnical mitigation measures and engineering design solutions outlined in the table below and CMW report, where relevant, were then considered to determine the natural hazard residual risk remaining after the proposed controls have been implemented.

Results of this assessment are presented in Table C1 below.

Table C1: Natural Hazard Risk Assessment Results								
NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Earthquake	Fault Rupture	Rare	Moderate	Low	Site is located approximately 24km west from the Thorpe-Poplar Fault Recurrence interval of 2,000 to 3,500 years, no control required.	Rare	Moderate	Low
	Liquefaction Subsidence	Rare	Minor	Low	Deep groundwater table, low risk of surface manifestation. No geotechnical controls warranted.	Rare	Minor	Low
	Lateral Spread	Rare	Negligible	Low	Deep groundwater table. No geotechnical controls warranted.	Rare	Negligible	Low
Volcanic Activity	Ash & Pyroclastic Falls	Very Rare	Moderate	Low	No geotechnical controls warranted	Very Rare	Moderate	Low
	Lava flows & Lahars	Very Rare	Moderate	Low	No geotechnical controls warranted	Very Rare	Moderate	Low

Table C1: Natural Hazard Risk Assessment Results

NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Geothermal Activity	Formation of geysers, hot springs, fumaroles, mud pools	Rare	Moderate	Low	Site located outside Mangakino Geothermal System. Low risk due to distance from closest known geothermal area and no elevated ground temperatures within 20mbgl.	Rare	Moderate	Low
Erosion	Cut and Fill Batters	Almost Certain	Minor	Medium	Cut and fill batters to be designed by geotechnical engineer, including erosion protection	Unlikely	Minor	Low
Landslip	Global Slope Instability	Possible	Major	High	Implementation of a slope stability hazard zone as shown on Drawing 1. Future development within this zone, must be subject to specific geotechnical investigation and slope stability analyses by geotechnical engineer	Rare	Moderate	Low
	Soil Creep	Possible	Moderate	Medium	Historic fill areas show signs of soil creep. Remediate fill to engineer standard and fill batters designed by geotechnical engineer	Rare	Moderate	Low
	Bearing Capacity Failure	Possible	Moderate	Medium	Bearing Capacity to be assessed by Geotechnical Engineer and foundations designed to suit	Rare	Moderate	Low

Table C1: Natural Hazard Risk Assessment Results

NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
	Cut & Fill Batter Instability	Possible	Moderate	Medium	Cut and fill batters to be designed by geotechnical engineer	Rare	Moderate	Low
Subsidence	Soft soils leading to foundation subsidence	Possible	Moderate	Medium	Undercut and remove any surficial soft soils, existing topsoil and /or uncontrolled fill and replace with engineered fill. Geotechnical engineer to observe building preparation works during construction.	Rare	Moderate	Low
	Sinkholes / Tomo	Possible	Moderate	Medium	Foundations design to considered tomo/void size. Further investigations to quantify location and depth.	Rare	Moderate	Low
	Effects of Dewatering	Unlikely	Moderate	Medium	Dewatering unlikely to be required due to deep groundwater table	Rare	Moderate	Low
Sedimentation	Rockfall, Debris Inundation	Very Rare	Negligible	Low	No steep slopes above the site area which could result inundate the site	Very Rare	Negligible	Low
Coastal Erosion & Coastal Inundation	Erosion and Inundation	Very Rare	Negligible	Low	Site is >50km away from coast	Very Rare	Negligible	Low
Tsunami	Tsunami	Very Rare	Negligible	Low	Site is >50km away from coast	Very Rare	Negligible	Low
Flooding	Inundation	Rare	Minor	Low	No rivers or streams run through the site and positioned 25m	Rare	Minor	Low

Table C1: Natural Hazard Risk Assessment Results

NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
					above the adjacent lake. Stormwater disposal design for concentrated flows from roads and roof areas.			

Notes:

- Assessments include the impact of the proposed subdivision works on adjacent properties.
- The following reference(s) contain information on the hazards contained in this assessment and the non-geotechnical hazards that have not been included:
 - Waikato**
<https://waikatoregion.maps.arcgis.com/apps/MapSeries/index.html?appid=f2b48398f93146e8a5cf0aa3fddce92c>

19 May 2026

Proposed Residential Development

3 Karamu Street, Mangakino

PRELIMINARY GEOTECHNICAL ASSESSMENT REPORT

Wairarapa Moana ki Pouākani Incorporation

Job No. TGA2023-0106AE | Version 0



Rotorua

1422 Hinemoa St
Rotorua 3010
New Zealand
Ph: +64 7 9750 916
www.cmwgeosciences.com

Version Control

Document version information	
Job number	TGA2023-0106AE
Prepared by	Isaac Egan, Geotechnical Engineer 
Reviewed by	Kirstin Brown, Associate Geotechnical Engineer, CMEngNZ, CPEng 
Authorised by	Robert Taylor, Principal Geotechnical Engineer, CMEngNZ, CPEng 

Review and Update History

Revision	Date	Comments
A	14 May 2026	Initial draft for internal review
0	19 May 2026	Final issue to support Land Use Plan Change Application



CONTENTS

1.0	INTRODUCTION	4
2.0	AVAILABLE INFORMATION	4
3.0	SITE DISCRIPTION	4
3.1	Site Location	4
3.2	Landform	5
3.3	Site History	5
4.0	PROPOSED DEVELOPMENT	5
5.0	CONCENPTUAL GROUND MODEL	6
5.1	Published Geology	6
5.2	Stratigraphic Units	6
5.3	Groundwater	7
6.0	GEOHAZARDS ASSESSMENT	7
6.1	Context	7
6.2	Fault Rupture	7
6.3	Geothermal Activity	7
6.4	Liquefaction and Lateral Spread	8
6.5	Slope Stability	8
6.6	Erosion Features	8
6.7	Static Settlement	9
7.0	DEVELOPMENT CONSIDERATIONS	9
7.1	Foundations	9
7.2	Static Settlement Mitigation	10
7.3	Earthworks	10
7.4	Stormwater Management	10
7.5	Civil Works	11
8.0	FURTHER WORKS	11
9.0	CLOSURE	11

Appendices

APPENDIX A Drawings

APPENDIX B Natural Hazards Risk Assessment

1.0 INTRODUCTION

CMW Geosciences (CMW) was engaged by Wairarapa Moana ki Pouākani Incorporation to carry out a preliminary geotechnical assessment to support a proposed land use zone change of a site located at 3 Karamu Street, Mangakino. The plan change proposed is to rezone this parcel of land from rural to residential.

This report provides a summary of the geological setting with comments on the potential geotechnical risks and constraints for future development. It is intended that this report will support a land use plan change application to the Taupo District Council (TDC).

2.0 AVAILABLE INFORMATION

The following Information was reviewed as part of this report:

- New Zealand Geotechnical Database¹
- Historic Aerial Photographs from Retrolens²;
- Taupo District Council Online GIS³;
- Waikato Regional Council Online Regional Hazards Portal⁴;
- GNS Science Geological Map of New Zealand⁵;
- Institute of Geological and Nuclear Sciences (GNS Science) New Zealand Active Faults Database⁶;
- CMW, Geotechnical Investigation Report for 35, 37, & 57, Lake Road, Mangakino⁷;
- CMW, Geotechnical Investigation Report for Taniwha Street, Mangakino⁸.

3.0 SITE DISCRIPTION

3.1 Site Location

The site comprises an area of approximately 2 hectares and is located on the corner of Karamu Street and Wairenga Road, Mangakino as shown on Figure 1 below.

¹ nzgd.org.nz

² Retrolens website, Sourced from <http://retrolens.nz> and licensed by LINZ CC-BY 3.0

³ <https://taupo.maps.arcgis.com/apps/webappviewer/index.html?id=0248094929a04d01bb0c3144560264f6>

⁴ <https://waikatoregion.maps.arcgis.com/apps/MapSeries/index.html?appid=f2b48398f93146e8a5cf0aa3fddce92c>

⁵ GNS Science. (2012). Geological Map of New Zealand [Data set]. GNS Science. <https://doi.org/10.21420/QF82-7D42>

⁶ New Zealand Active Faults Database <https://data.gns.cri.nz/af/>

⁷ CMW Geosciences, Geotechnical Investigation Report for 35, 37, & 57, Lake Road, Mangakino (ref: TGA2023-0106AC Rev0) dated September 26th, 2023.

⁸ CMW Geosciences, Geotechnical Investigation Report for Taniwha Street, Mangakino (ref: TGA2023-0106AD Rev0) dated September 27th, 2023.

Figure 1: Site Location (Ref. TDC online GIS Mapi)



3.2 Landform

The current general landform together with associated features located within and adjacent to the site is presented on the attached Site Location Plan as **Drawing 04**.

The site is located across a portion of an elevated terrace with the grater terrace formation grading from approximately RL200m (Moturiki Datum) along the edge of Lake Maraetai (Waikato River) to approximately RL300m to the west beyond the Mangakino township. The site itself is near level to gently sloping at approximate RL218m with a 2m high slope, graded at approximately 18 degrees along the western boundary.

Lake Maraetai (Waikato River) is located approximately 800m north and east of the site as shown on **Drawing 04**.

The site is bound to the north by Wairenga Road, to the east by Karamu Street and the south and west by rural properties.

3.3 Site History

Based on our review of the historical aerial photographs², the landform appears to have undergone modification, with the following land changes noted:

- The 1940 image (earliest available image) shows the site to be undeveloped and in vegetation.
- In 1943 earthworks appear to be underway to form Lake Maraetai including some minor earthworks within proximity to the subject site. Accessway/roadway appears to be being formed within the site itself
- By 1950, the site is developed, along with the wider Mangakino township, comprising a series of residential buildings and roads.
- By 1964, the residential buildings and road within the site have been removed and the site is in pasture. The site appears to be largely unchanged from the mid-1960's to the present day.

4.0 PROPOSED DEVELOPMENT

It is currently proposed to change the current land zoning from Rural to Residential.

No scheme plans for the future proposed residential development have been provided at this stage, and it is understood that the findings from this report will also be used to support a feasibility assessment with regards to developing the site for future residential development.

Specific details for disposal of concentrated stormwater flows from roads and lots are yet to be confirmed. However, it is understood stormwater will need to be disposed of onsite and may include stormwater pond, raingardens and/or individual soakage systems.

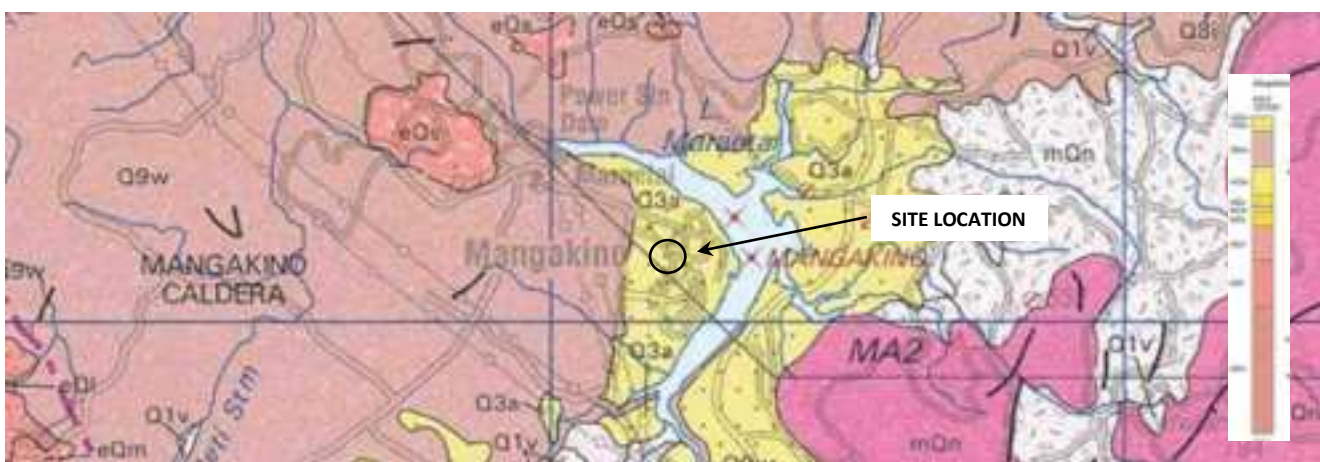
We understand wastewater will likely connect to the existing reticulated council system.

5.0 CONCEPTUAL GROUND MODEL

5.1 Published Geology

Published geological maps⁵ for the area depict the site as being located within the Mangakino Caldera with the regional geology comprising Late Pleistocene-aged deposits of the Hinuera Formation River deposits (Q3a) containing 'Cross-bedded pumice sand, silt and gravel with interbedded peat', overlying 'variably welded, crystal-rich, columnar jointed ignimbrite' of the Whakamaru Group (Q9w), as illustrated in Figure 2 below.

Figure 2: Regional Geology (ref: GNS Geological Map of New Zealand).



5.2 Stratigraphic Units

Based on a review of existing geotechnical investigation data, both from NZGD and existing geotechnical reports referenced in Section 2.0 within proximity to the site, as shown on **Drawing 04** attached, the following ground conditions are anticipated:

- Existing fill associated with historic earthworks. Likely to be relatively shallow (1-2m) and comprise a mixture of organic silt, and inorganic silts and sands.
- Recent volcanic ash deposits comprising silt and pumiceous sands are typically encountered beneath the topsoil/existing fill. Silts are generally encountered at shallower depths, overlying the sands.
- Interbedded silts and sands of the Hinuera Formation underlying the volcanic ash deposits.
- Very dense sands are typically encountered beneath the Hinuera Formation, inferred to be weathered ignimbrite.

5.3 Groundwater

Based on nearby geotechnical investigation data and the water level of Lake Maraetai (Waikato River), the groundwater level beneath the site is anticipated to be around RL195m to RL190m, equating to approximately 23m to 28m below the site.

6.0 GEOHAZARDS ASSESSMENT

6.1 Context

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land or structures (consequence).

The following sections of this report provide an assessment of the geohazards relevant to the Plan Change area in accordance with the National Policy Statement for Natural Hazards 2025 and provides the basis for the Natural Hazards Risk Assessment presented in **Appendix B**.

6.2 Fault Rupture

The site is located adjacent to the western extent of the Taupo Volcanic Zone (TVZ), an area of tectonic extension. This Zone is characterized by a fault system, known as the Taupo Rift, typically comprising closely spaced NNE-SSW to NE-SW trending normal faults.

The Institute of Geology and Nuclear Sciences (GNS) active faults database indicates the nearest known active to the site is the Thorpe - Poplar Fault (Ref No. #77909) located approximately 24km to the east.

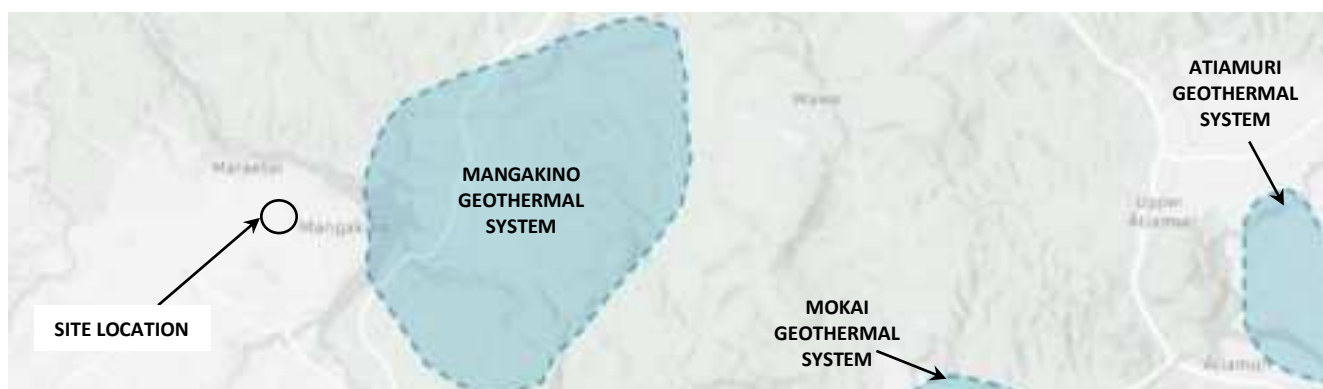
The distance to the nearest fault suggests a low risk of fault rupture affecting the site.

6.3 Geothermal Activity

The closest known geothermal field is the Mangakino Geothermal System located approximately 600m west of the site, as shown on Figure 3 below.

There do not appear to be any visible signs of geothermal activity note in historic and recent aerial photographs. Furthermore, elevated ground temperatures do not appear to have been recorded in nearby geotechnical investigation data. Therefore, the risk of onsite geothermal activity is considered low.

Figure 3: Geothermal Areas (Image obtained from the Waikato Regional Hazards Portal).



6.4 Liquefaction and Lateral Spread

Liquefaction occurs in loose saturated cohesionless soils that are subject to cyclic shear loading during an earthquake. This process leads to pore pressure build-up, soil grains moving into suspension and temporary loss of strength causing vertical and lateral ground deformation.

A review of the Waikato Regional Hazard Portal liquefaction hazard maps indicates the site has been classified as “possible” as shown in Figure 4 below.

Figure 4: Liquefaction Hazard Categories (Image obtained from Waikato Regional Hazards Portal)



Based on the elevated nature of the site and a review of nearby geotechnical investigation data, the groundwater table is anticipated at depths greater than 20m below the site. With reference to the 10m deep liquefaction threshold in MBIE Canterbury Rebuild Documents and Ishihara (1985), the deep groundwater table will provide a significantly thick non-liquefiable crust, as such, the risk of significant damage as a result of liquefaction and/or lateral spreading is considered low for future residential buildings at the site.

6.5 Slope Stability

The landform within and immediately surrounding the site is generally near level. The nearest significant slopes are the escarpments associated with Lake Maraetai (Waikato River) more than 400m north and east of the site. On this basis, the risk of global instability affecting the site is considered to be low and as such, quantitative site-specific stability analyses were not considered necessary.

An approximately 2m high slope, graded at approximately 18 degrees is present along the western boundary. It is anticipated that this is formed within natural soils and therefore given the relatively low height and shallow gradient of the slope, the likelihood of slope instability is considered to be low for future residential buildings at the site.

6.6 Erosion Features

The site is expected to be underlain by layers of highly permeable pumiceous soils which can be susceptible to rapid infiltration of surface water and internal erosion, which can create underground water flow paths, particularly where impermeable layers are present, leading to preferential flow paths along low permeability lenses. The flowing subsurface water can lead to piping erosion, which can develop over time to circular collapse structures or tomo's at the ground surface. As has been observed on other sites within the Mangakino township, voids / tomo's may be present within the ground profile of the subject site.

Should erosional cavities be identified within the pumice soil profile, further investigation should be undertaken to quantify where and at what depth these occur, particularly for structures located in cut. Should evidence of

voids / tomos be noted during bulk earthworks and construction, possible mitigation measures may include deepening of foundations, engineering shallow foundations to 'bridge' voids or grout filling of voids.

Alternatively, specific investigation such as test pitting and / or geophysical methods can be undertaken prior to construction to identify the extent of erosional cavities and to provide recommendations for future development.

The pumiceous soils have infrequent silt, gravel and dense sand layers which could result in the development of preferential subsurface flow paths which in turn would lead to piping erosion and instability where discharges of concentrated stormwater are not managed appropriately.

Possible mitigation measures for dwellings are discussed further in Section 7.1 below, with recommendations regarding earthworks methodologies and stormwater disposal provided in Sections 7.3 and 7.4 respectively.

6.7 Static Settlement

Load-induced static settlements occur in subsoils that are subject to static loading (eg. by filling and / or building loads) where the magnitude of settlement is governed by the soil stiffness and the load applied.

Based on the predominantly granular ground model outlined in Section 5.0 above, load induced settlements are anticipated to be mostly elastic (immediate) and therefore largely built out during construction.

Where existing fill is present, there is a risk of settlement occurring within these areas of the site. Typically, fill placed without engineering supervision can be variable, with the quality depending on type of material placed and earthworks methodology. Geotechnical investigations within the previously earthworked areas are required to assess the quality and extent of the existing fill.

Should the existing fill be considered unsuitable to support future residential structures, ground improvement works such as excavation and replacement with engineered fill or piled foundations may be required, subject to specific investigation.

7.0 DEVELOPMENT CONSIDERATIONS

7.1 Foundations

While it is anticipated that, where away from any areas of existing fill, no particularly weak natural subsoils that could give rise to significant foundation settlement issues will be encountered. Nearby hand auger boreholes indicate the upper few metres of the soil profile typically comprises geologically recent and unconsolidated volcanic ash. As such a reduced geotechnical ultimate bearing capacities may be required or undercut and replacement works undertaken beneath building platforms to achieve a geotechnical ultimate bearing pressure of 300 kPa for conventional shallow foundations designed in accordance with NZS3604.

The identified potential for erosional cavities to exist within the pumice soil profile requires further investigation to quantify where and at what depth these occur. Should voids be encountered within the proximity of building foundations, mitigation measures may include:

- Potentially affected areas may be subject to earthworks (cutting and filling) to ensure any near-surface voids are backfilled;
- For voids less than 1.0m diameter, a TC2 or equivalent raft foundation may be sufficient to cantilever or bridge across such zones;
- Where large, extensive voids are identified, foundations may be piled to intercept competent soil/rock deposits at depth, which are proven to be free of voids, or the cavities filled with injection grouting or similar.

7.2 Static Settlement Mitigation

Within areas where existing uncontrolled fill is identified, to mitigate excessive static settlements over these areas it is recommended the uncontrolled fill is excavated and replaced with engineered fill. Alternatively, the use of pile foundations may be considered, with the piles extending into the underlying natural ground.

7.3 Earthworks

Given the relatively level nature of the site, earthworks to form level residential building platforms are expected to be relatively minor, with earthworks typically limited to road formation and remediation of any identified uncontrolled fill.

Earthworks must be carried out in general accordance with the requirements of the Taupo District Council Code of Practice for Development of Land (2009) and NZS 4431 under the guidance of a Chartered Professional Geotechnical Engineer.

As the development is currently in the early planning stages and scheme plans are yet to be developed, the following general recommendations are provided:

- Most of the on-site natural soils are anticipated to be suitable for reuse as engineered fill. Soil textures and moisture contents may vary widely, and careful management, conditioning and compaction control will be required.
- Existing fill must be fully investigated and either certified or remediated to engineered fill standards.
- Earthworks operations, including the stripping of existing topsoil and undercutting of existing filling, must be subject to observation and testing by the project geotechnical engineer to ensure that all unsuitable materials have been removed prior to fill placement.
- Exposure of high permeable pumice soils at design subgrade level will elevate the piping and rilling erosion susceptibility. Earthworks will therefore need to be carefully managed to ensure that stormwater infiltration into exposed pumice soils is minimised. Such techniques could include:
 - Limiting the lateral extent of earthworks exposing pumice soils at any one time;
 - Shaping the profile to encourage sheet flow rather than concentrated flows;
 - Diverting stormwater away from exposed areas of pumice soil during construction;
 - Immediately placing nominally 150mm of hardfill as a protective surface once subgrade is exposed; and
 - Installing flow path barriers during construction such as baffles or fences.
- The proposed earthworks and source of the fill should be discussed with and approved by the project geotechnical engineer to verify its appropriateness and quality control testing requirements.

7.4 Stormwater Management

The ground conditions across the site are anticipated to comprise free draining pumiceous sands, which have high coefficients of permeability. However, the addition of concentrated water into these deposits needs to consider possible implications on slope stability and internal erosion.

Given the site is located more than 400m from any significant slopes, the use of soakage systems as a means to dispose of stormwater may be considered suitable for this site, dependent on the outcome of a site-specific geotechnical investigation including onsite permeability testing. Subject to further site-specific testing, the upper few metres of the soakage system may need to be non-perforated to prevent saturation of the near surface soils and preserve foundation conditions.

An above ground stormwater disposal method, such as a lined stormwater pond and/or series of lined swales are considered appropriate, provided outlet structures are designed to prevent erosion and consideration is given to slope instability. Additionally onsite attenuation may be considered for future lots with stormwater collected into a raintank with outlets attenuated and discharged to an appropriate area of site (such as kerb and channel).

7.5 Civil Works

The upper few metres of the soil profile are anticipated to be more cohesive in nature and therefore likely to provide relatively low roading subgrade CBR's, which may require a subgrade improvement layer depending on the subgrade density requirements. The natural sands are anticipated to provide a CBR greater 6%.

A programme of penetration resistance testing should be carried out when the roads and pavement areas are being formed to their final levels to confirm CBR values.

8.0 FURTHER WORKS

The above geotechnical considerations and recommendations are based on available information described In Section 2.0 above. To confirm the ground conditions for the site it will be necessary to undertake further work including site investigations, ground modelling, engineering analyses and specific design as necessary to address relevant geotechnical issues.

Following the land use plan change, recommended further work to advance development plans and resource consent application may include, but not limited to:

- Intrusive investigations including machine boreholes, test pits, hand auger boreholes and Cone Penetrometer Tests (CPTs) to assist in developing an appropriate ground model for the site;
- Geophysics investigations to assist in assessing scale and extent of any tomos;
- Permeability testing to assist in determining the suitability for the disposal of concentrated stormwater flows via soakage to ground;
- Geotechnical analyses for the proposed development including slope stability, liquefaction, bearing capacity and static settlement;
- Preparation of a Geotechnical Investigation Report with recommendations supporting the proposed development and a resource consent application to Taupo District Council.

9.0 CLOSURE

This report has been prepared for use by Wairarapa Moana ki Pouākani Incorporation in relation to the proposed residential development at 3 Karamu Street, Mangakino in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Wairarapa Moana ki Pouākani Incorporation seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site. A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental matters are not covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

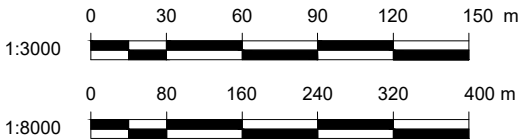
APPENDIX A

Drawings

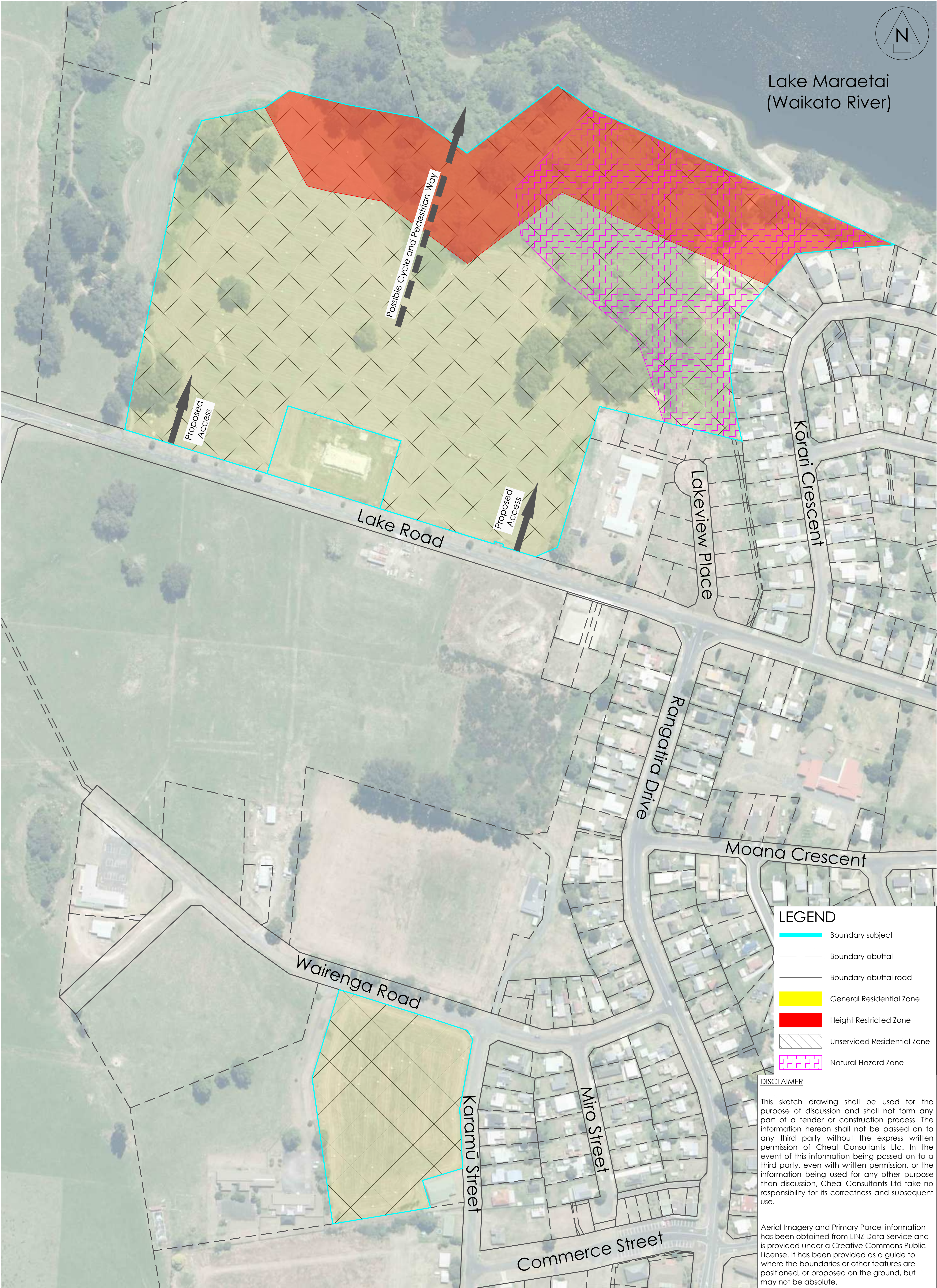
- NOTES:
- 1. AERIAL IMAGE COURTESY OF LINZ, WAIKATO-03m-RURAL-AERIAL-PHOTOS-2021-2024.
 - 2. EXISTING GROUND CONTOURS ADAPTED FROM LINZ, NEW-ZEALAND-LIDAR-1m-DEM, CONTOURS SHOWN IN 0.5m INTERVALS.
 - 3. CRS: NZTM. MOTURIKI VERTICAL DATUM 1953.
 - 4. TEST LOCATIONS ARE INDICATIVE ONLY.



- LEGEND:
- SITE BOUNDARY
 - EXISTING GROUND CONTOUR (MAJOR)
 - EXISTING GROUND CONTOUR (MINOR)
 - HAND AUGER (HA) LOCATION
 - CONE PENETROMETER TEST (CPT) LOCATION
 - SOAKAGE TEST LOCATION



CLIENT:	WAIRARAPA MOANA KI POUAKANI INCORPORATION		DRAWN:	HV	PROJECT:	TGA2023-0106
PROJECT:	3 KARAMU ROAD, MANGAKINO		CHECKED:	KB	DRAWING:	04
TITLE:	SITE LOCATION PLAN		REVISION:	0	SCALE:	AS SHOWN
			DATE:	19/05/2026	SHEET:	A3 L



LEGEND

- Boundary subject
- Boundary abuttal
- Boundary abuttal road
- General Residential Zone
- Height Restricted Zone
- Unserviced Residential Zone
- Natural Hazard Zone

DISCLAIMER

This sketch drawing shall be used for the purpose of discussion and shall not form any part of a tender or construction process. The information hereon shall not be passed on to any third party without the express written permission of Cheal Consultants Ltd. In the event of this information being passed on to a third party, even with written permission, or the information being used for any other purpose than discussion, Cheal Consultants Ltd take no responsibility for its correctness and subsequent use.

Aerial Imagery and Primary Parcel information has been obtained from LINZ Data Service and is provided under a Creative Commons Public License. It has been provided as a guide to where the boundaries or other features are positioned, or proposed on the ground, but may not be absolute.

Status **INFORMATION**

Scale A1 -
A3 1:3000

Drawing Number
200723-SK003

Rev
B

B	15/05/26	Added/Extended Zones	JLM	MR	CE
A	11/05/26	First Issue	JLM	MR	CE
Rev	Date	Amendment	By	Chk	App

Project Title
Wairarapa Moana ki Pouakani
Incorporation
37 Lake Road, Mangakino

Drawing Title
Proposed Zones
of 37 Lake Road
and 3 Karamu Street

Surveyed	-	-	-
Designed	-	-	-
Drawn	JL Morrison	11/05/26	JLM
Checked	M. Ryder	11/05/26	MR
Approved	C. Eagles	12/05/26	CE



APPENDIX B

Natural Hazards Risk Assessment

NATURAL HAZARDS RISK ASSESSMENT FOR LANDUSE CHANGE

PLAN USE CHANGE, 3 KARAMU STREET, MANGAKINO

1 CONTEXT

This appendix to CMW report reference TGA2023-0106AE Rev 0 sets out the criteria for and presents the results of an assessment of the geotechnical-related natural hazards associated with this proposed subdivision development.

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land, other land, or structures (consequence).

Section 2 of the RMA defines natural hazards as any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

The National Policy Statement for Natural Hazards 2025 (NPS-NH) provides direction under the Resource Management Act 1991 for assessing the risk associated with natural hazards for subdivision, use and development.

2 BASIS OF ASSESSMENT

2.1 Risk Classification

The occurrence of natural hazards and their potential impacts on the proposed subdivision development is assessed in terms of risk significance, which is based on likelihood and consequence factors. A risk matrix is used to assess the likelihood and consequence factors, the form of which used by CMW for this project is presented in Table B1 which is derived from Appendix 1 of the NPS-NH.

Table B1: Risk Matrix

	Almost certain Up to 10 AEP 10% or more	Very Likely 10-20 10% to 5%	Likely 20 – 50 5% to 2%	Possible 50 – 100 2% to 1%	Unlikely 100 – 500 1% to 0.2%	Rare 500 – 5000 0.2% to 0.02%	Very rare >5000 <0.02%
Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
Major	Very High	Very High	High	High	Medium	Medium	Medium
Moderate	High	High	High	Medium	Medium	Low	Low
Minor	Medium	Medium	Medium	Medium	Low	Low	Low
Negligible	Low	Low	Low	Low	Low	Low	Low

2.2 Likelihood

With respect to assessing the likelihood or chance of the risk occurring, the qualitative definitions used by CMW for this project are provided in Table B2 for each likelihood classification, which is derived from Appendix 1 of the NPS-NH.

Table B2: Likelihood Classification (extract from NPS-NH)

Likelihood level	Annual exceedance probability (AEP)	Average recurrence interval (ARI) or 'return period'
Almost certain	10% or more	Up to and including 10 years
Very likely	10% to 5%	Over 10 and up to and including 20 years
Likely	5% to 2%	Over 20 and up to and including 50 years
Possible	2% to 1%	Over 50 and up to and including 100 years
Unlikely	1% to 0.2%	Over 100 and up to and including 500 years
Rare	0.2% to 0.02%	Over 500 and up to and including 5,000 years
Very rare	Less than 0.02%	More than 5,000 years

2.3 Consequence

In terms of determining the consequence or severity of the natural hazard occurring, the qualitative definitions used by CMW for this project are provided in Table B3 for each consequence classification, which is derived from Appendix 1 of the NPS-NH.

Table B3: Consequence Table (extract from NPS-NH)

Consequence Level	Damage to Property	Potential for Injury or Fatalities
Catastrophic	Severe damage to land and building(s), potential for collapse or total destruction of structures. Building(s) need to be demolished, rebuilt or relocated.	High threat to life safety, with probable fatalities and/or critical injuries.
Major	Major damage to land and building(s), including structural damage. Loss of use and substantial repair required.	Unsafe for people, with potential for many injuries, or critical injuries and/or fatalities.
Moderate	Some damage to land and non-structural damage to building(s). Limited loss of use, repairs required.	Unsafe for people, with potential for injuries, although expected to be minor.
Minor	Minor damage to land and building(s). No loss of use, minimal repairs required.	Isolated minor injuries possible.
Negligible	No loss of use, no building repairs required.	No injuries.

2.4 Proportionate Management of Natural Hazard Risk

It is recognised that the natural hazard risk assessment provided herein is qualitative and, due to the wide range of possible geohazards that could occur, is somewhat subjective. Decision-makers must consider the scale and detail of information necessary to assess the risk by having regard to the anticipated level of risk.

Other methods are available to quantitatively assess an acceptable level of geotechnical related natural hazard risk, such as defining an acceptable factor of safety with respect to slope stability or acceptable differential ground settlements with respect to recommended building code limits.

When managing natural hazard risk associated with subdivision, use and development, decision-makers must apply mitigation measures, including location and design, for the purposes of ensuring that:

- (a) very high natural hazard risk is avoided;
- (b) high or medium natural hazard risk is avoided or mitigated proportionate to the level of risk; and
- (c) any creation of, or increase in, significant natural hazard risk on other sites is avoided or mitigated proportionate to the level of natural hazard risk.

3 RISK ASSESSMENT

The natural hazards relevant to this proposed subdivision development and adjacent, potentially affected land have been assessed with respect to the criteria outlined above.

Assessment is based on proposed post development ground conditions with and without any geotechnical controls. The latent risk was first assessed with the site in its proposed developed state to consider the risks to the development and surrounding land, including assessment of land modifications from the pre-existing natural state, without any implemented geotechnical controls. The specific geotechnical mitigation measures and engineering design solutions outlined in the table below and CMW report, where relevant, were then considered to determine the natural hazard residual risk remaining after the proposed controls have been implemented.

Results of this assessment are presented in Table C1 below.

Table C1: Natural Hazard Risk Assessment Results								
NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Earthquake	Fault Rupture	Rare	Moderate	Low	Site is located approximately 24km west from the Thorpe-Poplar Fault Recurrence interval of 2,000 to 3,500 years, no control required.	Rare	Moderate	Low
	Liquefaction Subsidence	Rare	Minor	Low	Deep groundwater table, low risk of surface manifestation. No geotechnical controls warranted.	Rare	Minor	Low
	Lateral Spread	Rare	Negligible	Low	Deep groundwater table. No geotechnical controls warranted.	Rare	Negligible	Low
Volcanic Activity	Ash & Pyroclastic Falls	Very Rare	Moderate	Low	No geotechnical controls warranted	Very Rare	Moderate	Low
	Lava flows & Lahars	Very Rare	Moderate	Low	No geotechnical controls warranted	Very Rare	Moderate	Low
Geothermal Activity	Formation of geysers, hot springs,	Rare	Moderate	Low	Site located outside Mangakino Geothermal	Rare	Moderate	Low

Table C1: Natural Hazard Risk Assessment Results

NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
	fumaroles, mud pools				System. Low risk due to distance from closest known geothermal area.			
Erosion	Cut and Fill Batters	Almost Certain	Minor	Medium	Cut and fill batters to be designed by geotechnical engineer	Unlikely	Minor	Low
Landslip	Global Slope Instability	Unlikely	Minor	Low	No significant steep slopes within or immediately adjacent to site boundaries recorded, no geotechnical controls warranted	Unlikely	Minor	Low
	Soil Creep	Rare	Negligible	Low	No geotechnical control warranted	Rare	Negligible	Low
	Bearing Capacity Failure	Possible	Moderate	Medium	Bearing Capacity to be assessed by Geotechnical Engineer and foundations designed to suit	Rare	Moderate	Low
	Cut & Fill Batter Instability	Possible	Moderate	Medium	Cut and fill batters to be designed by geotechnical engineer	Rare	Moderate	Low
Subsidence	Soft soils leading to foundation subsidence	Rare	Moderate	Low	Undercut and remove any surficial soft soils, existing topsoil and or uncontrolled fill and replace with engineered fill. Geotechnical engineer to observe building preparation works during construction.	Very Rare	Moderate	Low
	Sinkholes / Tomo	Possible	Moderate	Medium	Foundations design to considered	Rare	Moderate	Low

Table C1: Natural Hazard Risk Assessment Results

NPHS Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
					tomo/void size. Further investigations to quantify location and depth.			
	Effects of Dewatering	Unlikely	Moderate	Medium	Dewatering unlikely to be required due to deep groundwater table	Rare	Moderate	Low
Sedimentation	Rockfall, Debris Inundation	Very Rare	Negligible	Low	No steep slopes above the site area which could result inundate the site	Very Rare	Negligible	Low
Coastal Erosion & Coastal Inundation	Erosion and Inundation	Very Rare	Negligible	Low	Site is >50km away from coast	Very Rare	Negligible	Low
Tsunami	Tsunami	Very Rare	Negligible	Low	Site is >50km away from coast	Very Rare	Negligible	Low
Flooding	Inundation	Rare	Minor	Low	No rivers or streams run through the site and positioned 25m above the adjacent lake. Stormwater disposal design for concentrated flows from roads and roof areas.	Rare	Minor	Low

Notes:

- Assessments include the impact of the proposed subdivision works on adjacent properties.
- The following reference(s) contain information on the hazards contained in this assessment and the non-geotechnical hazards that have not been included:
 - Waikato**
<https://waikatoregion.maps.arcgis.com/apps/MapSeries/index.html?appid=f2b48398f93146e8a5cf0aa3fddce92c>



Rotorua

1422 Hinemoa St
Rotorua 3010
New Zealand

Ph: +64 7 9750 916

www.cmwgeosciences.com

Wairarapa Moana ki Pouakani Incorporation

37 Lake Road and 3 Karamū Street, Mangakino

Engineering Services Report

200723_Rev.1
19 May 2026

Wairarapa Moana ki Pouakani Incorporation

37 Lake Road and 3 Karamū Street, Mangakino

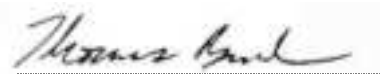
Engineering Services Report

Prepared by:



Lourdes Uriarte
Senior Civil Engineer
BEng Tech (Civil)

**Approved
for Release by:**



Thomas Brand
Regional Manager, Chartered Professional Engineer
BSc (Civil), CPEng, CMPEngNZ, IntPE (NZ)

Date: 19 May 2026
Reference: 200723
Status: Final
Revision: 1
Previous Revision Date: 4 November 2024

This document is the property of Cheal Consultants Limited. Any unauthorised employment or reproduction, in full or part is forbidden.

This document has been prepared for a specific purpose for the above client and shall not be used for any other unauthorised purpose. Cheal Consultants Limited does not acknowledge any duty of care or responsibility to any other party.

© Cheal Consultants Limited

TABLE OF CONTENTS

1. SCOPE	4
2. SITE DESCRIPTION.....	4
3. GEOTECHNICAL CONTEXT OF THE SITE	6
4. EARTHWORKS	7
5. STORMWATER	7
5.1 Primary Disposal System	7
5.2 Secondary Overland Flow	9
5.3 Overland Flows	9
6. WASTEWATER.....	11
6.1 Wastewater Reticulation.....	11
6.2 Mangakino Wastewater Treatment Plant (MWWTP)	12
6.3 Sewer Pressure Individual Pump Station	14
7. ROADING	15
7.1 Lake Road and Surrounding Road Network.....	15
7.2 Footpath and Cycleways	16
7.3 Road Lighting	17
8. WATER SUPPLY SERVICING	17
8.1 Water Supply Reticulation.....	17
8.2 Mangakino Water Supply Capacity.....	18
9. POWER AND TELECOM SERVICING	19
10. SUMMARY	20
11. DISCLAIMER	20

Appendices –

1. Concept Development Plans for Lake Road and Karamū Street
2. Preliminary Stormwater Calculations
3. Sewer Pressure Individual Pump Station
4. TDC Water Network Plans, Mangakino Water Take Resource Consent; Preliminary Water Reticulation Layout Sketch, Preliminary Water Demand Calculations
5. The Lines Company Confirmation Letter

1. SCOPE

Cheal has been engaged by Wairarapa Moana ki Pouakani Incorporation (WMI) to provide an assessment of the existing infrastructure, identifying requirements and constraints and identify additional infrastructure and recommendations for servicing their two properties in accordance with Taupō District Council Code of Practice for Land Development. This report is to support a plan change submission to Plan Change 44 from rural to residential.

This engineering services assessment covers required engineering and services in accordance with Taupō District Council and NZS 4404 to support the Plan Change 44 submission as below:

Plan Change 44 (Residential Zones)

Plan Change 44 makes changes to the bulk and location provisions of the Residential Zones, provides for Comprehensive Housing Developments and rezones some existing areas that have already been developed.

2. SITE DESCRIPTION

WMI are currently pursuing the potential development of two General Freehold sites owned by WMI located at 37 Lake Road and 3 Karamū Street, Mangakino (see Figure 1a and 1b below).

The site at 37 Lake Road is approximately 15ha in area and is legally described as Lot 3 DPS 43655. This parcel is zoned General Rural Environment in the Operative Taupō District Plan where residential development is not necessarily supported by the Objectives and Policies in the District Plan.

The Lake Road site is bound to the south by Lake Road, to the east by Kōrari Crescent, a gully and old land fill site to the west and Lake Maraetai to the north. The area in the northeastern corner of the site is land leased to the Mangakino Rowing Club. The site has access to wastewater, water and power.

The site was historically developed and utilised as part of the original Mangakino township prior to the downscaling that occurred in 1970s and 1980s and is the former site of the Mangakino Timber Mill. Therefore, the site has been urbanised historically and is currently undeveloped largely in pasture, with recently cleared blackberry.



Figure 1a – Site Location 37 Lake Road

The second site at 3 Karamū Street is located at the corner of Wairenga Road and Karamū Street, is approximately 1.99ha in area and is legally described as Lot 3 DPS 563013. This parcel is currently zoned General Rural Environment in the Operative Taupō District Plan.

To the south of the site is a school and Karamū Street to the east. A rural property neighbours the site to the west. The northern boundary of the site is Wairenga Road, which is where proposed access is located. All areas to the east of this property are residential environments with the town centre environment nearby. This site has access to wastewater, water and power. Currently the site surface is grassed.



Figure 1b – Site Location 3 Karamū Street

Refer to Appendix 1 for Outline Development Plans on Proposed Zones of 37 Lake Road and 3 Karamū Street.

3. GEOTECHNICAL CONTEXT OF THE SITE

A geotechnical site investigation was undertaken for the Lake Road site, and desktop evaluation has been undertaken for Karamū Street Site, both by CMW Geoscience. We are using similar parameters and requirements for the Karamū site. As part of the subdivision consent each site will require a site specific geotechnical investigation to support the earthworks modelling and stormwater assessment of soils conditions at each site. Refer to CMW Geosciences Geotechnical Investigation Report dated 19 May 2026.

4. EARTHWORKS

It is proposed to earthwork both sites to form building platforms for residential houses and associated infrastructure including roading, and stormwater. For Lake Road, walking and cycling paths are proposed to allow ongoing connectivity through the interconnecting gullies and to the Town Centre Environment.

Post development, the intention is to vest the Stormwater / Recreation Reserves as local purpose reserves through the Taupō District Council (TDC) subdivision process, which will allow for contact recreation areas including walking /cycling paths and territorial authority stormwater discharge activities.

At the time of writing this report there are no earthwork depth plans developed. We suggest that as part of the Application for Subdivision Consent the Developer shall provide an Earthworks Management Plan in accordance with the Waikato Regional Council requirements which shall include regional consent if Regional Consent for Earthworks activities in High Erosion Areas associated with a residential subdivision development is required; Assessment of Potential Environmental Effects and Relevant Planning Provisions in the Resource Management Act 1991; detailed design of Earthworks cut/fill depths and comprehensive Erosion and Sediment Control as part of the application for Subdivision.

Earthworks Proposal for:

- 37 Lake Road – 150 Residential Lots varying from 500m² to 800m²
- 3 Karamu Street – 30 Residential Lots varying from 486m² to 569m²

5. STORMWATER

Stormwater treatment and disposal for the WMI developments Lake Road and Karamū Street are proposed to follow methodologies used in the Taupō District and surrounding subdivisions. The design of stormwater disposal shall be done in accordance with the finding of the Detailed Geotechnical Investigation at the specific location of the stormwater management devices.

The stormwater will consist of catchpits and reticulation in the larger roads, with reticulation and /or vegetated swales utilised for the shorter cul-de-sacs. Additionally, the Lake Road site has an added consideration of upstream catchments which currently drain through the middle of the proposed development. Consequently, overland flow paths are proposed through and around the site to allow for these flows.

Please refer to Cheal Consultants Preliminary Stormwater Calculations in Appendix 2.

5.1 Primary Disposal System

As per the TDC Code of Practice, Stormwater runoff disposal from all dwellings and hardstand areas on each lot will be disposed onsite. For example, individual lots can use above or below ground devices with options like water tanks, rainsmart tanks or underdeck storage tanks on each lot, soakage pits or underground tanks. Stormwater attenuations devices capable of dealing with a 10-year, 1 hour storm event. This will require an individual stormwater design part of the building consent application.

The same storm event must be attenuated for all road corridors as well. Consequently, the roads will be split into suitable catchment areas, with runoff collected via either catchpits or swales and directed to suitably sized attenuation ponds. These ponds will be sized for the 10-year, 1 hour storm event as per the TDC Code of Practice and will meet the permitted activity rules for Stormwater Discharge to Ground in the Waikato Regional Council (WRC) Regional Plan.

From the Geotechnical Preliminary investigation on Lake Road soakage to ground is not recommended, instead above ground stormwater disposal is recommended such as lined pond or lined swales with outlet structures designed to prevent erosion. However, a detailed geotechnical investigation will be carried out at the specific location of the stormwater ponds. This will provide insights to the use of soakage to ground or not, in the specific location.

Any proposed privately owned rights of way will utilise kerb and channel, with a catchpit draining to an individual attenuation storage device or underground tanks for disposal of the 10-year, 1 hour storm volume.

Lined ponds could be used for stormwater management. Lined ponds would be placed in Stormwater Reserves designated for that purpose. These pond systems will consist of a smaller, low flow coarse sediment pond (first flush), with larger flows then directed to the primary attenuation pond via a large diameter pipe. A suitable overflow spillway (vegetated and armour weir) will also be incorporated into the first flush pond for large flows. The base and sides of the ponds will be lined with an outlet control pipe outlet to attenuated flows to 80% of the pre-development flows, this will allow the ponds to drain completely following a rain event. The Stormwater Reserves and associated ponds will be designed and situated such that a natural and attractive space is provided for walkways and recreational use as much as possible. The reserve where the ponds are proposed as shown on the Concept Plans (Appendix 1) are indicative only to ensure that enough space is available for the required volume. These will be refined during detailed design.

Calculated storage volumes for roads using a water depth of 1m are 202m³ for the pond for Road 1, 346m³ for the pond catchment of Road 2 and 118m³ for pond catchment of Road 3.

Table 1a: 37 Lake Road - Stormwater Reserve Calculations

Description	Proposed Reserve Area (m ²)	Pond Volume (m ³)	Pond Area (m ²)	Percentage Reserve to Pond
Stormwater Reserve 1	2400	202	608	25%
Stormwater Reserve 2	3050	346	608	20%
Stormwater Reserve 3	400	118	184	46%

Table 1b: 3 Karamu Street - Stormwater Reserve Calculations

Description	Proposed Reserve Area (m ²)	Pond Volume (m ³)	Pond Area (m ²)	Percentage Reserve to Pond
Stormwater Reserve 3 (Lot 34)	854	85	98	12%

As shown on Table 1a and 1b above, the Stormwater Reserve can easily accommodate the ponds with a coverage of less than 50% of the area of the proposed purpose reserve. There are no real constraints considering the size of the proposed subdivision 15ha & 1.5ha to accommodate stormwater reserves / ponds for the attenuated flows requirement.

5.2 Secondary Overland Flow

For storm events greater than the 10-year, 1 hour event, or should the primary system experience blockages, secondary flow paths and emergency spillways are required to safely allow for passage of these flows. These flow paths will be provided within the road corridors and then through the Stormwater Reserves towards the existing flows paths below the site. Discharge points will be selected to align with existing flow paths into the adjacent downstream land. These discharge points will be armour and protected from erosion and located away from instable areas as much as possible. The design of the primary disposal system will be conservative to ensure that actual storage of runoff exceeds the 10-year, 1 hour requirement and that only extreme events will discharge flows off site.

5.3 Overland Flows

1a - Lake Road Site

There are three catchment areas on the Lake Road site all discharging towards Lake Maretai. A main central catchment which traverses the site south to north. This existing flow path enters the site where an incised gully feature is located in the northwestern portion of the site, connecting to Lake Maretai. The overland flow from upstream will be collected and passed through the WMI development property. The flow from this upper catchment already discharges via natural flow paths to this site. Designated overland flow paths or specific Stormwater Reserves will be required to safely pass these flows through the WMI balance land. Flow paths will consist of specifically designed and sized stormwater infrastructure or road corridors where available.



Figure 2a – Lake Road -Contributing Catchment (Source: Mapi)

Preliminary sizing of a swale for the existing catchment has been completed to ensure allowance has been made within the affected area for the overland flow paths as well as reasonable post development from the proposed development change from pastoral to residential areas is included. Upper contributing catchments have been sized and flows calculated on a conservatively large basis and have been based upon 100-year flows from the upper catchments. Catchment sizing and flows were obtained from New Zealand River Flood Statistics as shown in Figure 2a above.

1b - Karamu Street Site

Karamu Street is located in a flat area with overland flow paths directed to adjacent roads and converging to the main flow path which traverses site 37 Lake Road as shown on Figure 2b Karamu Street Contributing Catchments.

Similarly, Stormwater Management will be provided for a 10 year 1 hour intensity onsite attenuation. In this case, the overland flow path will be provided through the proposed central road and into the stormwater reserves at either side of the catchments then overflowing to their current flow paths.



Figure 2b – Karamu Street - Contributing Catchment (Source: Mapi)

Refer to Appendix 2 for Stormwater Preliminary Calculations.

In summary, the proposal can adequately store flows from a 10-year peak flow and provide adequate allowance for overland flow path for a 100-year event peak flow. All stormwater design proposed for Stormwater treatment and / or disposal shall meet requirements of the WRC Permitted

Activity rule 3.5.11.5 of the Regional Plan. Most relevant rules to this site are the rules requiring compliance with the following:

- a) *The discharge shall not originate from a catchment that includes any high-risk facility or contaminated land unless there is an interceptor system in place.*
- b) *The discharge shall be below a rate that would cause flooding outside the design discharge soakage area, except in rain events equivalent to the 10% Annual Exceedance Probability design storm or greater. Any exceedance shall go into designated overland flow paths.*
- c) *There shall not be any overland flow resulting in a discharge to surface water, except in rain events equivalent to the 10% Annual Exceedance Probability design storm or greater; then there shall be no adverse surface water effects as a result of the discharge.*
- d) *Any erosion occurring as a result of the discharge shall be remedied as soon as practicable.*
- e) *The discharge shall not contain concentrations of hazardous substances that may cause significant adverse effects on aquatic life or the suitability of the water for human consumption after treatment.*

6. WASTEWATER

The WMI development at Lake Road sits well above the existing sewer infrastructure to the east, servicing the new Kōrari Crescent Subdivision. Wastewater disposal for the development site area can be primarily accomplished via gravity drainage.

However, it is envisaged that around 14 lots located in the northern portion of the Lake Road site will require private pump stations, feeding into common rising mains as required and discharging into the gravity reticulation. The private pump stations will be provided when the future owners build on the sections. The eventual owners then operate and maintain the pump stations. This approach has been utilised in similar subdivisions in the Taupō District.

Likewise, the Karamū Street site will require connection to the existing wastewater infrastructure. Note that both sites discharge to the same Wastewater Treatment Plant.

6.1 Wastewater Reticulation

Whether gravity or pumped, all wastewater disposals would be to the 150mm diameter gravity sewer main northwest of Lake Road to the Mangakino Wastewater Pump Station. Including the existing properties connected to the wastewater infrastructure, 125 properties and WMI development of 150 + 30 new lots, the total proposed catchment for this sewer main is 305 lots.

Per Taupō District Council Code of Practice:

- Average dry weather flow per person 250 litres/day/person
- Diurnal peaking factor 2.3
- Wet Weather peaking factor 3.5
- People per dwelling 2.7

The resulting peak developed flow rate is therefore 19.18 litres/second. The existing 150mm gravity main seems sufficient to accommodate this peak flow rate.

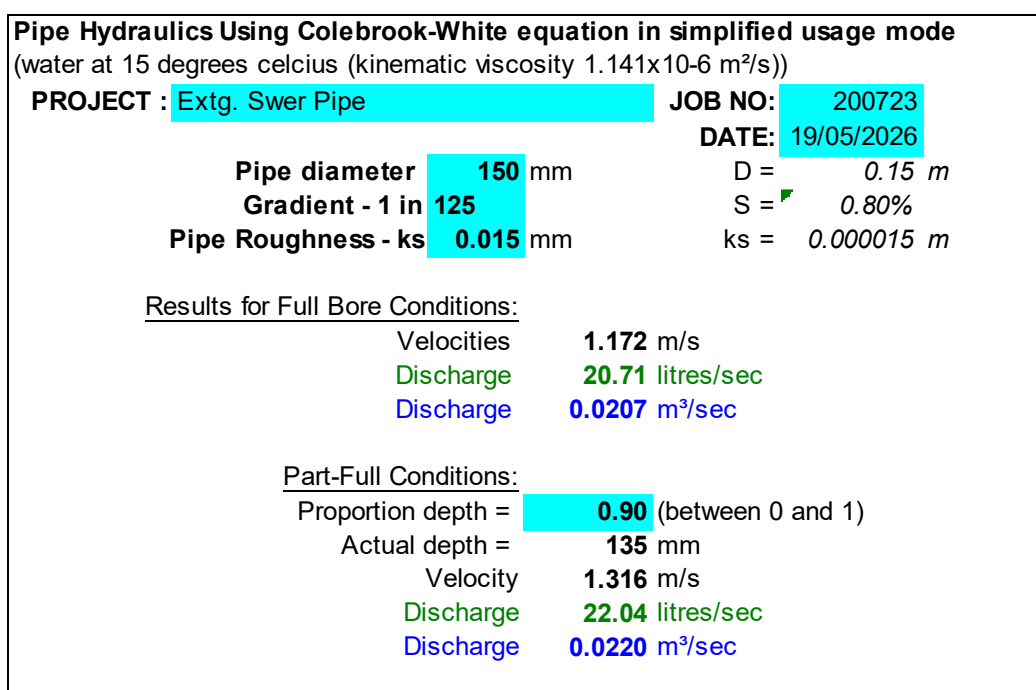
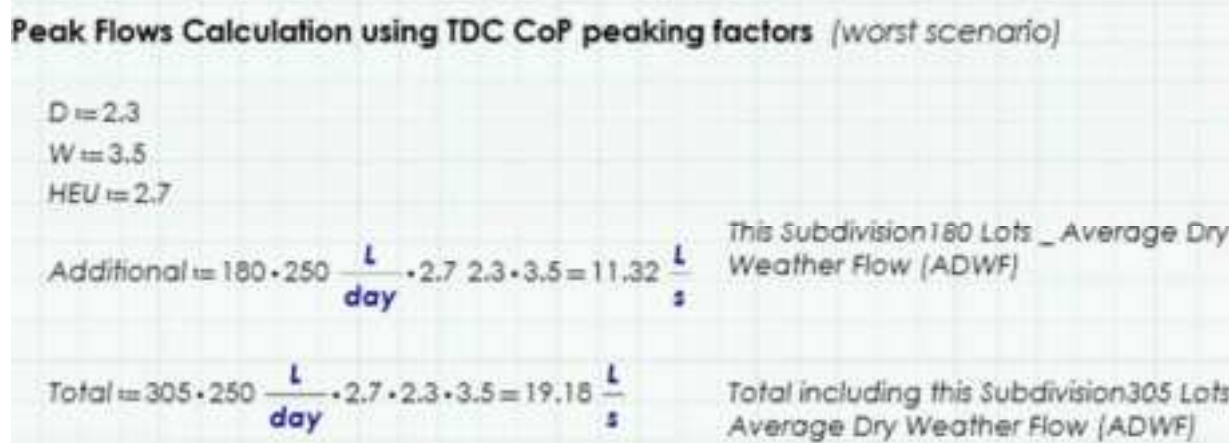


Figure 3: Existing Sewer Pipe Flow Rate Calculation

The additional flow rate is therefore 11.32 litres/second for this new development. The existing 150mm gravity main seems sufficient to accommodate this peak flow rate as shown on figure 3 above. However, the actual capacity and flow rate of the pipe will need to be confirmed and/or engineered at detailed design phase.

6.2 Mangakino Wastewater Treatment Plant (MWWTP)

The Mangakino Water Treatment Plant Type is SAF (Submerged Aerated Filter - Wastewater Treatment Process) and was built in 2006. Upgrades to the plant were undertaken in 2007/2008 & 2013/2014. These upgrades included WWTP upgrade (SAF) and Tertiary Filter Upgrade. In 2006 the Mangakino Wastewater Treatment Plant was upgraded to include a new secondary treatment stage, in the form of a new SAF plant. This includes a pumping station that conveys the primary tested wastewater into the SAF reactor tanks. Prior to 2016 there had been significant issues with overflow which was further heightened by excessive stormwater infiltration, as such significant improvements were made between 2016/2020 to the reticulation system and the peak flows in heavy rain events. The network is now in very good condition. Rapid infiltration trenches were installed at the north side of the golf course to improve the performance of the disposal system, and

these have worked well and enabled the drip irrigation system to recover. The existing township reticulation is separated into four main catchment areas. Three of the areas each drain to a communal septic tank and the fourth area drains directly to the plant. The 150mm diameter sewer collects effluent from all the treatment tanks and the wastewater process through a SAF prior to discharge to ground.

With regard to the overall capacity of the MWWTP, the information provided by Council indicates that the maximum daily flow of wastewater is around 784m³ per day, well below the volume discharge application. Figure 4 below also indicates average daily wastewater volume.

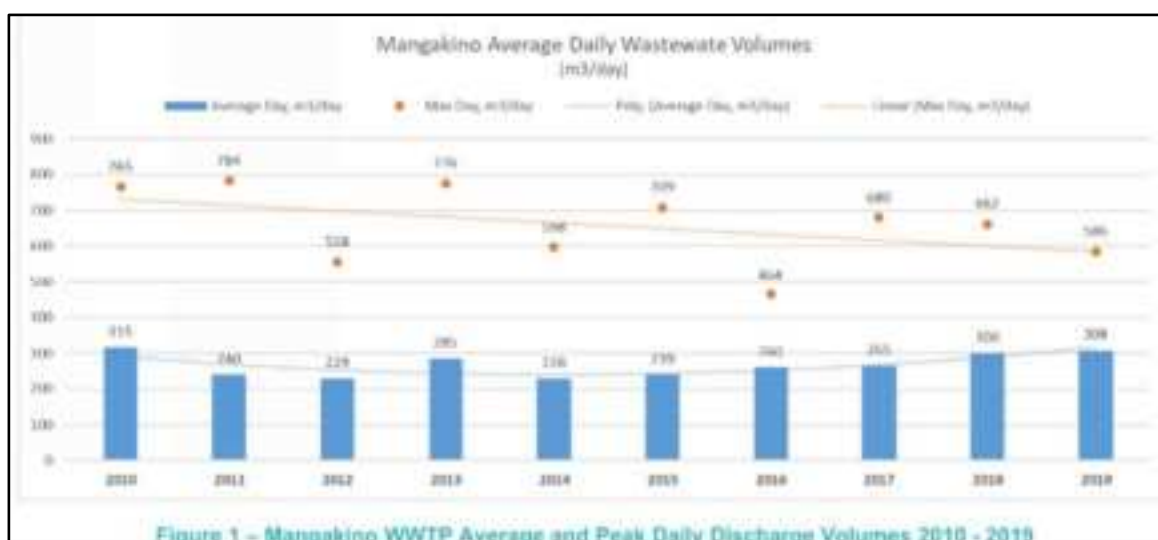


Figure 4: Mangakino WWTP Average Daily Discharge Volumes (Source TDC)

Great Lake Consulting Ltd
Mangakino WWTP Future Upgrade Options

Table 2 – Mangakino Current and Future Household Equivalent Wastewater Connections

Description	Household Equivalent Units [HEU]
Current connections	792
Total including redevelopment potential of existing vacant lots	865
Ultimate including allowance for 10% growth	908

Figure 5: Mangakino WWTP Peak Daily Discharge Volumes (Source TDC)

It shall be noted that TDC is currently applying for a renewal of the MWWTP with the Waikato Regional Council to increase the discharge to 1,300m³/day to allow for future growth, noting that the WWTP is currently operating below 800m³/day. The MWWTP has no capacity constraints in the network. However, treatment capacity and capacity for nitrogen removal will need to increase. The capacity in the WWTP is designated to be upgraded by 2027/2028. This timeframe is noted in the Long Term Plan 2024 and associated Development Contributions Policy.

The detail of the MWWTP upgrade would be determined by TDC through the design process. However, as noted on the Regional Consent Application further upgrades will likely require land to be used for disposal field and/ or reserve land. The WMI proposed development of 150 + 30 lots will

increase the volume of waste effluent by 101m³/day once all dwellings are constructed. Please note that the economic report indicates rather slow development at the rate of 10 lots /year.

Finally, Council is proposing work to assess influent levels through checking the network for illegal connections, possibly reducing influent levels by up to 20%.

For a subsurface irrigation disposal 15mm/day (using current loading rate) requires a disposal field of 6,750m². For a scenario of trench infiltration, the loading rate is higher, requiring less land for disposal. This will be part of a site investigation and specific design for On-site Effluent Disposal.

Additional information can be found in the MWWTP Application for Discharge Consent by TDC in Appendix 4.

6.3 Sewer Pressure Individual Pump Station

Due to the site topography, some lots are sited below the gravity reticulation and have been identified and marked on the Concept Plan for Development of Lot 3 DPS 43655, Cheal drawing 230385-SK001.

Individual pump stations E-one can be used for this situation as used in other areas of the district. These individual pump station have a storage capacity for 24hours and will require a rising main which then will be connected to the gravity line. For those lots where the public sewer line is not at the road frontage, a private satellite manhole will be constructed to provide individual sewer connections from these sites. The number of lots connected to a private manhole will be limited. A specific design for rising main pipe size and private manhole layout will be provided. This will provide an opportunity to educate the owners about water conservation and create awareness about wastewater discharge items. The pumps can be timed and adjusted to discharge outside peak hours reducing pressure on the public infrastructure as well as maintenance, as all responsibility lays on the user, whose best interest would be maintaining their pump to keep it fully operationally.

A condition noted on the title for the Developer to provide all wastewater individual pump stations is to minimise additional time and cost to TDC to assess different pump systems or instead, this can be done as part of the subdivision consent construction through a supply agreement between the developer and Ecoflow Limited (Ecoflow or similar approved TDC supplier) to provide pump stations, full instruction and technical support to the approved individual pumps. Ecoflow also provides sewer design and pipe sizing analysis for the system. The pumps are a shelf item at Ecoflow and replacement can be done within 24 hours.

Optionally, details for a small public pump station servicing these lots can be identified as part of the engineering design following TDC preferences. Refer to Appendix 3 for Sewer Pressure Individual Pump Station.

7. ROADING

7.1 Lake Road and Surrounding Road Network

The main access to this development will be from Lake Road. Construction will be carried out from within the development with a construction access off of Lake Road. Provisions would be made for the construction staging in regard to road hierarchy and traffic connection. Roads would comply with the TDC Code of Practice for Development Land. Some narrower cul-de-sacs and private roads will be consistent with road design and construction following TDC Code of Practice.

A detailed Integrated Transportation Assessment (ITA) will be provided at subdivision application stage to analyse the traffic and transportation effects of the proposed residential development. This forms part of the Resource Consent Application.

Engineering detailed design would be required for each stage to demonstrate there are no conflicts or if departures are proposed from the Code of Practice on the proposed infrastructures.

Low impact Stormwater features could be incorporated to the streetscape such as vegetated swales and landscaped Stormwater ponds to attenuate the flow of the development. This has successfully been used in different areas of the Taupō District.

Along the road frontage of Lake Road on this property, there is excellent visibility at all points, posing no limits to an intersection along this frontage. Surrounding intersections of Lake Road/Waipapa Road and Lake Road/Rangatira Road are well designed being:

- The main access to the site is via State Highway 30 onto Waipapa Road. Waipapa Road is classified as a Primary Collector. Lake Road branches off Waipapa Road as shown below on Figure 6.
- Lake Road and Karamu Street are local roads with 20m width and 6.4m roading surface.
- Additional traffic generated by this proposal is 10 movements per lot, therefore 1,770 additional total vehicle movements. Considering, the existing road counts, intersections and roads are deemed to be adequate.

However, specific traffic assessment will be carried as part of the subdivision to determine if upgrades are required and to confirm that the road and additional traffic counts from this subdivision meets the requirements of Waka Kotahi, TDC roading requirements and Road Safety Standards.

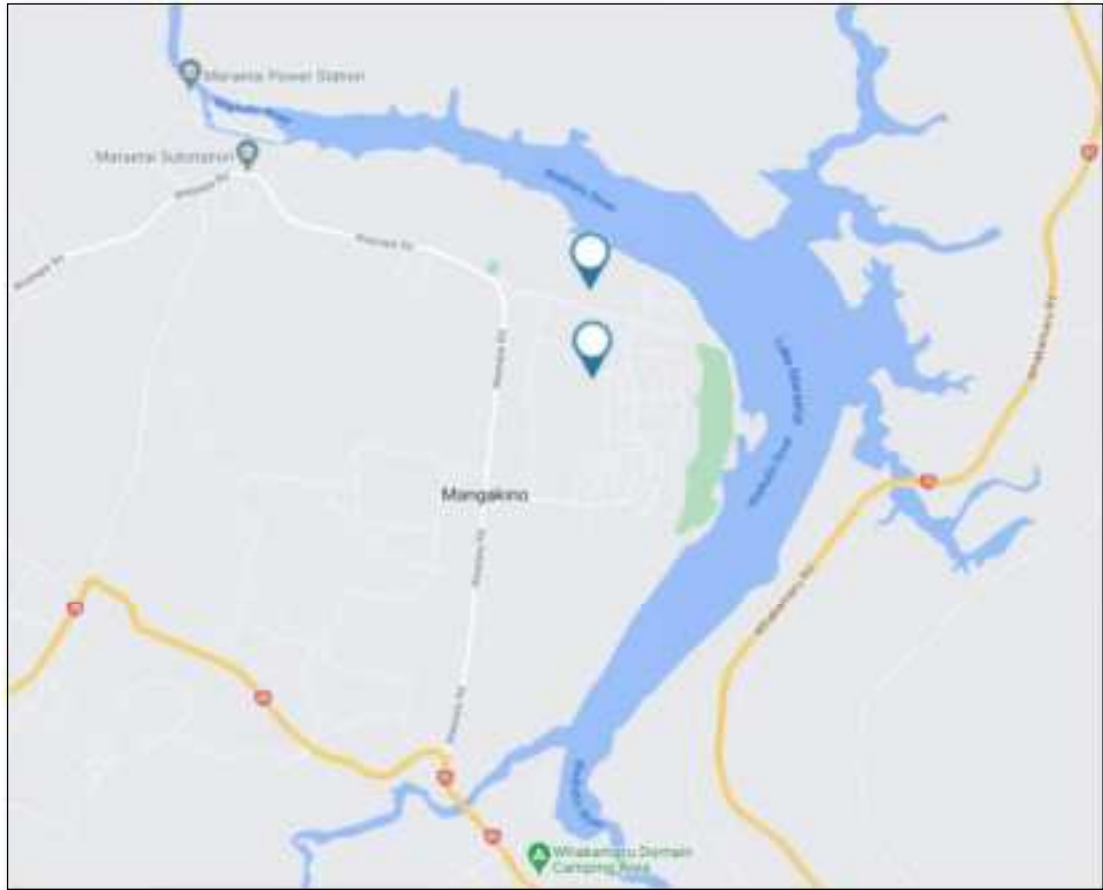


Figure 6: Mangakino Road Network

7.2 Footpath and Cycleways

Following similar surrounding areas in Mangakino, a single footpath per Public Road is proposed. There is an intention and advantage to connect this site to the network of cycleways at the western side of the subdivision, known as the Maraetai to Mangakino trail. The network of footpaths will extend throughout the proposed WMI development to provide for safe and efficient connectivity without impacting on vehicular traffic. The overall layout of the proposed footpath network will be part of the detailed roading design.



Figure 7: Popular Trails in Area

7.3 Road Lighting

Road lighting throughout all public roads will be continued in accordance with the style of the surrounding areas and to Council's and best practice lighting design requirements.

8. WATER SUPPLY SERVICING

8.1 Water Supply Reticulation

There is an existing 200mm diameter watermain pipe (PE100) proposed to connect to the Lake Road site. This main is in excellent condition along the southern boundary of Lake Road. From this watermain, a 150mm diameter pipe could be extended and looped throughout the development to provide water supply and firefighting supply to all 150 lots in this subdivision. Water modelling shall be engaged to WSP (Consultant for Taupō District Council) for various options for the servicing of the stages as part of the detailed design for when the stages will be confirmed.

Preliminary indications are that the proposed 150 lots can be serviced by existing Council infrastructure. Upon completion of the specific modelling report, pipe sizes and potential existing pipe upgrades can be confirmed.

Subject to confirmation from Council's modelling consultants, standard engineering practices suggest that a watermain 150mm diameter high pressure main will be required to provide enough pressure to the networks of Lower pressure 100mm mains and 50mm rider mains will be utilised for the servicing of the individual lots. Cul-de-sacs will require 100mm mains to extend to the ends of the cul-de-sacs to allow for fire hydrants. In time, with the completion of staging of the WMI development the internal water supply network will be looped back into the existing TDC networks to the existing 200mm diameter pipe at Lake Road. This will be addressed during detailed design following completion of the Water modelling.

Similarly, calculations for Karamū Street are provided. The existing waterline entering the site will be removed and relocated to be in the berm side of the main road and loop back to Wairenga Road. This new watermain will be upgraded to a suitable watermain size capable of providing firefighting supply within the site, if necessary. Note there are two existing fire hydrants either side of this property. We cannot see constraints for those pipes to be extended to supply water and firefighting water to this site.



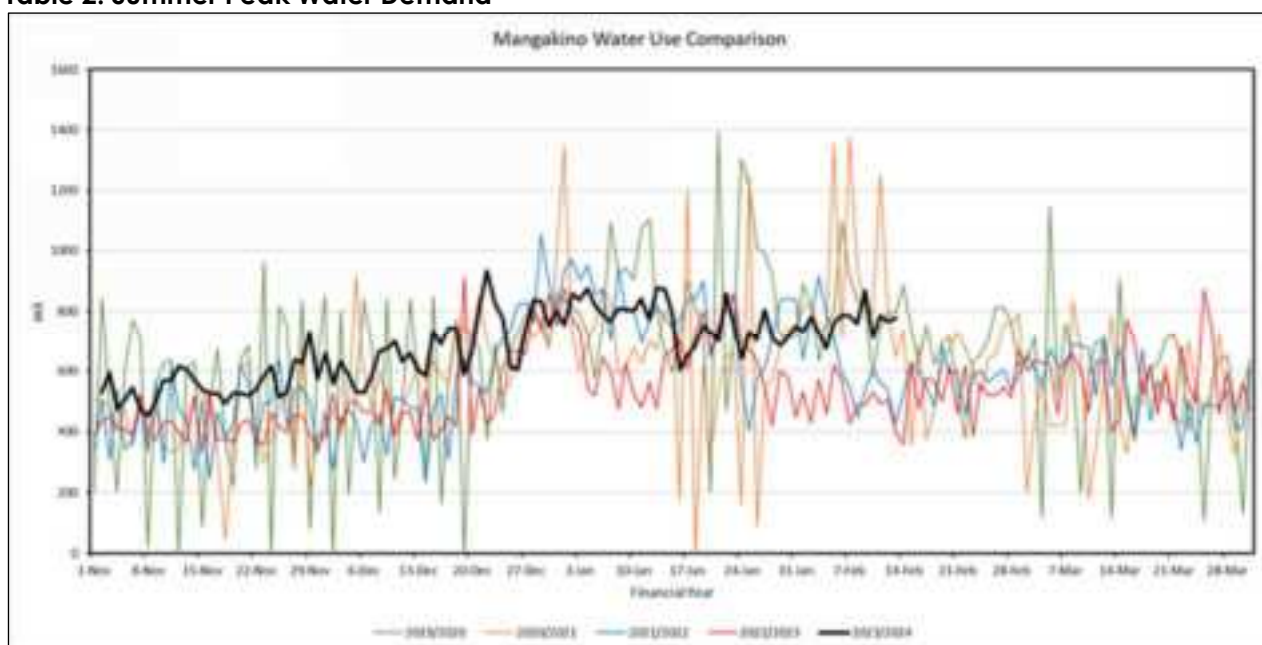
Figure 8: Karamū Street Site Existing Water Reticulation (Source TDC)

Refer to Appendix 4 for Preliminary Water Reticulation Layout.

8.2 Mangakino Water Supply Capacity

There is an authorised consent for water take for the Mangakino Water Supply of 2,000m³/day. TDC confirmed the Mangakino Treatment Plant and supply can produce the full 2,000m³/day. Summer peak demand is around 1,200m³/day as shown on Table 2 below.

Table 2: Summer Peak Water Demand



As per preliminary water demand calculation below, the proposed number of additional lots for the current water allowance in the community still falls within treatment plant capacity and supply already considered by TDC for water supply infrastructure. It is expected that existing TDC water network in Mangakino will be suitable to provide domestic and fire supply and pressure for WMI development.

Domestic Demand	
HEU = 2.7	Person per dwelling TDC CoP
Flow = $400 \frac{\text{L}}{\text{day}} = 0.005 \frac{\text{L}}{\text{s}}$	Flow allowance per person TDC CoP
No.Lots = 150	Number of Lots
Average_Flow = $150 \cdot 400 \frac{\text{L}}{\text{day}} \cdot 2.7 = 162 \frac{\text{m}^3}{\text{day}}$	Average Desing Flow TDC CoP
Peak = 5	Peaking factor
Daily_flow = $\text{Peak} \cdot \text{Average_Flow} = 9.375 \frac{\text{L}}{\text{s}}$	Peak Wet Weather Flow
Combined Fire and Domestic Demand From Appendix K of SNZ PAS 4509:2008	
Water Supply Classification= FW2 Flow = $25 \frac{\text{L}}{\text{s}}$ D = 150 $Q = 0.0467 D \cdot \frac{\text{L}}{\text{s}} = 605.232 \frac{\text{m}^3}{\text{day}}$	
Demand varies from zone to zone, but as a guide in residential areas, can be estimated as follows: Zones less than 1000 dwellings: $Q_{peak} = 0.0802 D^{\frac{1}{2}} \text{ L/s}$ Zones larger than 1000 dwellings: $Q_{peak} = 0.04570 D \text{ L/s}$ where Q_{peak} = Peak annual demand (L/s) D = Number of dwellings	
	Number of Lots
	Demand

Therefore, the infrastructure plan can accommodate the additional water supply requirements for the proposed WMI development.

Refer to Appendix 4 for TDC Water Network Plans, Mangakino Water Take Resource Consent, Preliminary Water Demand Calculations.

9. POWER AND TELECOM SERVICING

The Lines Company confirmed they can provide electricity to the area on Lake Road, Mangakino for the additional 156 residential lots. The supply can be provided without the need for a new sub-station to be built.

Preliminary communication with Chorus for telecommunications servicing has been requested. As part of the subdivision detail design engagement and incorporation of their infrastructure requirements is expected.

Refer to The Lines Company letter attached in Appendix 5.

10. SUMMARY

Based upon the above review and commentary, services and access to both sites can be generally accommodated within existing networks, considering the surrounding residential environment with the Town Centre Environment a few blocks away. Final stormwater disposal may vary once more specific geotechnical assessments have been completed as some of Lake Road and potentially all of Karamu Street may allow for soakage.

Currently Taupō District Council is applying to the Waikato Regional Council for a Consent to upgrade both Wastewater Treatment Plants. Provision to service these two sites was confirmed within the proposed upgrade. Significant Developers contribution fees towards upgrade and enhancement of the water quality to the Lake and Town Supply are a mutual benefit to Mangakino Township, TDC and Developer.

11. DISCLAIMER

This Report has been prepared solely for the use of our client with respect to the particular brief given to Cheal Consultants Limited.

No liability is accepted in respect of its use for any other purpose or by any other person or entity. All future owners of this property should seek professional advice to satisfy themselves as to its ongoing suitability for their intended use.

CHEAL CONSULTANTS LIMITED

Appendix 1

Concept Development Plans
for Lake Road and
Karamū Street



www.cheal.co.nz

DISCLAIMER

This sketch drawing shall be used for the purpose of discussion and shall not form any part of a tender or construction process. The information hereon shall not be passed on to any third party without the express written permission of Cheal Consultants Ltd. In the event of this information being passed on to a third party, even with written permission, or the information being used for any other purpose than discussion, Cheal Consultants Ltd take no responsibility for its correctness and subsequent use.

Extent of contaminated soil has been sourced from Geohazard Environmental Detailed Site Investigation Report.

Notes

Asbuilt utilities may have other services in close proximity which are not shown for the purposes of this plan. Please identify existing utility locations and depths with Taupo District Council GIS before any field investigation or construction.

Reduced Levels are in terms of New Zealand Vertical Datum 2016
Origin: AH5J (AJ 52)
R.L.: 224.313
Source: Land Information New Zealand Geodetic Database
Authorized: 30/11/18

Coordinates are in terms of New Zealand Geodetic Datum 2000, Mt Eden Circuit.
Origin: IT XV DPS 10215 (E7XJ)
488204.57 mE
634725.33 mN
Source: Landonline xml

Boundary information has been sourced from DPS 43655 and is subject to survey.

Aerial Imagery has been capture with a DJI Matrice M300 and a Zenmuse P1 Camera.

Topographic information has been captured with a DJI Matrice M300 and a Zenmuse L1 LiDAR unit and a Leica GNSS System.

Legal Description: Lot 3 DPS 43655 & Lot 1 DPS 24879
Comprise in: RT SA38D/115 and SA23B/255
Total Area: 15.6260

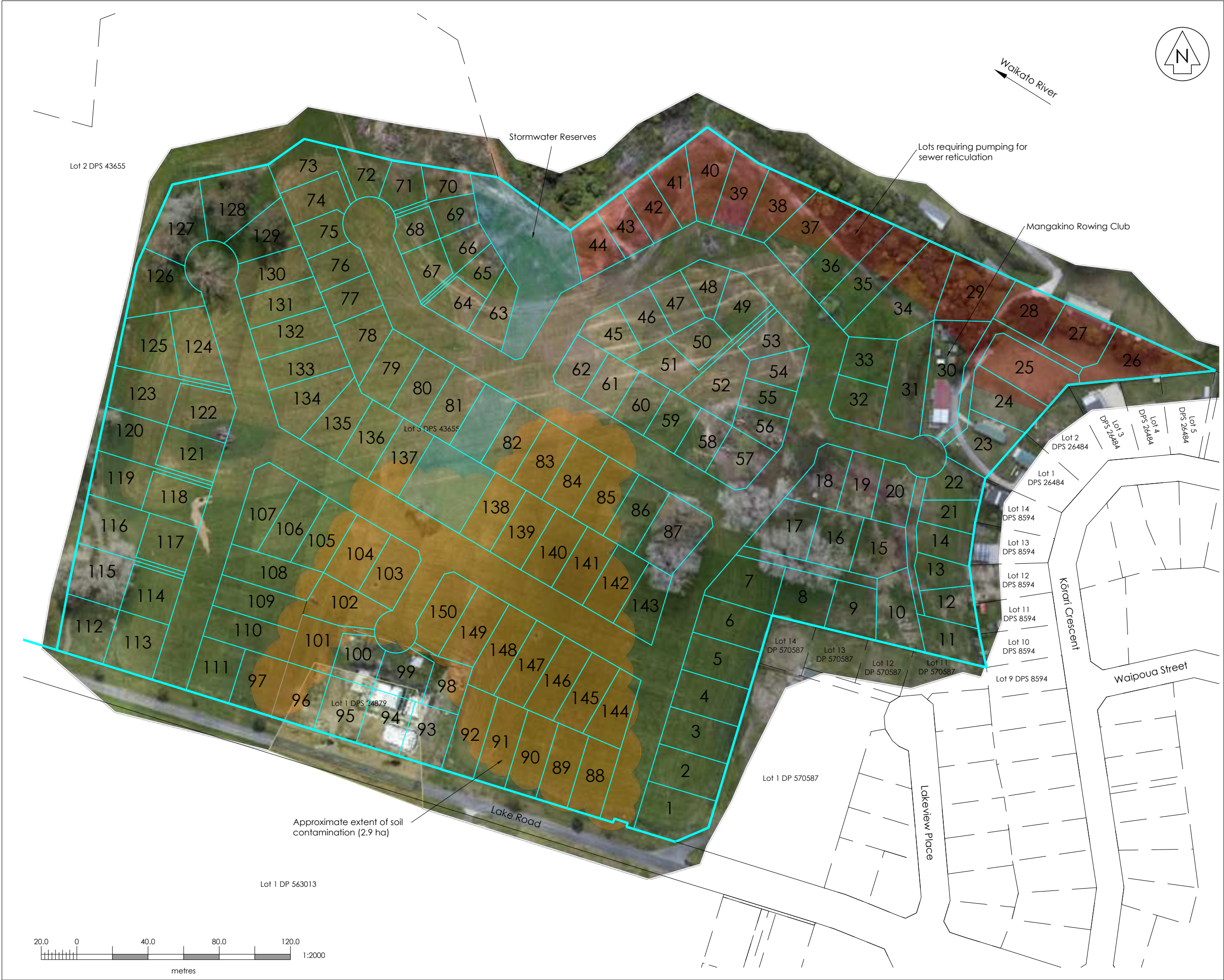
B	28/11/23	Lot layout	AGM	CE	AGM
A	16/11/23	Information	AGM	CE	AGM
Rev	Date	Amendment	By	Chk	App

Project Title
Wairarapa Moana ki Pouakani Incorporation
37 Lake Road, Mangakino

Drawing Title
Concept Plan for Development of Lot 3 DPS 43655

Surveyed	K. Larsen	19/10/23	KL
Designed			
Drawn	A. Moss	16/11/23	AGM
Checked	C. Eagles	16/11/23	CE
Approved	A. Moss	16/11/23	AGM

Status	INFORMATION		
Scale	A1 1:1000	A3 1:2000	
Drawing Number	230385-SK001		Rev B





www.cheal.co.nz



LEGEND:

 Potential Stormwater pond/reserve

Note:
Narrowest section is 13.9m wide (Lot 23)



Rev	Date	Amendment	By	Chk	App

Project Title
Wairarapa Moana ki Pouakani
Incorporation
3 Karamu Street, Mangakino

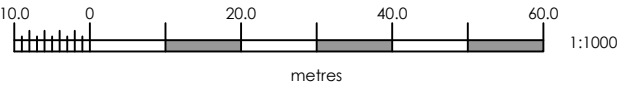
Drawing Title
Concept Plan for Development
of Lot 3 DPS 563013

Surveyed			
Designed			
Drawn	K.Larsen	26/10/21	KL
Checked			
Approved			

Status **DRAFT**

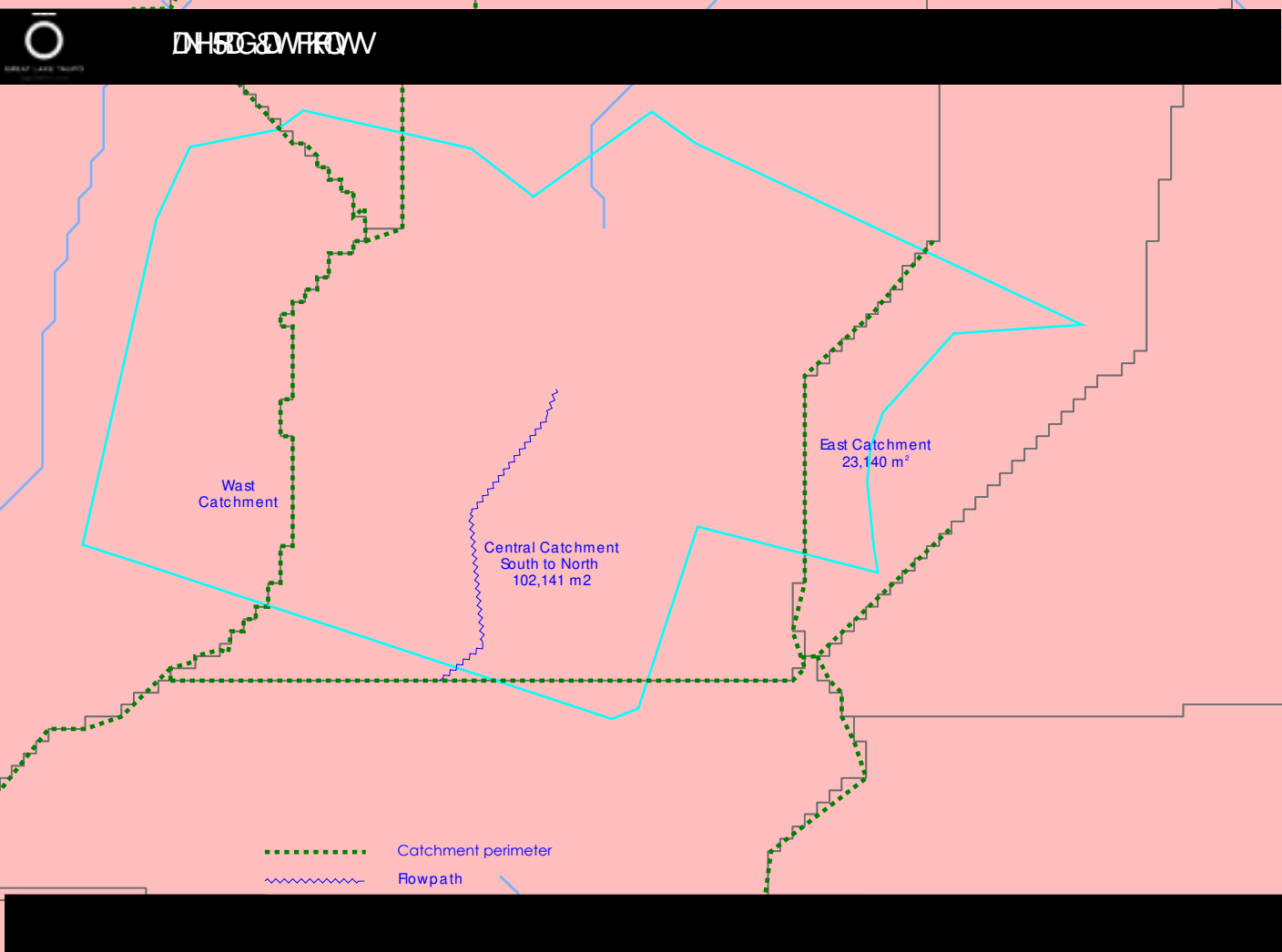
Scale A1	-	A3
A3	1:1000	

Drawing Number	200723-SK01	Rev	-
----------------	-------------	-----	---



Appendix 2

Preliminary Stormwater
Calculations





Lake Road Road 1

Road Width (Typ.): 20 m
 Paved Width: 8.5 m
 Footpath Width: 1.4 m

Footpath Length (south): 437 m
 Total Road Reserve Area: 8740 m²

Total Road/Footpath Area: 4326.3 m² Footpath one sides, aprox 50% of cross section

Cpaved: 0.85 Asphalt - from E1
 Cberm: 0.3 Grass, medium soakage - from E1
 Weighted C value: 0.57

Rainfall Depth: 40.4 mm, From NIWA, RCP8.5, 2081 - 2100

Req'd Storage Volume: 202 m³

Approximate Dimensions

Base Width: 8
 Base Length: 18
 Side Slope (1v:1h): 4
 Water Depth: 1
 Freeboard: 0.3
 Sectional Area: 12
 Total Width: 18.4
 Volume: 216

Req'd Pond Area: 331.2 m²

Proposed Stormwater Reserve 2400 m²

Lake Road Road 2

Road Width (Typ.): 16 m
 Paved Width: 7 m
 Footpath Width: 1.4 m

Footpath Length (south): 437 m
 Total Road Reserve Area: 14900 m²

Total Road/Footpath Area: 7450 m² Footpath one sides, 50% of cross section

Cpaved: 0.85 Asphalt - from E1
 Cberm: 0.3 Grass, medium soakage - from E1
 Weighted C value: 0.58

Rainfall Depth: 40.4 mm, From NIWA, RCP8.5, 2081 - 2100

Req'd Storage Volume: 346 m³

Approximate Dimensions

Base Width: 20
 Base Length: 20
 Side Slope (1v:1h): 4 9.9
 Water Depth: 1 0.495
 Freeboard: 0.3
 Sectional Area: 24
 Total Width: 30.4
 Volume: 480

Req'd Pond Area: 608 m²

Proposed Stormwater Reserve 2400 m²

Prop

Lake Road Road 3

Road Width (Typ.): 16 m
 Paved Width: 7 m
 Footpath Width: 1.4 m

Footpath Length (south): 437 m
 Total Road Reserve Area: 5080 m²

Total Road/Footpath Area: 2540 m² Footpath one side, 50% of cross section

Cpaved: 0.85 Asphalt - from E1
 Cberm: 0.3 Grass, medium soakage - from E1
 Weighted C value: 0.58

Rainfall Depth: 40.4 mm, From NIWA, RCP8.5, 2081 - 2100

Req'd Storage Volume: 118 m³

Approximate Dimensions

Base Width: 10
 Base Length: 9
 Side Slope (1v:1h): 4
 Water Depth: 1
 Freeboard: 0.3
 Sectional Area: 14
 Total Width: 20.4
 Volume: 126

Req'd Pond Area: 184 m²

Proposed Stormwater Reserve 450 m²

Karamu Street Road

Road Width (Typ.): 20 m
 Paved Width: 8.5 m
 Footpath Width: 2.8 m

Footpath Length (south): 170 m
 Total Road Reserve Area: 3474 m²

Total Road/Footpath Area: 1921 m² Footpath one side, 50% of cross section

Cpaved: 0.85 Asphalt - from E1
 Cberm: 0.3 Grass, medium soakage - from E1
 Weighted C value: 0.60

Rainfall Depth: 40.4 mm, From NIWA, RCP8.5, 2081 - 2100

Req'd Storage Volume: 85 m³

Approximate Dimensions

Base Width: 6
 Base Length: 6
 Side Slope (1v:1h): 4
 Water Depth: 1
 Freeboard: 0.3
 Sectional Area: 10
 Total Width: 16.4
 Volume: 60

Req'd Pond Area: 98 m²

Proposed Stormwater Reserve 854 m²

Swale Sizing for Catchment B

C_exist= 0.3 E1/VM1 pasture, high soakage
C_future= 0.55 E1/VM1 residential areas
i_10 = 29.7 Rainfall (mm), 10 year, 30 min.
i_100 = 48.4 Rainfall (mm), 100 year, 30 min.

Catchment Name	Size (ha)	10 Year Flows (existing) m3/s	100 Year Flows (existing) m3/s
Pre-development	3.53	1.34	2.02
Development	0.15	1.36125	2.22
Post development		2.70	4.24

High soakage gravel, sandy and volcanic soil types:
– pasture and grass cover 0.20
– bush and scrub cover 0.15
– cultivated 0.10

T_c = 30min

Flow data as per from New Zealand River Flooding

100 year event, existing

	Swale Future
Peak Flow (m3/s)	4.24
Base Width (m)	20
Side Slopes (1v:Xh)	4
Water Depth (m)	0.2
Freeboard (m)	0.1
Top Width (m)	22.4
Top Width of Flow (m)	21.6
Slope (m/m)	1.5%
Mannings Roughness, n	0.03
Area (m2)	4.16
Hydraulic Radius (m)	0.19
Velocity (m/s)	1.359
Channel Flow (m3/s)	5.66
Pass/Fail	PASS

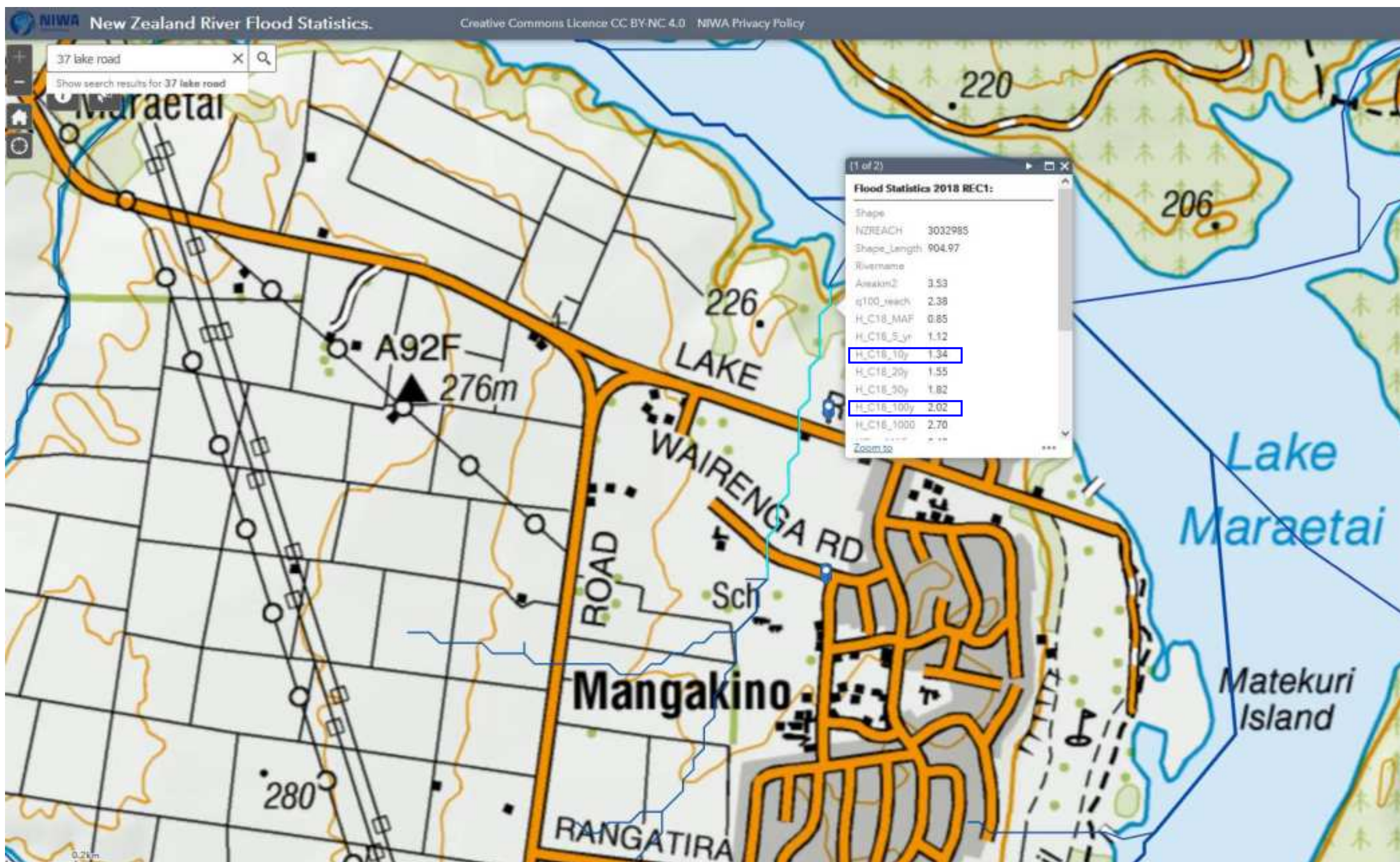
Culvert Sizing, 100 Year Event, Pipes Flowing Full

	Existing flows	Future flows
Peak Flow (m3/s)	2.02	4.24
Pipe Dia. (mm)	1050	1350
Slope (m/m)	2.0%	2.0%
Mannings 'n'	0.013	0.013
Hyd. Rad. (mm)	262.5	337.5
Area (m2)	0.87	1.43
Velocity (m/s)	4.460	5.273
Pipe Flow (m3/s)	3.86	7.55
Pass/Fail	PASS	PASS

Culvert Sizing, 10 Year Event, Pipes Flowing Full, Existing

	Culvert Exist	Culvert Future
Peak Flow (m3/s)	1.34	2.70
Pipe Dia. (mm)	750	900

Rainfall depths (mm) :: RCP8.5 for the period 2081-2100				
ARI	AEP	10m	20m	30m
1.58	0.633	9.30	13.6	16.9
2	0.500	10.3	15.1	18.6
5	0.200	13.8	20.2	24.8
10	0.100	16.6	24.1	29.7
20	0.050	19.6	28.3	34.8
30	0.033	21.5	31.0	38.0
40	0.025	22.8	32.9	40.3
50	0.020	24.0	34.5	42.2
60	0.017	24.9	35.8	43.8
80	0.013	26.4	37.9	46.4
100	0.010	27.6	39.6	48.4
250	0.004	32.7	46.8	57.0





www.cheal.co.nz

DISCLAIMER

This sketch drawing shall be used for the purpose of discussion and shall not form any part of a tender or construction process. The information hereon shall not be passed on to any third party without the express written permission of Cheal Consultants Ltd. In the event of this information being passed on to a third party, even with written permission, or the information being used for any other purpose than discussion, Cheal Consultants Ltd take no responsibility for its correctness and subsequent use.

Extent of contaminated soil has been sourced from Geohazard Environmental Detailed Site Investigation Report.

Notes

Asbuilt utilities may have other services in close proximity which are not shown for the purposes of this plan. Please identify existing utility locations and depths with Taupo District Council GIS before any field investigation or construction.

Reduced Levels are in terms of New Zealand Vertical Datum 2016
Origin: AH5J (AJ 52)
R.L.: 224.313
Source: Land Information New Zealand Geodetic Database
Authorized: 30/11/18

Coordinates are in terms of New Zealand Geodetic Datum 2000, Mt Eden Circuit.
Origin: IT XV DPS 10215 (E7XJ)
488204.57 mE
634725.33 mN
Source: Landonline xml

Boundary information has been sourced from DPS 43655 and is subject to survey.

Aerial Imagery has been capture with a DJI Matrice M300 and a Zenmuse P1 Camera.

Topographic information has been captured with a DJI Matrice M300 and a Zenmuse L1 LiDAR unit and a Leica GNSS System.

Legal Description: Lot 3 DPS 43655 & Lot 1 DPS 24879
Comprise in: RT SA38D/115 and SA23B/255
Total Area: 15.6260

Rev	Date	Amendment	By	Chk	App
B	28/11/23	Lot layout	AGM	CE	AGM
A	16/11/23	Information	AGM	CE	AGM

Project Title
Wairarapa Moana ki Pouakani Incorporation
37 Lake Road, Mangakino

Drawing Title
Concept Plan for Development of Lot 3 DPS 43655

Surveyed	K. Larsen	19/10/23	KL
Designed			
Drawn	A. Moss	16/11/23	AGM
Checked	C. Eagles	16/11/23	CE
Approved	A. Moss	16/11/23	AGM

Status	INFORMATION		
Scale	A1 1:1000	A3 1:2000	
Drawing Number	230385-SK001		Rev B





LEGEND:

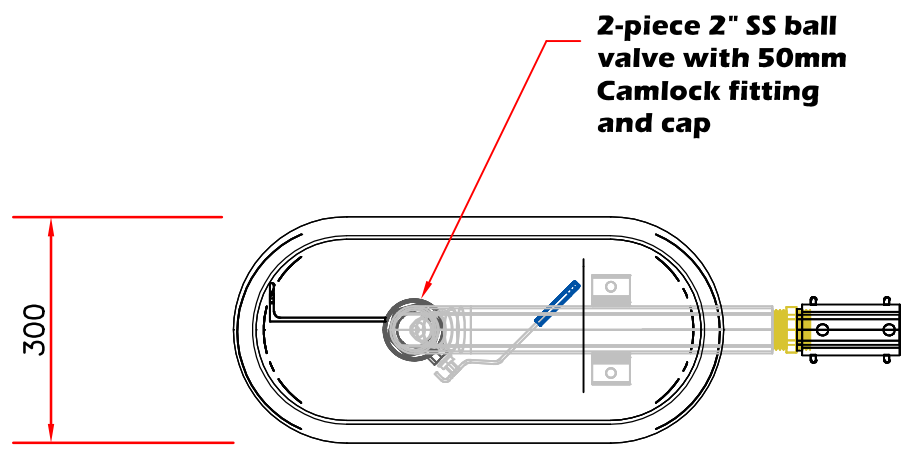
 Potential Stormwater pond/reserve

Note:
Narrowest section is 13.9m wide (Lot 23)

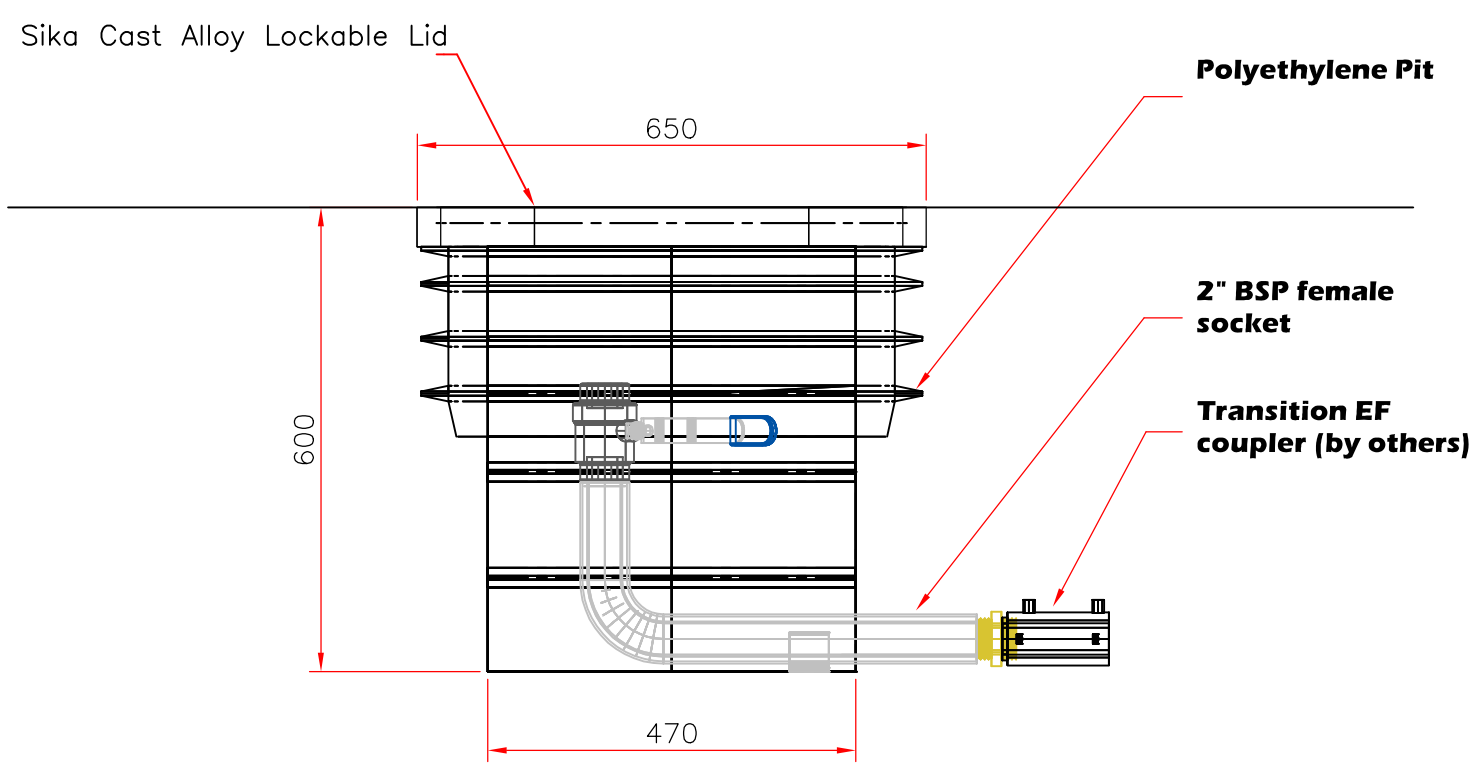


Appendix 3

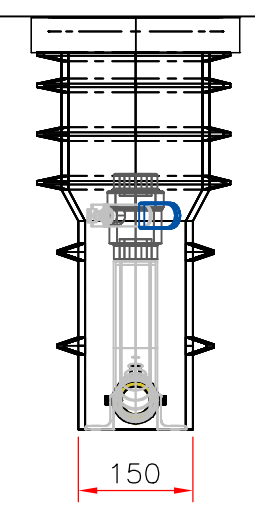
Sewer Pressure Individual
Pump Station



Plan View



Front View



Side View

YOUR GUIDE TO THE NEW PRESSURE SEWER SYSTEM

FOR ANY ALARMS PHONE

ecoflow

0508 528 3725
0508 LATERAL



The new Pressure Sewer System

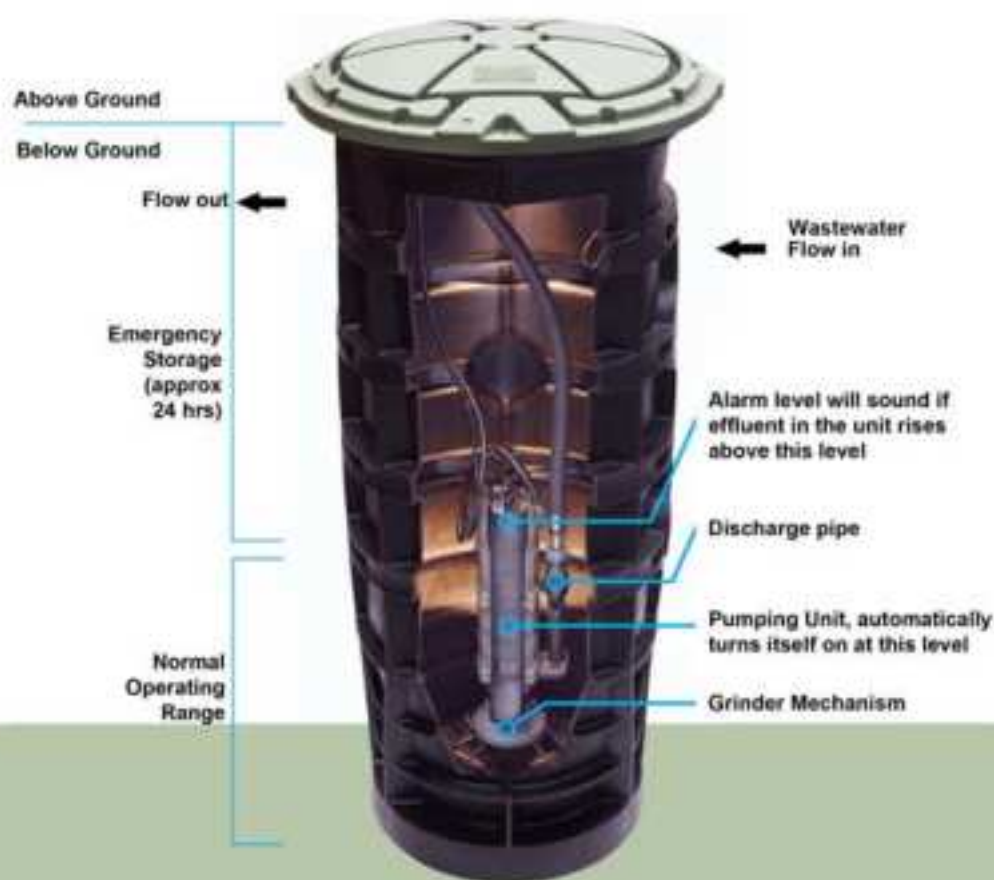


The E/One Pressure Sewer System is reliable and robust. There is little that you need to do and very little that can go wrong. Here is how it works:

The new system consists of a pumping unit installed on your property which is connected to a network of pipes from other units in your area.

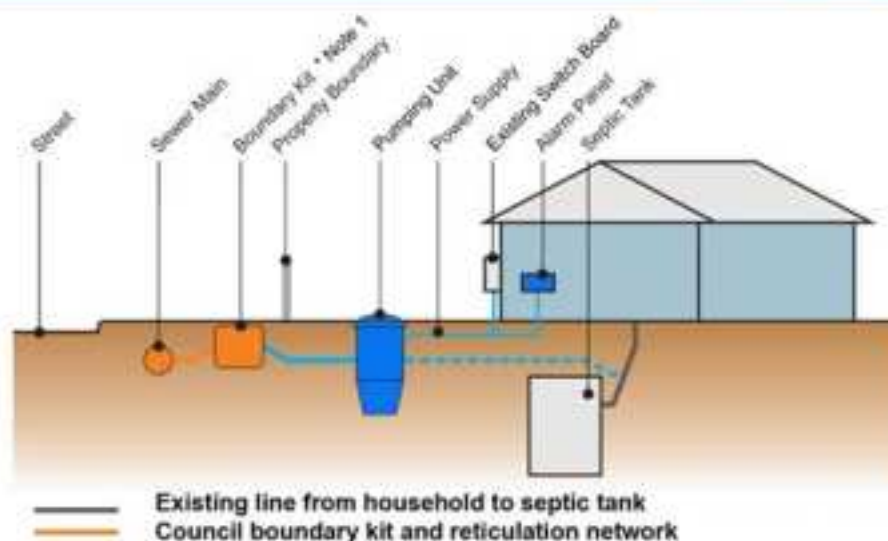
These pipes transfer wastewater to a sewerage treatment plant which processes the wastewater into reclaimed water suitable for re-use or disposal.

From ground level to the alarm level you have approximately 24 hours of emergency sewage storage. This means that even after the alarm sounds you can continue to use the system for around 24 hours before it will overflow (however you are encouraged to minimise water use during this time).



Using the System

There are a few things you need to know to ensure the system runs smoothly. The system operates like a normal sewerage system. It will take waste liquids from your toilet, sink, shower, bath, dishwasher and washing machine and transfer the waste to the local sewerage treatment plant.



Note 1: Boundary kits may not be installed for temporary solutions.

To avoid blockages and damage to the Pressure Sewerage System the following items should **NOT** be placed into the system.



If the alarm sounds



The audible alarm can be turned off by pressing the button underneath the alarm panel. If your Pressure Sewer System has had a short term build up of volume then the system will automatically clean itself and the alarm will switch off within an hour. You will know if this has happened because the alarm light will go out.

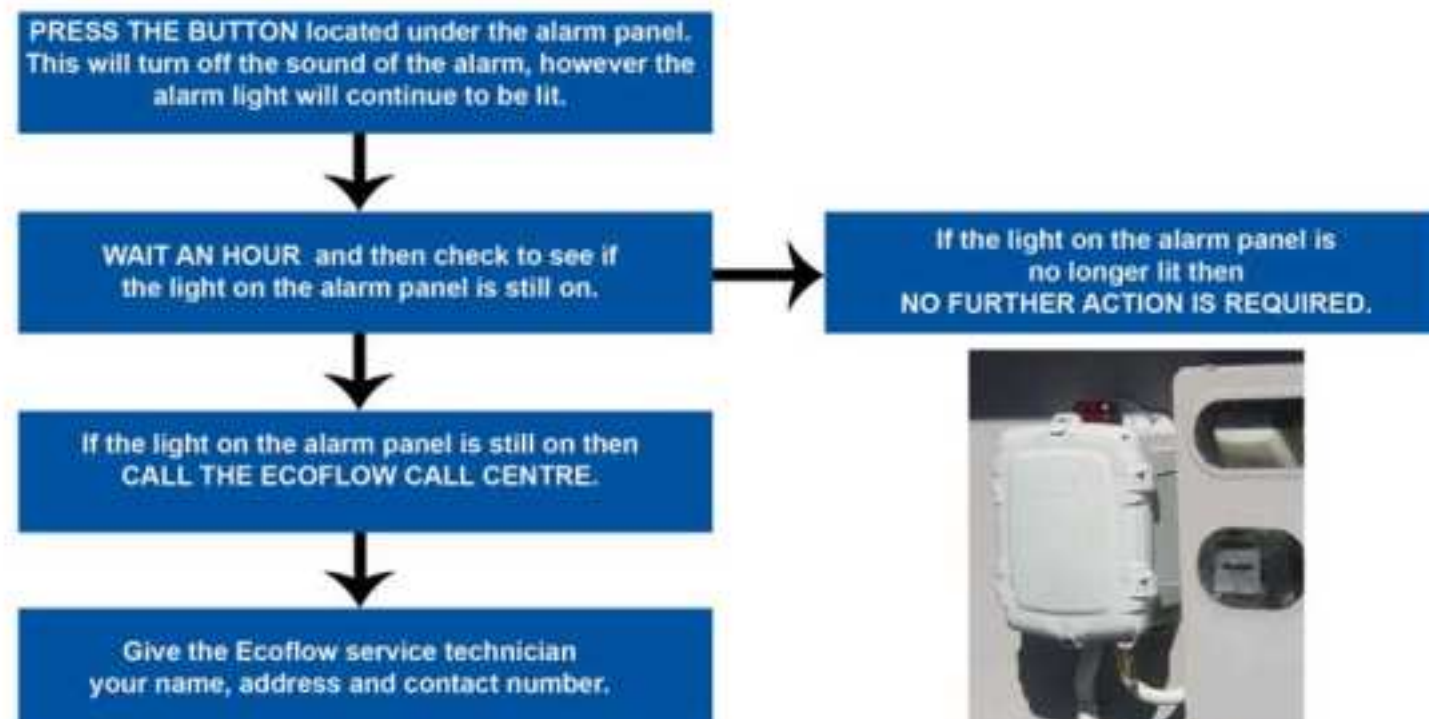
If the alarm light is still active after one (1) hour then call Ecoflow for assistance (refer to phone number on alarm panel). Please also call if the system re-alarms within the next few days.

- The Ecoflow Technician will ask you a series of questions to help determine the urgency and nature of any repairs that may be required.

The system has a built in 24 hour emergency storage capacity so any repairs will be carried out within the 24 hour period. Whilst waiting for the unit to be repaired you should try to minimise the amount of waste going through the system.

If the alarm sounded because of a short term build up and the system subsequently cleaned itself, you should still consider what caused this to happen. If possible, you should guard against this happening in the future (illegal storm water connections to the system, etc).

If you notice any irregularity with the unit, i.e. the alarm frequently sounding, then contact the Ecoflow and discuss your concerns with them.



Trouble Shooting



What happens if...

THE SYSTEM IS DAMAGED AND NEEDS REPAIR? (eg a pipe breaks)

If the alarm goes off, follow the alarm procedure on the previous page.

Determine if the broken pipe is a water main or sewer main.

If it is a sewer main, turn off the power to the pumping unit on your switchboard, report the damage to the Ecoflow Call Centre and state if the damage is on council land, or is on your land.

If the damaged pipe is a water main or sewer street main, report the damage to your local Council Call Centre.

THE UNIT BECOMES SMELLY

When operating normally there should be no noticeable odours coming from the unit. If it gets smelly the unit may need flushing. Just run clean water down your kitchen or bathroom sink for about 5 minutes. If the unit remains smelly contact the Ecoflow Call Centre.

YOU NOTICE WET SPOTS AROUND THE UNIT OR ITS PIPES

The pumping unit and the pipeline are totally sealed. If you notice wet spots around the unit or its pipes and there has not been any recent heavy rains, contact the Ecoflow Council Call Centre to investigate.

THE ALARM KEEPS GOING OFF WHEN IT RAINS

It means rainwater may be getting into the system and overloading it. Contact the Ecoflow Call Centre to investigate.

THE NEIGHBOUR'S ALARM SYSTEM GOES OFF AND THEY ARE AWAY

Telephone the Ecoflow Call Centre. Do not investigate the problem yourself.

THERE IS A FLOOD OR POWER FAILURE

If you can safely stay in your home during the flood then simply minimise the water usage through the unit.

If there is a power failure, discontinue using the system. When the power is restored the system will reset itself.

On Your Property



Be aware...

DO NOT

Put heavy weights on the unit lid, eg. large pot plants.

The unit lid can be safely walked on but this should be avoided.

DO NOT

Touch the valves in the boundary kit.

DO NOT

Turn off the power to the pumps unless in response to a broken sewerage pipe or evacuation in an emergency.

DO NOT

Cover the pumping unit with any dirt / garden mulch etc.

ENSURE ACCESS

Is available to the pump at all times.



CONTACT ECOFLOW

If you are making any modifications to your home which may effect the system, e.g. installing a pool or spa pool.

IF YOU ARE GOING ON HOLIDAY

Even if only for a few days, you should flush the system. This is to avoid the possibility of the system becoming smelly in your absence and causing alarm to your neighbours. To flush the system, simply run a tap in the kitchen or bathroom sink for approximately 5 minutes.

TAKE CARE IN THE GARDEN

Be careful when digging in the garden near the pump unit or it's discharge pipes. If you do accidentally break the pipeline, immediately contact the Ecoflow Council and let them know what has happened. While waiting for the Ecoflow Service Technician to arrive, minimise the water use in the house.

DO NOT ATTEMPT TO REPAIR THE SYSTEM YOURSELF

For emergency alarms phone:

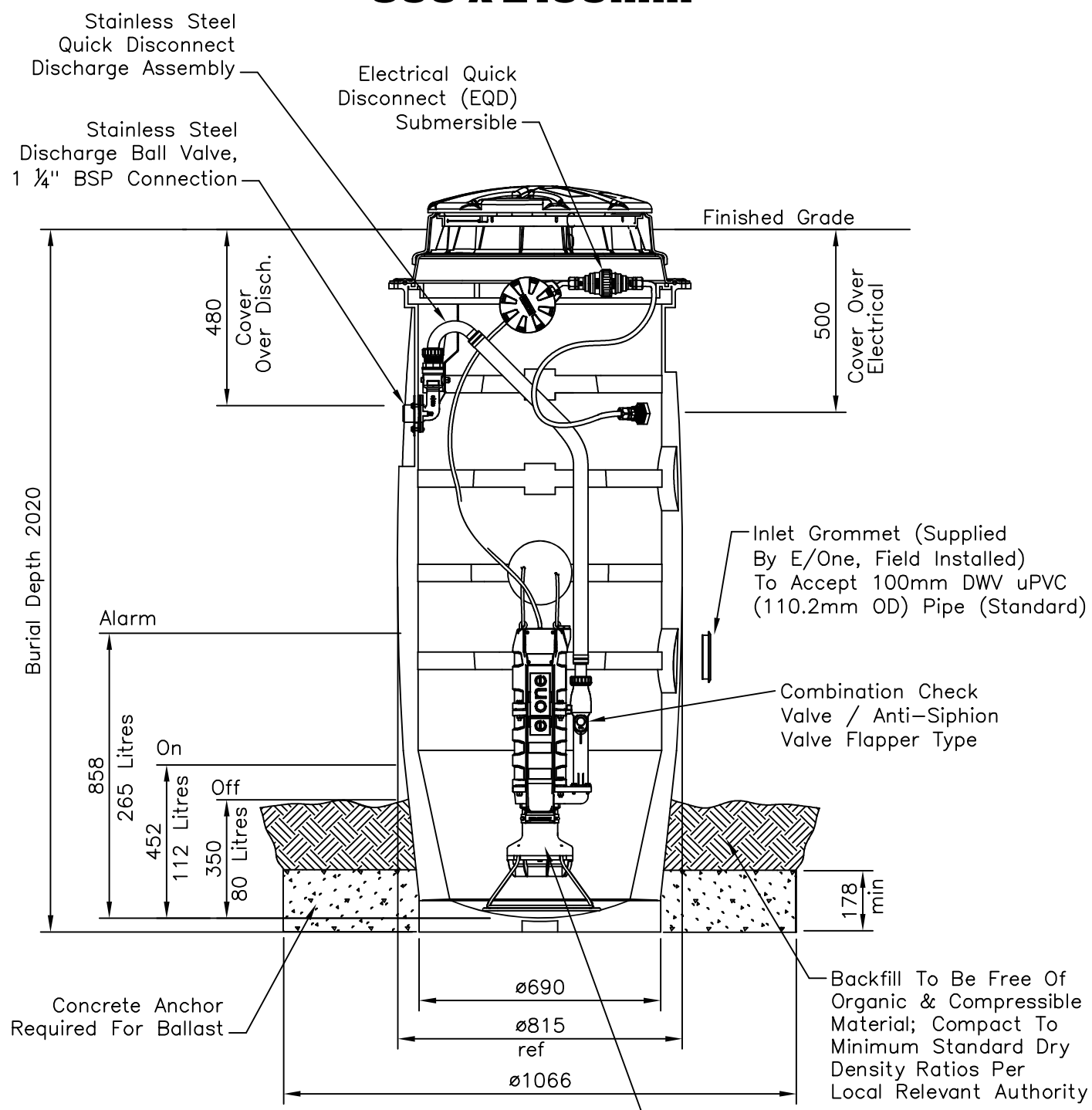
ecoflow

0508 528 3725

0508 LATERAL

MODEL 2010iP

800 x 2100mm



SPECIFICATIONS 2010iP - 800 x 2000

BASIN	Diameter (mm)	Height (mm)	Weight (kg)	Total Capacity (l)	Capacity Above Alarm (l)	Ballast (m3)	Inlet Pipe Size (mm)
	800	2100	74	720	455	SEE DWG	100

PUMP	Pump (s)	Dimensions (mm)	Weight (kg)	Nominal Pump Rate @ 0m TDH (lps)	Nominal Pump Rate @ 20m TDH (lps)	Nominal Pump Rate @ 42m TDH (lps)	Discharge Size (mm)	ELECTRICAL	Voltage (VAC)	Phase	Cycle (Hz)	Supply Cable (m)	Alarm Panel
	Simplex (1)	330 X 800	47	.75	.63	.47	32		240	Single	50	As Specified	Simplex (1)

"Extreme" Semi-Positive Displacement Grinder Pump. Direct Driven By A 0.75kW Submersible Motor



MODEL 2010iP LIGHT TRAFFICABLE

Sealed Manhole Cover
ø600 Cover with
ø810 Frame
(supplied by others)

ø50 Lateral Vent to be installed
above flood level in accordance
with relevant code

Adjustment Ring
300mm adjustment

Reinforced Concrete

Compacted Backfill

Inlet Grommet (Supplied
By E/One, Field Installed)
To Accept 100mm DWV uPVC
(110.2mm OD) Pipe (Standard)

Combination Check
Valve / Anti-Siphon
Valve Flapper Type

Backfill

Concrete Anchor
Required For Ballast

"Extreme" Semi-Positive Displacement
Grinder Pump. Direct Driven By A
0.75kW Submersible Motor

SPECIFICATIONS

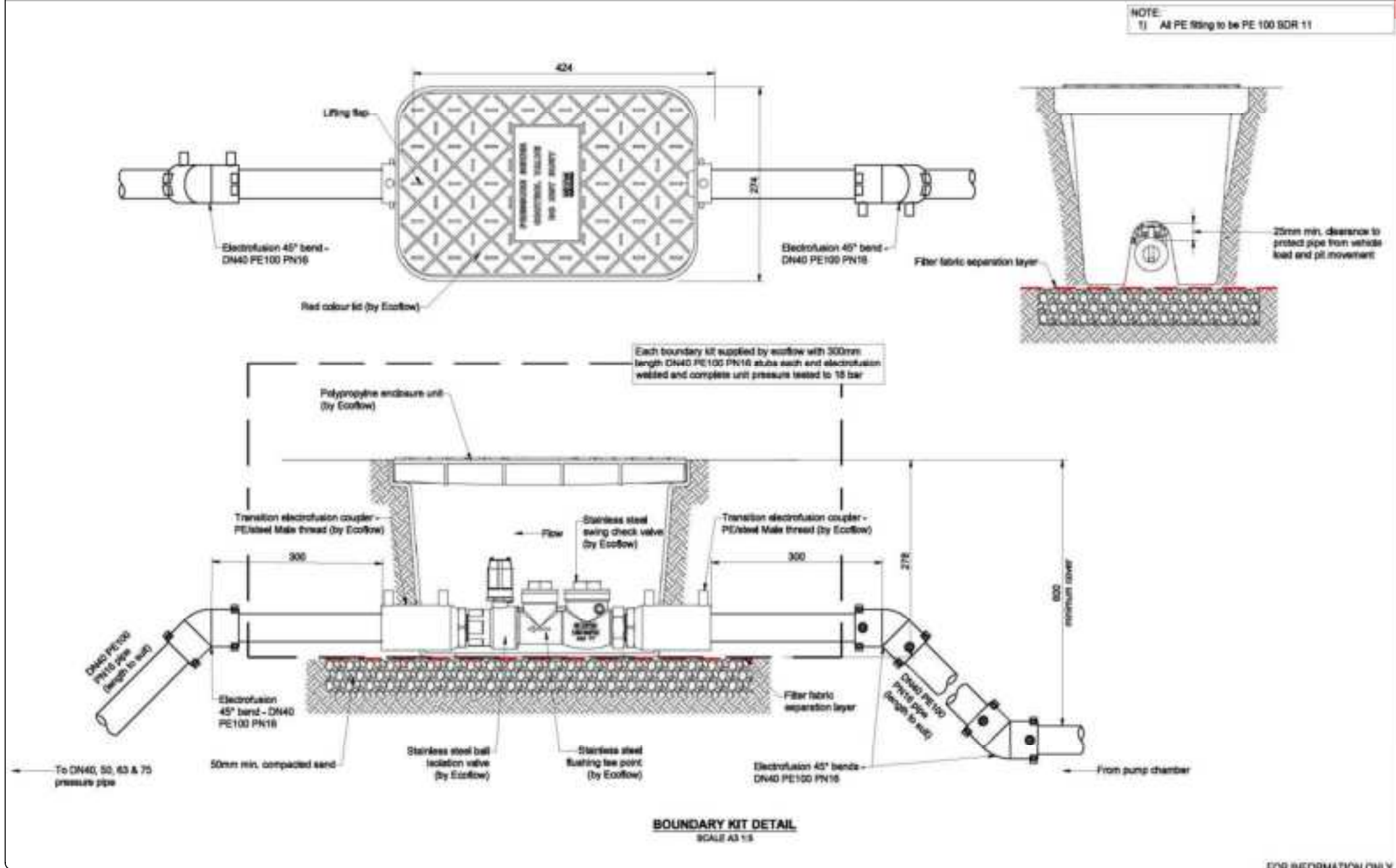
2010iP - 800 x 2000

BASIN	Diameter (mm)	Height (mm)	Weight (kg)	Total Capacity (l)	Capacity Above Alarm (l)	Ballast (m ³)	Inlet Pipe Size (mm)
	800	2000 +300	74	720	455	SEE DWG	100

PUMP	Pump (s)	Dimensions (mm)	Weight (kg)	Nominal Pump Rate • 0m TDH (lps)	Nominal Pump Rate • 20m TDH (lps)	Nominal Pump Rate • 42m TDH (lps)	Discharge Size (mm)
	Simplex (1)	330 X 800	47	.75	.63	.47	32

ELECTRICAL

Voltage (VAC)	Phase	Cycle (Hz)	Supply Cable (m)	Alarm Panel
240	Single	50	As Specified	Simplex (1)



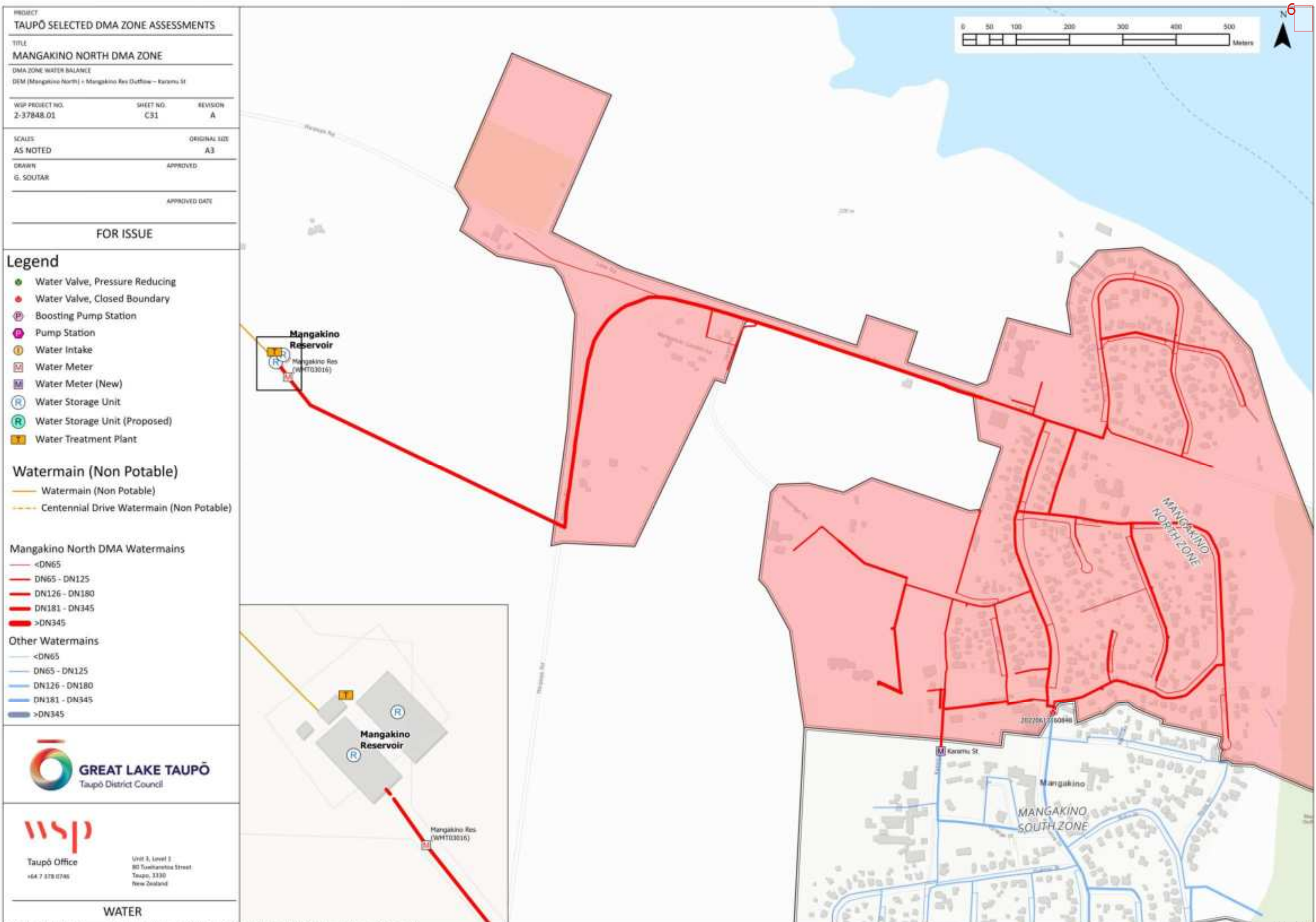
Appendix 4

TDC Water Network Plans

Mangakino Water Take
Resource Consent

Preliminary Water Reticulation
Layout Sketch

Preliminary Water Demand
Calculations



- Water Valve, Pressure Reducing
- Water Valve, Closed Boundary
- Boosting Pump Station
- Pump Station
- Water Intake
- Water Meter
- Water Meter (New)
- Water Storage Unit
- Water Storage Unit (Proposed)
- Water Treatment Plant

— Watermain (Non Potable)
- - - Centennial Drive Watermain (Non Potable)

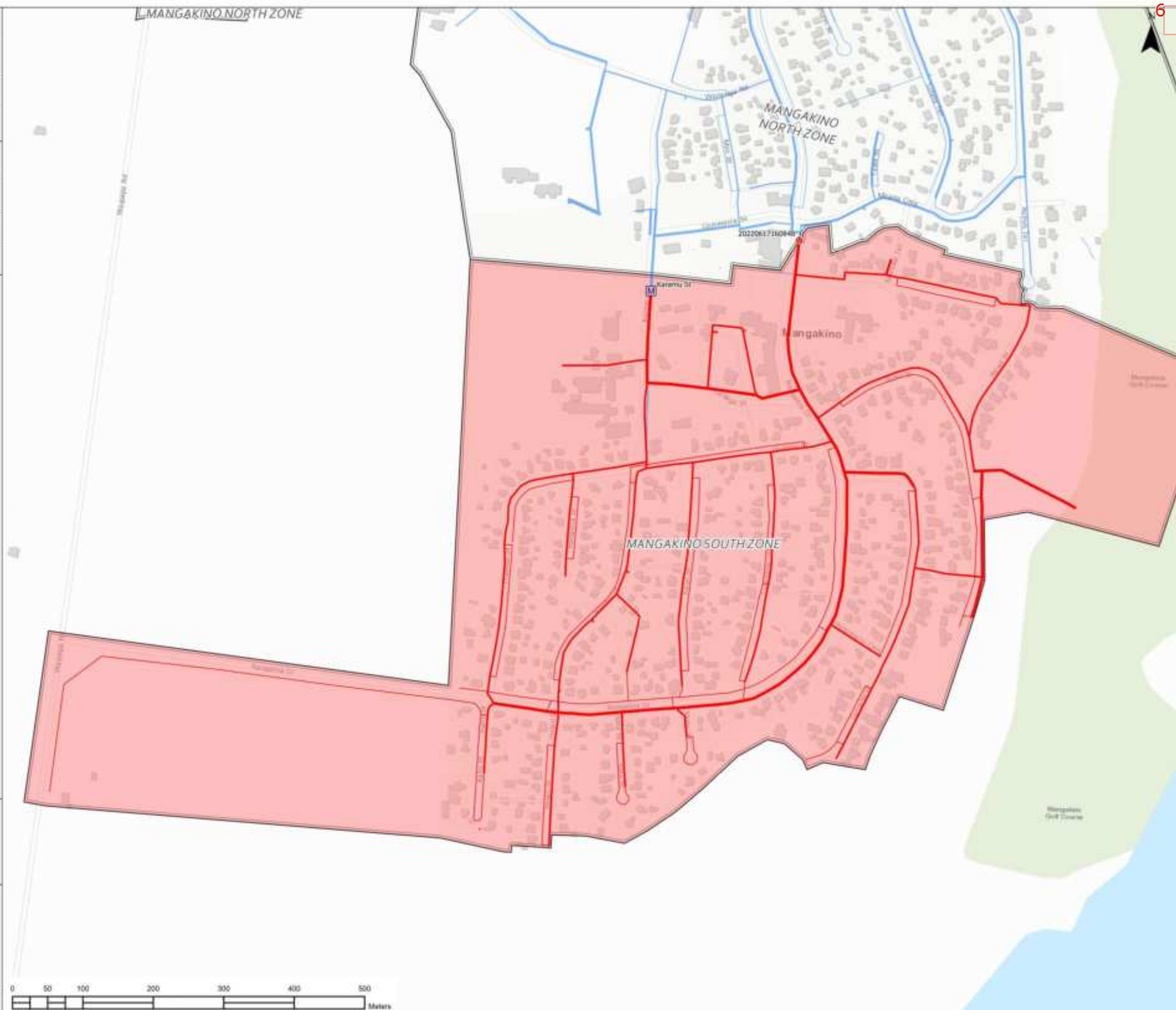
— <DN65
 — DN65 - DN125
 — DN126 - DN180
 — DN181 - DN345
 — >DN345

— <DN65
 — DN65 - DN125
 — DN126 - DN180
 — DN181 - DN345
 — >DN345



Taupo Office
+64 7 378 0745
Unit 3, Level 1
80 Tuahangahanga Street
Taupo, 3330
New Zealand

WATER



RESOURCE CONSENT CERTIFICATE

Resource Consent: AUTH140647.01.01

File Number: 60 01 75A

Pursuant to the Resource Management Act 1991, the Regional Council hereby grants consent to:

Taupo District Council
Private Bag 2005
Taupo Mail Centre
Taupo 3352

(hereinafter referred to as the Consent Holder)

Consent Type: Water Permit

Consent Subtype: Surface water take

Activity authorised: Take water from unnamed tributary of Waikato River for Mangakino town supply

Location: Waipapa Road - Mangakino

Map reference: NZTM 1839658 E 5751601 N

Consent duration: This consent will commence on the date of decision notification and expire on 30 November 2049.

Subject to the conditions overleaf:

CONDITIONS

General

1. The activity authorised by this resource consent shall be undertaken in general accordance with the following application documentation:
 - a) “Mangakino Water, Lake Taupo, Resource Consent Renewal” (recorded as document number 14141902 on the Waikato Regional Councils document recording system)
 - b) “Water Demand Management Plan, dated 2 June 2016” (recorded as document number 1868941 on the Waikato Regional Councils document recording system), and
 - c) “Resource Consent Application APP140647 – Mangakino Surface Water Take” (recorded as document number 14492224 on the Waikato Regional Councils document recording system)

and as identified in the resource consent conditions below which shall prevail in the event of any inconsistency between the aforementioned documentation and the conditions.

2. The consent holder shall be responsible for all sub-contracted operations related to the exercise of this consent, and must ensure sub-contractors are made aware of the conditions of this consent.
3. The consent holder shall pay to the Waikato Regional Council any administrative charge fixed in accordance with section 36 of the Resource Management Act 1991, or any charge prescribed in accordance with regulations made under section 360 of the Resource Management Act 1991.
4. Water must not be taken under this consent unless consent AUTH102792.01.01 has either been surrendered by the consent holder, or has expired.
5. Within the period of 20 working days from the commencement of this consent the consent holder must give written notice to the Waikato Regional Council of the surrender in whole of consent AUTH102792.01.01.
6. Water taken pursuant to this consent must only be used for municipal supply for the Mangakino community.

Abstraction Limits

7. The maximum net take volume in any 24 hour period shall not exceed 2,000 cubic metres.
8. The maximum instantaneous take shall not exceed 61 litres per second.
9. The annual net take volume must not exceed 590,000 cubic metres, for the period of 1 July to 30 June.
10. When the taking of water will contribute to:
 - a) the minimum flow (based on a 7–day rolling average of river flow data) from the Taupo Gates to be less than 50 cubic metres per second when the level of Lake Taupo is below 355.95 metres above sea level; or
 - b) the minimum flow (based on a 7–day rolling average of river flow data) from the Karapiro Dam to be less than 140 cubic metres per second and the minimum flow (based on a 7–day rolling average of river flow data) from the Taupo Gates to be less than 50 cubic metres per second when the level of Lake Taupo is below 355.95 metres above sea level

for ten or more consecutive days, the total combined net take volume in any two-day period must not exceed 3,400 cubic metres.

Recording and Reporting

11. A water measuring system must quantify water taken on a continuous basis. The system must have a reliable calibration to water flow and must be maintained to an accuracy of +/- 5%. Within six months of the commencement of this consent, evidence of the water measuring system's calibration to an accuracy of +/- 5% must be provided to the Waikato Regional Council.
12. Verification of the water measuring system's accuracy shall be undertaken by the consent holder:
 - a) at the written request of the Waikato Regional Council;
 - b) at a frequency of no less than five yearly from the date of the first calibration first required by condition 11; and
 - c) to the satisfaction of the Waikato Regional Council.

Evidence documenting each respective additional calibration must be forwarded to the Waikato Regional Council within one month of the calibration being completed.

13. The consent holder must telemeter, by 1 July 2020 – via a telemetry system developed after liaison with the Waikato Regional Council to ensure that the telemetry system is compatible with Waikato Regional Council telemetry system standards and data protocols – continuous 15 minute values of net take volume (in units of cubic metres). These data must be reported once daily to the Waikato Regional Council via the telemetry system and there must be 96 values per daily report. When no water is being taken the data must specify the net take volume as zero.
14. Prior to the implementation of electronic recording required by condition 8, the consent holder shall provide to the Waikato Regional Council, reports detailing total daily water take and maximum daily take rate data on a monthly basis.

Water Management Plan

15. The Taupo District Council Water Demand Management Plan, dated June 2016 (recorded as document number 1868941 on the Waikato Regional Councils document recording system), must be reviewed and updated, having due regard to the Waikato Regional Plan's 8.1.2.2 Water Management Plans, and submitted to the Waikato Regional Council by no later than 31 December 2021. Thereafter, the Water Demand Management Plan must be reviewed and updated, having due regard to the Waikato Regional Plan's 8.1.2.2 Water Management Plans, and submitted to the Waikato Regional Council at a frequency of at least three yearly.
16. In the event of conflict between any version of a Water Demand Management Plan and the conditions of this consent, the conditions prevail.

Review

17. At any time and on only one occasion subsequent to finalisation of the peer reviewed technical report (hereinafter "technical report") prepared by the Waikato Regional Council in accordance with method 3.3.4.8 of the Waikato Regional Plan, the Waikato Regional Council will, following service of notice on the consent holder, commence a review of condition 10 of this consent pursuant to section 128(1) of the Resource Management Act 1991 for the purpose of giving full effect to the provisions of the Waikato Regional Plan pertaining to water shortage conditions by (1) using the Q5 flow statistics recorded in the technical report for the Waikato River for the catchment upstream of Karapiro Dam and (2) replacing the wording of condition 9 with the wording set out in italics below.

When the 7-day rolling average natural flow of the Waikato River for the catchment upstream of Karapiro Dam, as determined by the Waikato Regional Council, is less than the minimum natural flow for the purposes of this consent the minimum natural flow of the Waikato River for the catchment

upstream of Karapiro Dam is 95 percent of the Q5 calculated for this catchment and recorded in the technical report or any subsequent review(s) of the technical report for ten or more consecutive days, the total combined net take volume in any two-day period must not exceed 3,400 cubic metres.

Advice Note: Costs associated with any review of the conditions of this resource consent will be recovered from the consent holder in accordance with the provisions of section 36 of the Resource Management Act 1991.

18. At any time during the years 2024, 2029, 2034, 2039 and 2044 the Waikato Regional Council may, following service of notice on the consent holder, commence a review of the conditions of this consent pursuant to section 128(1) of the Resource Management Act 1991 for the following purposes:
- To review the effectiveness of the conditions of this consent in avoiding or mitigating any adverse effects on the environment from the exercise of this consent and if necessary to avoid, remedy or mitigate such effects by way of further or amended consent conditions;
 - To review the adequacy of and the necessity for monitoring undertaken by the consent holder;
 - To review the appropriateness of any rate and/or volume specified within this consent and, if necessary, to address any inappropriateness of any rate and/or volume by way of reducing any take rate and/or take volume;
 - To review the effectiveness of condition 10 in avoiding or mitigating adverse effects on the environment during water shortage conditions in the Waikato River at Karapiro Dam catchment and if necessary to avoid, remedy or mitigate such effects by way of further or amended consent conditions.

Advice Note: Costs associated with any review of the conditions of this resource consent will be recovered from the consent holder in accordance with the provisions of section 36 of the Resource Management Act 1991.

19. At any time during the periods 1 July 2032 through 30 June 2033 the Waikato Regional Council may, following service of notice on the consent holder, commence a review of the conditions of this consent pursuant to section 128(1) of the Resource Management Act 1991 to take account of any change to the Waikato Regional Plan being proposed as a result of any catchment investigation undertaken by the Waikato Regional Council in respect of the catchment denoted Waikato River (2) Huka Falls to Karapiro Dam in the Waikato Regional Plan's Table 3-4A Catchment Investigation Dates.

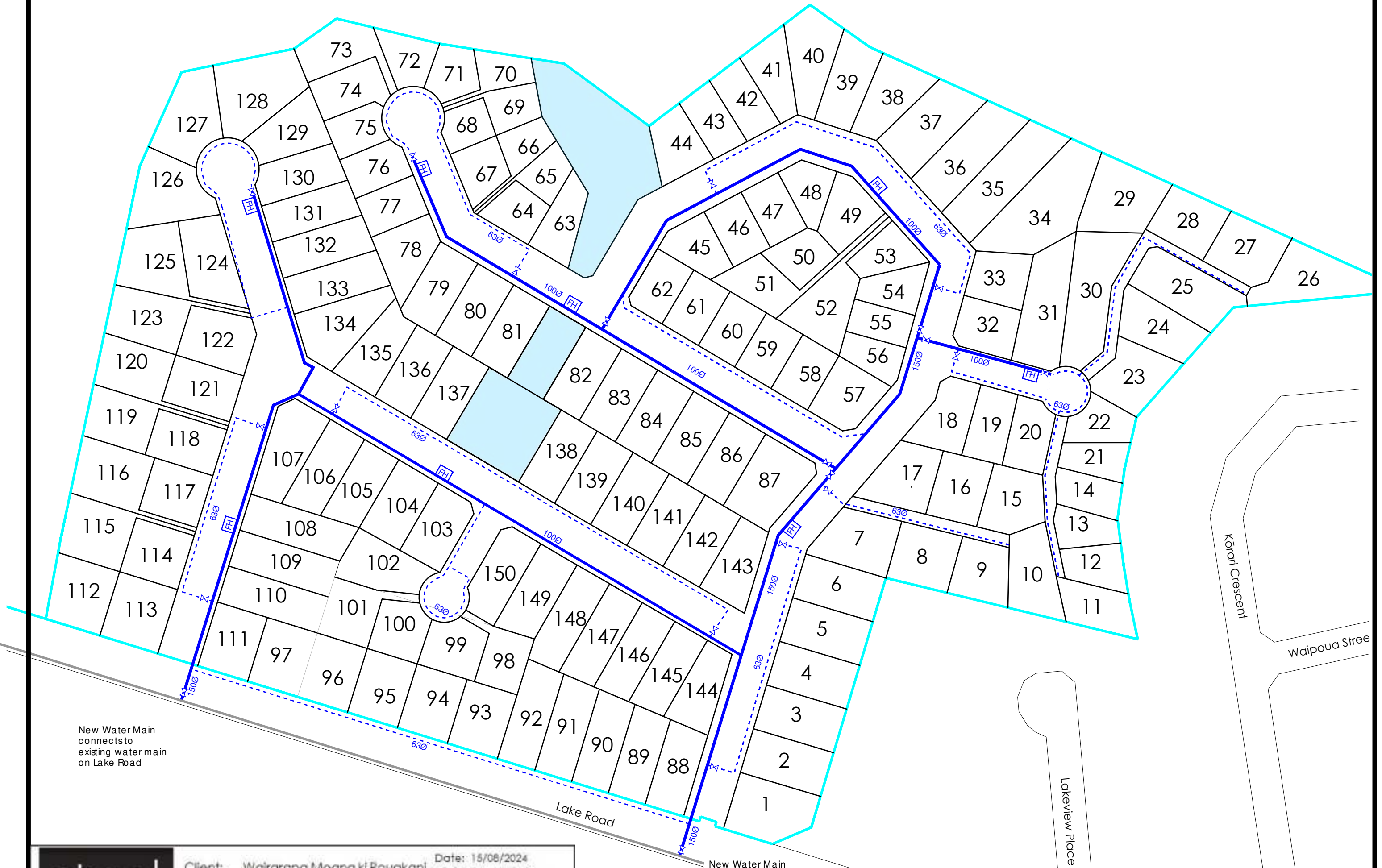
Advice Note: Costs associated with any review of the conditions of this resource consent will be recovered from the consent holder in accordance with the provisions of section 36 of the Resource Management Act 1991.

Advice notes - General

- This resource consent does not give any right of access over private or public property. Arrangements for access must be made between the consent holder and the property owner.
- This resource consent is transferable to another owner or occupier of the land concerned, upon application, on the same conditions and for the same use as originally granted (s.134-137 RMA).
- The consent holder may apply to change the conditions of the resource consent under s.127 RMA.
- The reasonable costs incurred by Waikato Regional Council arising from supervision and monitoring of this/these consents will be charged to the consent holder. This may include but not be limited to routine inspection of the site by Waikato Regional Council officers or agents, liaison with the consent holder, responding to complaints or enquiries relating to the site, and review and assessment of compliance with the conditions of consents.
- Note that pursuant to s332 of the RMA 1991, enforcement officers may at all reasonable times go onto the property that is the subject of this consent, for the purpose of carrying out inspections, surveys, investigations, tests, measurements or taking samples.

- If you intend to replace this consent upon its expiry, please note that an application for a new consent made at least 6 months prior to this consent's expiry gives you the right to continue exercising this consent after it expires in the event that your application is not processed prior to this consent's expiry.

In terms of s116 of the Resource Management Act 1991, this consent commences on the date of notification of consent decision.



New Water Main connects to existing water main on Lake Road

New Water Main connects to existing water main on Lake Road.



Client: Wairarapa Moana ki Pouakani
Address: 37 Lake Road, Mangakino
Title: Proposed Water Supply

Date: 15/08/2024
Designer: LU/TWB
Job Number: 200723
Plan: SK- 001



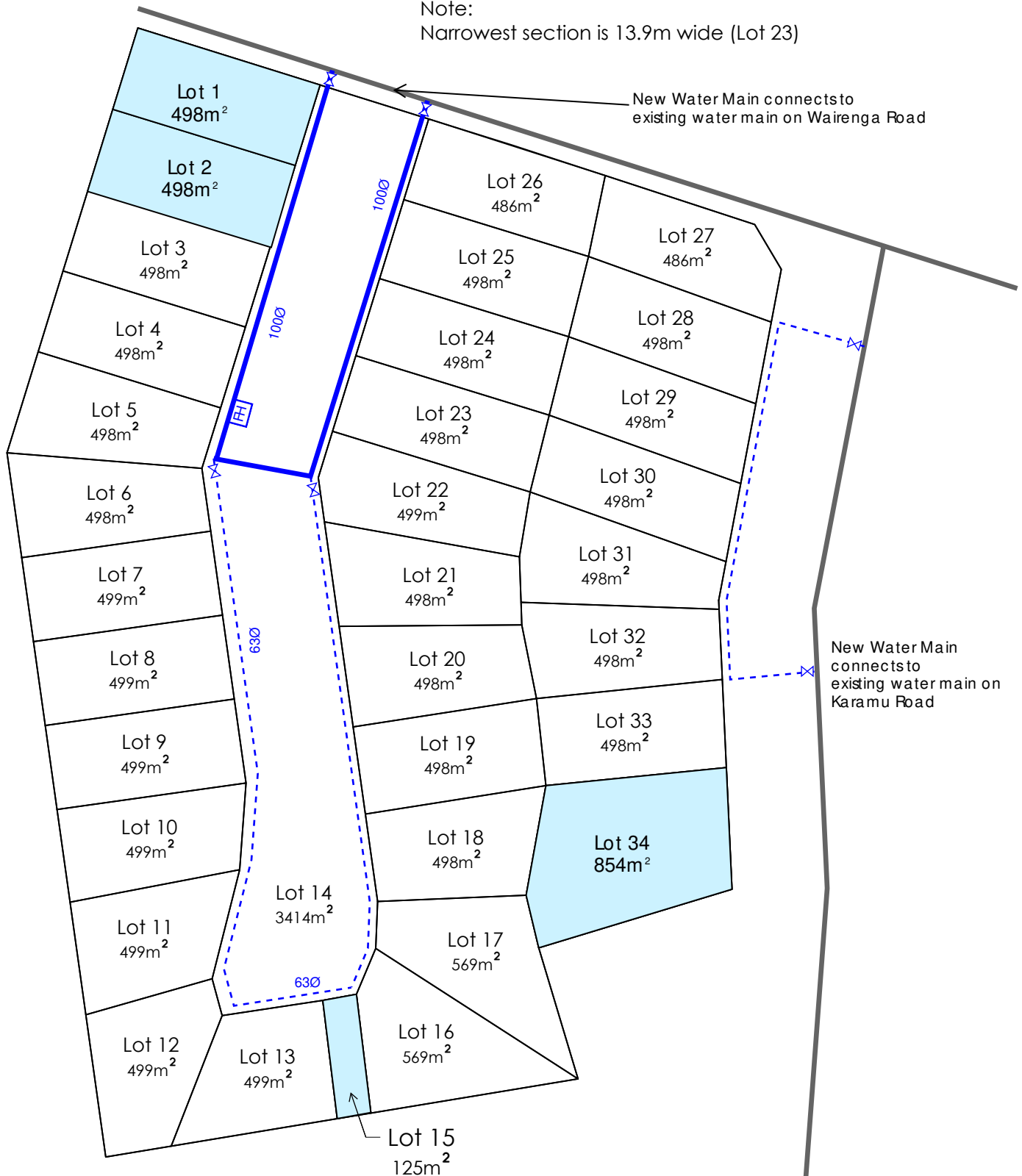
LEGEND:



Potential Stormwater pond/reserve

Note:

Narrowest section is 13.9m wide (Lot 23)



Water Supply Domestic Demand

1. Domestic Demand

1a. Lake Road Domestic Demand

$$HEU := 2.7$$

Person per dwelling TDC CoP

$$Flow := 400 \frac{L}{day} = 0.005 \frac{L}{s}$$

Flow allowance per person TDC CoP

$$No.Lots := 150$$

Number of Lots

$$Average_Flow := 150 \cdot 400 \frac{L}{day} \cdot 2.7 = 162 \frac{m^3}{day}$$

Average Desing Flow TDC CoP

$$Peak := 5$$

Peaking factor

$$Daily_flow := Peak \cdot Average_Flow = 9.375 \frac{l}{s}$$

Peak Wet Weather Flow

1b. Karamu Street Domestic Demand

$$HEU := 2.7$$

Person per dwelling TDC CoP

$$Flow := 400 \frac{L}{day} = 0.005 \frac{L}{s}$$

Flow allowance per person TDC CoP

$$No.Lots := 34$$

Number of Lots

$$Average_Flow := 150 \cdot 34 \frac{L}{day} \cdot 2.7 = 13.77 \frac{m^3}{day}$$

Average Desing Flow TDC CoP

$$Peak := 5$$

Peaking factor

$$Daily_flow := Peak \cdot Average_Flow = 0.797 \frac{l}{s}$$

Peak Wet Weather Flow



Client: Wairarapa Moana ki Pououkani Inc.
Address: 57 Lake Rd & 3 Karamu St, Mangakino
Job Description: Preliminary Water Demand

Date: 19/08/2024
Designer: LU/TWB
Job Number: 200723

2. Combined Fire and Domestic Demand

From Appendix K of SNZ PAS 4509:2008

demand varies from zone to zone, but as a guide in residential areas, can be estimated as follows:

Zones less than 1000 dwellings: $Q_{peak} = 0.0467D^{0.48} \text{ L/s}$

Zones larger than 1000 dwellings: $Q_{peak} = 0.0467D \text{ L/s}$

where Q_{peak} = Peak annual demand (L/s)

D = Number of dwellings

Water Supply Classification= FW2

Residential dwellings

$$Flow := 25 \frac{L}{s}$$

Minimum flow demand for Fire Fighting

2a. Lake Road Calculations

$$D := 150$$

Number of Lots

$$Q := 0.0467 D \cdot \frac{L}{s} = 605.232 \frac{m^3}{day}$$

Demand

2b. Karamu Street Calculations

$$D := 34$$

Number of Lots

$$Q := 0.0467 D \cdot \frac{L}{s} = 137.186 \frac{m^3}{day}$$

Demand



Client: Wairarapa Moana ki Pououkani Inc.
Address: 57 Lake Rd & 3 Karamu St, Mangakino
Job Description: Preliminary Water Demand

Date: 19/08/2024
Designer: LU/TWB
Job Number: 200723

Appendix 5

The Lines Company
confirmation letter

24 November 2023

Wairarapa Moana Ki Pouakani Incorporation
P O Box 1347
Taupo 3351

By email: michael@wairarapamoana.org.nz

Tena koutou

RE. PROPOSED RESIDENTIAL DEVELOPMENT AT LAKE ROAD, MANGAKINO

This is a follow up to the meeting with Michael Allan and Karol Good on 20 November 2023.

At the meeting we discussed the residential development proposal where 156 residential lots could be created on Lake Road, Mangakino. This area is currently zoned rural, and you are basing your proposal on achieving a change of zone for the area to residential.

You have requested that I confirm:

1. The Lines Company can provide electricity to the area on Lake Rd, Mangakino for the additional 156 residential sections;
2. The supply can be provided without the need for a new sub-station to be built.

I can confirm the above points 1 and 2, however please acknowledge that a line upgrade may be required. I cannot guarantee what the position will be like when the proposed development is ready for the power reticulation. There is a 50kVA transformer located on Lake Road that should provide adequate electrical supply for some of the earlier stages of the development.

The TLC Maraetai zone substation is located at 516 Waipapa Road. This is within an acceptable distance from the subdivision. If additional circuits or an overhead line upgrade are required to power the proposed subdivision these will be connected to the substation. If this is required, you should consider the line upgrade could be in the vicinity of \$500,000 of cost to you.

We remind you that you will be required to pay for the electrical reticulation from the boundary point on Lake Road into each residential lot.

If you have any queries, please feel free to contact me.



Joel Williams
Manager Programme Delivery & Key Accounts
Kaiwhakahaere Whakarato Kaupapa me Ngā Pūkete Hira

Mangakino Residential Demand

Economics Assessment

Prepared for Wairarapa Moana Ki Pouākani Incorporation

May 2026



Authors

Rodney Yeoman
rodney@formative.co.nz
021 118 8002

Derek Foy
derek@formative.co.nz
021 175 4574

Disclaimer

Although every effort has been made to ensure the accuracy and reliability of the information provided in this report, Formative Limited and its employees accepts no liability for any actions or inactions taken based on its contents.

© Formative Limited, 2021

Contents

1	Introduction.....	1
1.1	Background	2
1.2	Report structure.....	4
2	Mangakino and Planning Framework.....	5
2.1	Operative District Plan	6
2.2	Future Development Strategy.....	7
2.3	Plan Change 44.....	9
3	Residential Demand	12
3.1	Permanent resident demand situation.....	12
3.2	Permanent resident demand projections.....	14
3.3	Temporary resident demand	15
3.4	Temporary resident demand projections.....	16
3.5	Findings – demand context.....	17
4	Market Outcomes	19
4.1	Market sales and prices	19
4.2	Market rentals and rents	21
4.3	Findings – market outcomes.....	22
5	Conclusions.....	24
	Addendum 1 – Residential Sub-markets	26
A1.1	Standalone and Attached.....	27
A1.2	Existing and New Urban Area	28
A1.3	Residential Sufficiency	29
A1.4	Variety of Supply	30

Figures

Figure 1.1: Taupō District Population Projections – TD2050, SNZ High and TDC Medium	3
Figure 2.1: Mangakino Environs.....	5

Figure 2.2: Mangakino Operative District Plan Zones	6
Figure 2.3: FDS Future Residential Growth - Mangakino.....	7
Figure 2.4: TDC Potential Greenfield Developments - Mangakino.....	8
Figure 2.5: TDC Housing Capacity - Mangakino	9
Figure 3.1: Taupō District historic population age structure	13
Figure 3.2: Mangakino Occupied dwellings – historic, projection, and scenario	14
Figure 3.3: Mangakino Unoccupied dwellings – historic, projection, and scenario	16
Figure 4.1: Median house price sales for Taupō, Waikato, Rotorua, Hamilton, and New Zealand.....	19
Figure 4.2: Mangakino median house price sales.....	20
Figure 4.3: Active Bonds in Mangakino area (Marotiri SA2).....	22
Figure A.1: Taupō District New Dwelling Consents 2014-25 – Shares of Standalone and Attached....	27

1 Introduction

Wairarapa Moana Ki Pouākani Incorporation (“WMI”) is a major holder of land in and around Mangakino, in northern Taupō District, and has a special interest in the success of the town. As such, it has made general submission to the rolling Taupō District Plan review and the Future Development Strategy (“FDS”), that there is demand for more housing in Mangakino that more residential capacity should be provided to meet the needs of the community, and that there is a need for industrial land to serve the needs of the town and wider rural community. WMI has also commissioned research and engaged with Taupō District Council (“TDC”) on the renewal of the Mangakino wastewater treatment plant resource consent to ensure that sufficient capacity is provided in the town to allow for growth.¹ During the review the TDC changed the resource consent to increase capacity to enable more growth in Mangakino.² To meet the demand, TDC has recently included two potential greenfield developments in Mangakino within the capacity assessment that underpins the District’s planning framework, namely WMI land at 57 Lake Road (approximately 150 lots anticipated from 2030) and Karamu Street (approximately 30 lots anticipated from 2030).

TDC is now progressing Plan Change 44 (Residential Zones), which primarily focusses on the rules that apply within the Medium Density Residential Zone (MDZ), General Residential Zone (GRZ), and Low Density Residential Zone (LRZ). PC44 also includes rezoning of some land and s32 report acknowledges that landholders can submit to have rezoning of their land included if it meets a set of criteria.³ Mangakino is zoned GRZ, but is not mentioned in s32 report or background economic assessment, and the report does not provide advice on whether the potential greenfield developments in Mangakino should be live zoned.

There is no supporting evidence within the PC44 documentation that covers the capacity or demand for housing in Mangakino. Formative Limited has been commissioned by WMI to provide research on the nature and scale of residential demand that can be expected in Mangakino. This research focuses on two key issues:

- ❖ The nature and quantum of demand for residential dwellings in Mangakino, both historic and future. This includes demand arising from both permanent residents and temporary residents (holiday homes and short stay accommodation – AirBnB, etc.).

¹ Traverse Environmental (2021) Mangakino Wastewater Treatment Plant – Revised Resource Consent Renewal Application (22 April).

² Taupō District Council (2023) Resource Consent 137023 Mangakino Revised Conditions.

³ Taupō District Council (2026) Section 32 Evaluation Report Plan Change 44 Residential Chapter – Medium Density Residential Zone, General Residential Zone, and Low-Density Residential Zone (page 22-23).

- ❖ The outcomes in the Mangakino housing market, which indicate the degree to which the town (as zoned) is meeting the needs of the Mangakino community now. This includes assessment of sale prices, sales volume, rentals and rent.

1.1 Background

Taupō District has experienced significant population growth. The latest provisional population estimates from Statistics NZ for the Taupō District show a current (2025) estimated population of 42,700, up from 41,500 in 2023, which is equivalent to 1.4% per annum.⁴ In total 1.0% of the national population growth from 2023 to 2025 was located in Taupō District, making Taupō one of the fastest growing districts in the country. Importantly, since 2023 growth in Taupō has been tracking at a rate that is above the Statistics New Zealand Medium Projection and close to the High Projection.⁵

Accompanying this population growth, the Taupō District economy has also experienced strong employment growth, up from around 19,600 jobs in 2018 to 21,500 in 2025.⁶ Employment in the District has grown by 1.2% per annum, again faster than most districts in New Zealand.

Until recently TDC had been planning for the population to peak in the late 2030s at 39,000 people, with negative migration and an aging population driving a slow decline in population over the following decades (shown in Figure 1.1).⁷ That is understandable, as for most regional parts of New Zealand there had been a consistent trend of migration of younger population to the large centres (Auckland, Tauranga, Hamilton, etc) and an aging of the remaining population.⁸

However, nationally there has been a reversal of recent historic trends, with positive net migration to many regional areas, and unexpected positive population growth. This has caused issues in many regions where council planning has not been able to adapt to provide sufficient supply, with house prices and shortages being observed in many towns. This reversal has been driven by a number of factors, potentially the most influential of which has been the relatively affordable housing in regional areas compared to the large urban areas, and the more recent changes in work practises post Covid-19 (e.g. remote working).

These national trends have also affected Taupō, which has experienced rapid recent growth. The district's population now exceeds the peak level that was planned for in the District Growth

⁴ Statistics New Zealand (2024) Population Estimates.

⁵ Statistics New Zealand (2025) Projected Population Scenarios – Low, Medium, and High.

⁶ Formative (2025) Business and Employment Database – Total Employment Count which includes both working proprietors and employees.

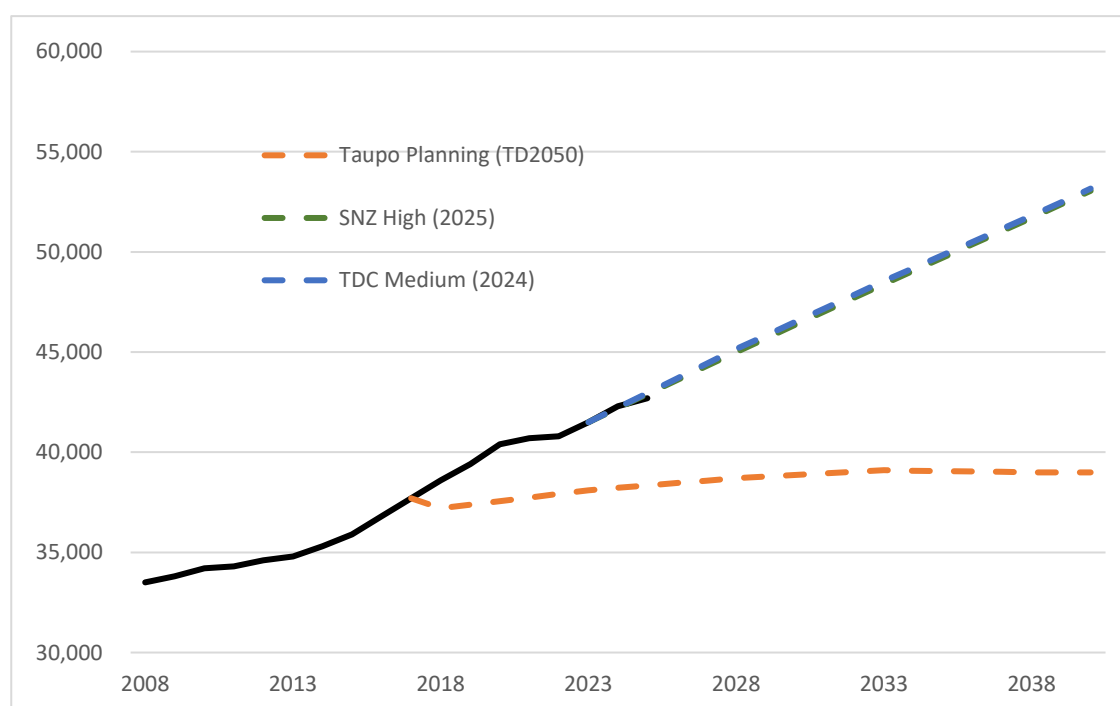
⁷ Taupō District Council (2018) Taupō District 2050 - District Growth Management Strategy.

⁸ National Institute of Demographic and Economic Analysis (2014) Taupō District Demographic Trends and Projections.

Management Strategy (i.e. 42,000 in 2023). Most of the TDC planning framework is over ten years old, which means that it does not account for the recent changes in demand.

Council is currently updating the planning framework to provide more supply, however this process will take some time to be implemented. TDC's latest projections which are available on the council website show population under the Medium projection⁹ is now expected to track above Statistics New Zealand's High projection¹⁰ (shown in Figure 1.1). The Council now expects population to exceed 53,000 by 2040, which is a growth of 10,000 people and is equivalent to a 24% increase in population. This compares to the TD2050 which had projected growth of 660 in the same period and was equivalent to only 2% increase in population. Obviously the 1300% increase in growth outlook will impact how Council provides for growth in the District. Specifically, there is little evidence that current zoning extents will be sufficient to meet ongoing demand, especially within the towns within wider district such as Mangakino.

Figure 1.1: Taupō District Population Projections – TD2050, SNZ High and TDC Medium



We also note that there are a considerable number of dwellings in the district which are used by non-residents for holiday homes and short stay accommodation. The District is likely to continue attracting visitors and tourists in the future, which will drive additional demand for dwellings. This additional demand should be considered when assessing the housing needs in the District, especially in the holiday locations like Mangakino.

⁹ Taupō District Council (2023) Taupō District Population Projections.

¹⁰ Statistics New Zealand (2025) Projected Population Scenarios – High.

1.2 Report structure

This report provides an assessment of the residential market of Mangakino town, within the wider context of the Taupō market. The report has the following sections:

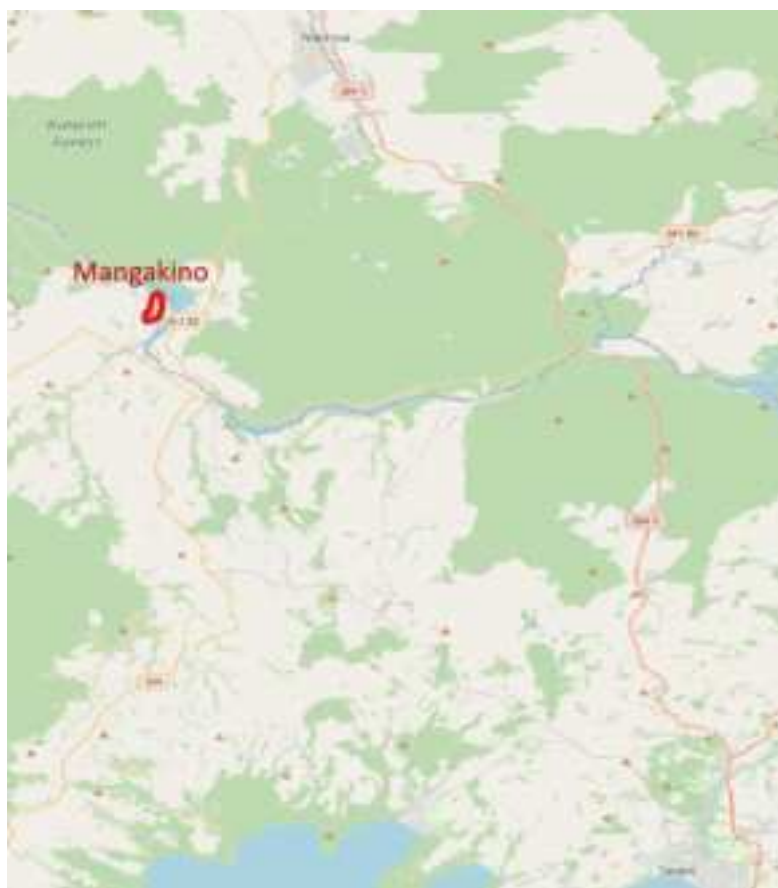
- ❖ Section 2: provides an overview of the existing Mangakino town and the planning framework that applies.
- ❖ Section 3: assesses demand for residential in Mangakino, and around Taupō.
- ❖ Section 4: assesses the market outcomes within Mangakino.
- ❖ Section 5: concludes the report with findings from the different aspects of the economic assessment of Mangakino.
- ❖ Addendum 1: provides additional discussion on the nature of demand, in the context of housing supply options.

2 Mangakino and Planning Framework

Mangakino is a small town on the banks of the Waikato River, on Lake Maraetai, north of Taupō. The town was developed in the 1940s to house workers needed for the construction of the hydroelectric stations along the river, and it grew to over 5,000 people in the 1950s. After the completion of the hydroelectric stations the resident population declined and is now under 1,000 people.¹¹ However, half the dwellings in the town are occupied by permanent residents with the other half of dwellings being used for holiday homes and short stay accommodation.¹²

The town is approximately 50km from Taupō, 37km from Kinleith and 28km west of State Highway 1 at Ātiamuri (Figure 2.1). The town is relatively close to Hamilton and Auckland, and has become a holiday location, with visitors coming to the area to undertake water sports on the sheltered lake or other recreational activities such as walks, hikes, bike trails, and golf. Recently, there has been increasing growth in the number of dwellings used as holiday homes and short term accommodation.

Figure 2.1: Mangakino Environs



¹¹ Statistics New Zealand (2025) Population Estimates.

¹² Statistics New Zealand (2023) Population Census of Population and Dwellings 2023.

2.1 Operative District Plan

In the operative District Plan the town is mostly zoned GRZ, with a small amount of Town Centre (Figure 2.2). In 2024 councils PC39 changed the performance standards for building coverage in GRZ, which now allows lot size down to approximately 300m².¹³ However, given the small nature of the change it is likely to have a limited impact on the subdivision pattern in Mangakino.

Finally, we note that the land surrounding Mangakino is zoned General Rural and is held by WMI. Therefore, new growth areas will be provided on WMI land.

Figure 2.2: Mangakino Operative District Plan Zones



¹³ GRZ-R5 – Standards which increases the building coverage to 40%. If a dwelling of 120m² was built then it would require a minimum lot size of 300m².

2.2 Future Development Strategy

The FDS includes commentary about Mangakino and future growth. It notes that:

“In order to meet the growth anticipated for Mangakino, this FDS has identified additional growth areas for Managkino, which will accommodate approximately 150 homes. To confirm that these sites are appropriate for residential development, in-depth site investigations would need to occur through a plan change process.”

And

“The growth model does not anticipate growth in these smaller towns and villages except for modest growth in Mangakino.”

And

“Mangakino has seen renewed growth, driven by its rising popularity as a destination for holiday homes.”

And

“Through our pre-engagement, we have heard that there is a need to ensure that there is adequate housing in our smaller villages and towns such as Mangakino, Whakamaru and Atiamuri to accommodate those who are working rurally but may not have accommodation provided”

The FDS notes two new Future Residential Growth areas in Mangakino, 57 Lake Road and Karamu Street (Figure 2.3). A key action of the FDS is that each time TDC reviews the Residential Chapters of the District Plan, that they will undertake an assessment to determine whether future growth areas need to be rezoned.

Figure 2.3: FDS Future Residential Growth - Mangakino



Also of relevance is the TDC Housing Capacity Model, which is updated regularly and used for Council planning purposes. The model currently identifies 57 Lake Road as being developed within the coming decade (from 2030, indicated in orange in Figure 2.4), and Karamu Street as being developed in the following decade (from 2040, indicated in blue in Figure 2.4). The assessment does not provide an estimate of remaining capacity in the GRZ zone and Council officers consider that infill is limited to 1-2 per annum.¹⁴ We agree, and expect that there is very little remaining and it would be less than 25 new dwellings¹⁵.

Figure 2.4: TDC Potential Greenfield Developments - Mangakino



Importantly, the Housing Capacity Assessment compares TDC demand projections (without competitiveness margin) to the capacity including the 180 in the potential greenfield developments (57 Lake Road and Karamu). TDC assessment shows that even with the new greenfield areas there will be a shortage by around 2051.

Figure 2.5 shows a map of the outcomes under the TDC medium growth projection, which indicates a shortages in Mangakino (red shading) and remaining capacity in rural area around the town (blue shading in Marotiri). Potentially, there is a risk that if more land is not zoned for urban use in Mangakino then households would be forced to find accommodation in the rural area. This would result in fragmentation of rural land, and loss of productive land. Also, it would not contribute to well-functioning urban environment.

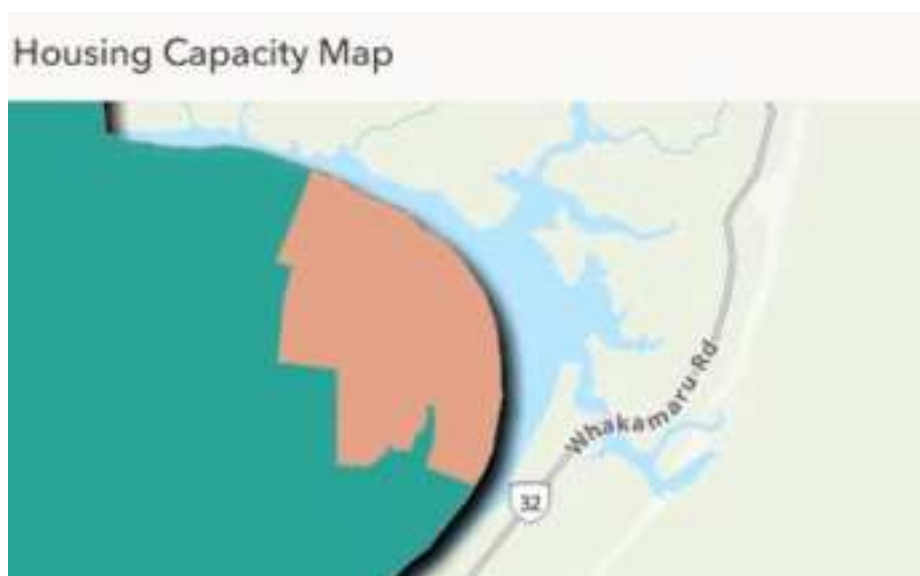
We consider that it will be vital for the Future Residential Growth areas in Mangakino, 57 Lake Road and Karamu Street to be zoned for use and also for other new Future Residential Growth areas to be

¹⁴ Communication with Senior Policy Advisor that manages Growth Model and data provided 19 May 2026.

¹⁵ There are 24 vacant lots recorded in Corelogic (2026) Property Guru.

identified to provide more capacity. Furthermore, we note that TDC should also include additional capacity to meet the requirement of the NPS-UD. It is not clear whether the reported results include 20% in the medium term and 15% in the long term.

Figure 2.5: TDC Housing Capacity - Mangakino



Furthermore, TDC has provided updated capacity and demand data from the current growth model (19 May 2026), which shows that there is already a shortfall in Mangakino and that this is expected to increase until the potential greenfield developments at 57 Lake Road and Karamu Street are zoned for development.

Specifically, TDC growth model indicates demand of between 40 (medium growth) and 67 (high growth) dwellings in Mangakino over the period 2025–2035. Including a competitiveness margin, this equates to a requirement to provide approximately 46 to 81 additional dwellings of capacity in Mangakino.

2.3 Plan Change 44

PC44 is not proposing to increase or zone additional residential land in Mangakino. There is no mention of Mangakino in s32 report or background economic assessment. The report does not provide advice on whether the potential greenfield developments in Mangakino should be live zoned.

As outlined above, a key action of the FDS is that each time TDC reviews the Residential Chapters of the District Plan, that they will undertake an assessment to determine whether future growth areas need to be rezoned.

PC44 changes the rules applying to almost all residential land in the district. In that context, it would seem reasonable for the Council to undertake an assessment of the resulting development capacity

to determine whether there remains a need to rezone potential greenfield development areas, consistent with the stated intent of the FDS.

The s32 report acknowledges that further rezoning may be required to provide additional LRZ capacity to address the identified shortfall in the FDS. It also notes that landowners may submit requests for rezoning of their land where the relevant criteria are met.¹⁶ While this part of the report does not explicitly mention GRZ, potentially the same criteria would be relevant to assessment of rezoning greenfield developments in Mangakino.

The following lists the criteria and the extent to which the 57 Lake Road and Karamu Street meet these criteria.

- ❖ *The area is located immediately adjacent to an existing LRZ or GRZ, or has an existing development pattern that is consistent with LRZ density and character.*

Yes, both 57 Lake Road and Karamu Street are immediately adjacent to GRZ.

- ❖ *The area is able to be efficiently serviced by Council-supplied water infrastructure.*

Yes, TDC has confirmed the existing water infrastructure is sufficient for the additional lots and has specifically increased wastewater capacity to allow both 57 Lake Road and Karamu Street to be developed.

- ❖ *The development of allotments would not result in more than minor adverse effects on the supporting land transport network.*

Outside my area of expertise, however at this scale I would expect minimal traffic impacts from either 57 Lake Road and Karamu Street.

- ❖ *The area is not identified as an Outstanding Natural Landscape or Significant Natural Area.*

No, there are no ONL or SNA in this location.

- ❖ *The area is proximate to the Taupō township and/or existing LRZ.*

Yes, 57 Lake Road and Karamu Street are proximate to an existing township.

- ❖ *The site does not take access from a State Highway.*

No

- ❖ *The area is not located within land being part of the Wairakei-Tauhara or Ohaaki Geothermal Systems shown on Map D1.*

No

¹⁶ Taupō District Council (2026) Section 32 Evaluation Report Plan Change 44 Residential Chapter – Medium Density Residential Zone, General Residential Zone, and Low-Density Residential Zone (page 22-23).

- ❖ *The area is demonstrated to be free of significant natural hazard risk.*

Yes, most of the land is free of natural hazard risk. Some of 57 Lake Road is proximate to the river and maybe subject to natural hazards.

I consider that both 57 Lake Road and Karamu Street satisfy all elements of the rezoning criteria outlined in the s32 report, notwithstanding that they are currently identified for LRZ rezoning. Accordingly, rezoning this land for GRZ would be consistent with the assessment framework adopted by TDC.

3 Residential Demand

Mangakino and Taupō are in the central North Island, an attractive tourism destination by virtue of its proximity to Waikato river, Lake Taupō, the central North Island mountains, and the national parks that surround the area. The area is located a similar distance from Auckland and Wellington, and its centrality makes it a popular destination for events, and an increasingly attractive place to live. Recent state highway upgrades such as the East Taupō Arterial, Waikato Expressway, and Transmission Gully, have decreased travel times from Auckland and Wellington, and combined with increasing ability to work remotely Mangakino and Taupō's attractiveness is likely to continue to increase.

This section summarises the current state of demand for residential property in Mangakino and Taupō generally, focussing in particular on demand for residential lots, both for permanent and temporary residence. We have provided a projection of demand, which provides an understanding of the medium-long term trends which are important when assessing long projects (i.e. housing development), assets management (i.e. infrastructure) and council planning which is mostly focused on 10-30 years periods. We acknowledge that over the long term there will be (many) fluctuations around the trend¹⁷, with some years having lower demand and other years having higher demand, however council and community stakeholders (such as WMI) should be focused on the medium-long term trends.

3.1 Permanent resident demand situation

The demand situation is important because households make decisions about where to live depending on their preferences and their ability to afford each potential option. These individual household decisions collectively combine across the local community and beyond, to produce a dynamically changing outcome in the market. It is important to understand the total quantum of demand, the character of that demand and market outcomes which result from that combined demand.

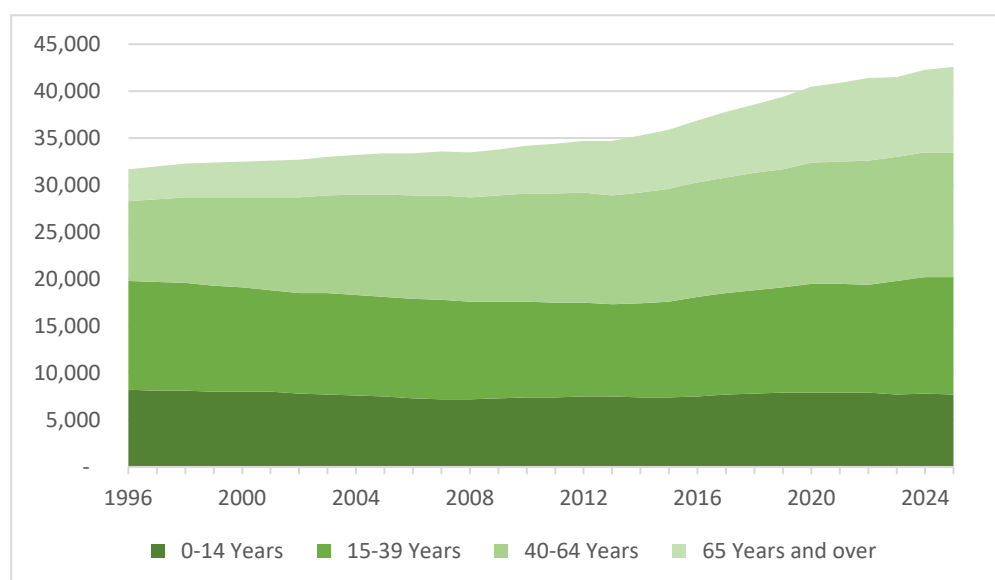
Taupō District's population in 1996 was 31,600, and that increased by just over 1% per annum on average, to 42,700 in 2025 (Figure 3.1). Over most of that period the population grew slowly, or even stagnated, and 76% of the growth has occurred in the last decade, including over half in the last five years.

While the population of all age cohorts has increased since 1996, there has been particularly strong growth in the 65+ age group, and that is projected to continue. Overall since 1996 the District's

¹⁷ There are signs in the wider economy and residential building market that activity may decline in the short term (2026-27). The forecasts from the Commercial Banks and RBNZ suggest that there may be increases in interest rates in the coming quarters which could impact the demand and supply of housing across New Zealand. However, these forecasts are invariably wrong and it is our opinion that it is artificial to try to pick when short term changes will occur or the scale/extent of those changes.

population has aged, household sizes have decreased and the share of the population that is children has decreased. Natural population increase (births minus deaths) and net international migration have both decreased recently, with net internal migration increasing, and being the key driver of population growth.

Figure 3.1: Taupō District historic population age structure



The population in the local area around Mangakino¹⁸ has also aged over the last three decades, however not to the same extent as the rest of Taupō. Since 2011 the population older than 65 increased by 53% in Mangakino, which compares to 72% in Taupō. That indicates that there may be potential for higher levels of natural population growth in the area relative to the rest of the District, and therefore increased demand for dwellings to accommodate permanent residents.

Mangakino's permanent resident population increased from 741 to 822 between the 2013 and 2023 censuses.¹⁹ During this period the number of occupied dwellings increased slightly from 321 to 369, meaning that the average persons per dwelling decreased over the period, from 2.3 to 2.2 persons per dwelling.

Since 2023 there has been new building consents and population growth in Mangakino, with 5% more residents living in the area today than recorded in Census. Most of these new residents will occupy additional houses, and at the household size recorded in the Census this would mean around 20 dwellings occupied. Therefore, we consider that as of 2025 there are likely to be around 390 dwellings

¹⁸ Statistics Area 2 – Mangakino.

¹⁹ Statistics New Zealand (2025) Census of Population and Dwellings 2023.

occupied by permanent residents in Mangakino. This means that since 2023 there has been demand for around 10 new dwellings per annum to meet the needs of the residents in the local community.

3.2 Permanent resident demand projections

Both the Statistics New Zealand and TDC population projections for Taupō District have been revised upward (significantly) in the last few years. It is now projected that the district population will, in the short and medium term at least, continue to be high. While it is beyond the scope of this report to develop independent projections of demand for the entire District, we consider that as a minimum TDC should plan for growth to continue at rates observed in the past decade.

Planning for more growth, rather than less, would ensure that there is a smaller chance of a future undersupply of residential land, which would help to alleviate increasing house prices and dwelling unaffordability. Planning for more growth is also consistent with the approach advanced in the National Policy Statement on Urban Development, which requires there to be at least sufficient capacity to accommodate growth, and so sets minimum required supply, but not maximum. This point is discussed further in Addendum 1.

In Figure 3.2 we estimate the future dwelling numbers required to meet the local community's demand, which is based on the population projections in the Stats NZ High²⁰ and TDC Medium 2024 projection²¹. Based on the existing household size the residents are projected to require an additional 115 to 138 new dwellings to provide for future permanent residents in Mangakino over the coming 28 years.

Figure 3.2: Mangakino Occupied dwellings – historic, projection, and scenario

Permanent Residents	2013	2018	2023	2025	2028	2033	2038	2043	2048	2053	Growth 25-58
Occupied Dwellings	321	330	369	389							
Stats NZ High				389	392	410	428	450	477	504	115
TDC Medium				389	411	435	456	478	502	527	138

These projections compare to TDC previous planned capacity at the Wastewater treatment plant which would enable enough service for 43 new connections (and 73 existing vacant lots) over the coming 35 years. We consider that the information provided in the projections and the latest SNZ projections indicates that permanent resident households in the town are likely to grow to a point which is greater than the capacity of the Wastewater plant. We acknowledge that TDC has now revised their resource consent application for Wastewater treatment plant to allow capacity for a further 300

²⁰ Projection suggests that Mangakino population reaches 1,120 by 2053.

²¹ Projection suggests that Mangakino population reaches 1,201 by 2053.

lots, which would be sufficient to meet the estimated demand from permanent residents in our assessment of Mangakino.

3.3 Temporary resident demand

Mangakino is known for its beautiful scenery and tranquil atmosphere, which makes it a popular destination for visitors and tourists. Lake Maraetai is now well known for wakeboarding, water skiing and other water sports. There is also Waikato River Trail and other walks that draw tourists. The growing number of visitors and tourists has driven increased demand for holiday homes and short term accommodation within the town.

The growth in demand from temporary residents has been important in Mangakino and wider Taupō area, supporting local businesses and employment. However, holiday homes and short term accommodation generate demand for council services, with a demand profile that varies from that of the permanent population, with larger peaks and lower troughs.

These temporary dwellings form a significant part of the housing market in Mangakino and to a lesser extent the rest of Taupō. Broadly, temporary visitors compete for housing within prime locations, and in many instances they have higher wealth or income than permanent residents so they can bid up sales prices and rents. This phenomenon has become more prevalent in recent years, with the rise of online booking sites making renting privately owned homes more feasible than in the past. Unlike permanent residents, the temporary visitors can come from locations which are further away which means that estimating the nature of this demand needs to be assessed using a wider catchment than simply Mangakino, or even Taupō.

In the wider Taupō area there were 6,743 dwellings recorded as being unoccupied in 2023, and most of these will have been holiday homes.²² In the case of Mangakino there was 354 dwellings recorded as being unoccupied in 2023, which is 5% of the total unoccupied dwellings in the District.

In the District there were 1,500 dwellings listed on AirBnB, which means that around 20% of the unoccupied dwellings are used for short term accommodation.²³ In Mangakino there are 43 dwellings listed on AirBnB, which suggests that around 10% of the unoccupied dwellings are used for short term accommodation.²⁴ This data also shows that Mangakino accounts for 2% of the AirBnB stock in the District.

Based on the available data we estimate that there are now around 370 dwellings in Mangakino that are unoccupied. This would mean that 49% of dwellings in the town are either holiday homes or short

²² Statistics New Zealand (2025) Census of Population and Dwellings 2013..

²³ Extracted from AirBnB, 13 April 2023.

²⁴ We note that there are other short stay accommodation others on other platforms (bookabach, etc) that are likely to have accommodation that is not listed on AirBnB, so the true number could be higher than 10%.

term accommodation. We note that that number may have been constrained by what appears to be a limited availability of building sites in the locations closer to the river.

Also, there are a number of vacant lots that have been sold and are yet to be built on. We consider that most of these vacant lots will be held by temporary residents who will develop a holiday home in the future. In the period 2019-23 there was been an average of 16 vacant lots sold per annum, which is higher than the combined number of dwellings occupied by permanent and temporary.²⁵ The implication is that the total demand for serviced lots may be higher than the number of new dwellings that were built in the past, and that the projections in this assessment could be conservatively low.

3.4 Temporary resident demand projections

In Figure 3.3 we estimate the future dwelling numbers required to meet the temporary resident demand, which is based on two methods – TDC Medium Projection which assumes pro rata share of activity²⁶ and Development Scenario²⁷. Our assessment suggests that there could be a need for 140 to 224 new dwellings to provide for future temporary residents in Mangakino over the coming 28 years.

Figure 3.3: Mangakino Unoccupied dwellings – historic, projection, and scenario

Temporary Residents	2013	2018	2023	2025	2028	2033	2038	2043	2048	2053	Growth 25-58
Unoccupied Dwellings	345	348	354	370							
TDC Medium				370	390	420	440	460	480	510	140
Development Projection				370	394	434	474	514	554	594	224

The Wastewater treatment plant assessment does not provide a discussion of how dwellings used by temporary residents are converted to equivalent households (HEU). We would expect that holiday homes tend to have higher peak load during the high season, as more people will stay in each dwelling than would be seen in a dwelling occupied by permanent residents. Conversely, load during low seasons will be much lower than seen in a dwelling occupied by permanent residents. Overall, it maybe that there is conversion factor that needs to be applied to establish wastewater load from temporary residents, and we expect that plant capacity needs to be sized to meet peak, not average loading.

Notwithstanding the conversion to household equivalents, given the scale of demand from permanent residents and non permanent residents, it is expected that the new revised supply of the plant will be sufficient to meet the demands of the community out to 2053. However, the remaining capacity within the Wastewater treatment plant may be nearly exhausted by the end of the period.

²⁵ REINZ (2023) Vacant Residential Lot Sales in Mangakino.

²⁶ Assumes that the share of growth in Mangakino that is Temporary residents remains constant in the future.

²⁷ Assumes that the implied development activity between 2023-25, continues in the future.

3.5 Findings – demand context

Recent population growth in Taupō has substantially exceeded TDC projections made in 2018. TDC has updated its demand projections and revised the resource consent for Mangakino Wastewater treatment plant to accommodate additional growth. The new demand projects and the revised capacity in the resource consent are consistent with our assessment of the outlook for Mangakino.

The general demand situation in Taupō and Mangakino has shifted considerably over the last decade, and there has been a reversal of historic domestic migration trends driving an influx of new residents to the District and visitors/tourists. These trends have resulted in greater demand for dwellings for permanent residences and temporary holiday and short stay accommodation, in both Mangakino and Taupō.

Residential properties within Mangakino would likely have broad geographic appeal, and we consider that the town would attract buyers from a large part of the North Island, given Taupō's good, and improving accessibility from both Auckland and Wellington, and improved technology supporting work from home options.

Our assessment of demand for both permanent residences and temporary holiday and short stay accommodation, suggest that there would be combined demand in the range of 255 to 362 new dwellings by 2053. This suggests that there is demand for around 7 to 10 residential lots per annum.

We acknowledge that TDC has now revised their resource consent for Wastewater treatment plant to allow capacity for a further 300 lots, which would be sufficient to meet most of the estimated demand from both permanent and temporary residents in our assessment of Mangakino. However, the remaining capacity within the Wastewater treatment plant may be nearly exhausted by the end of the period (2053) and TDC may need to plan for further capacity in the coming decades.

We note that demand and supply are to some extent circular, and the provision of increased supply in a particular part of the market, such as areas proximate to the river for holiday homes, may stimulate demand for that type of product, whereas a shortage of supply will mean that little new demand is able to be satisfied in that segment. However, the trend across the mid-North Island reveals that holiday homes have become increasingly popular. Our expectation is that the type of property that could be provided for within the Mangakino area would be attractive to purchasers from across the North Island, given the town's attractiveness as a lifestyle destination, and increasing abilities to work from home, and so if TDC enables more capacity then it may stimulate more demand, and growth in the town, supporting the local economy.

We consider that the growth in demand for Mangakino and holiday homes will continue to grow in popularity, and value, over the coming years. However, unlike urban residential property, the market

for this type of property and lifestyle is much broader than the specific location where the development occurs.

4 Market Outcomes

In this section we provide a discussion of the market outcomes for residential development in Mangakino and Taupō District. This situation is then compared to the demand assessed in section 3, to provide an understanding of the likely future demand-supply balance in the town.

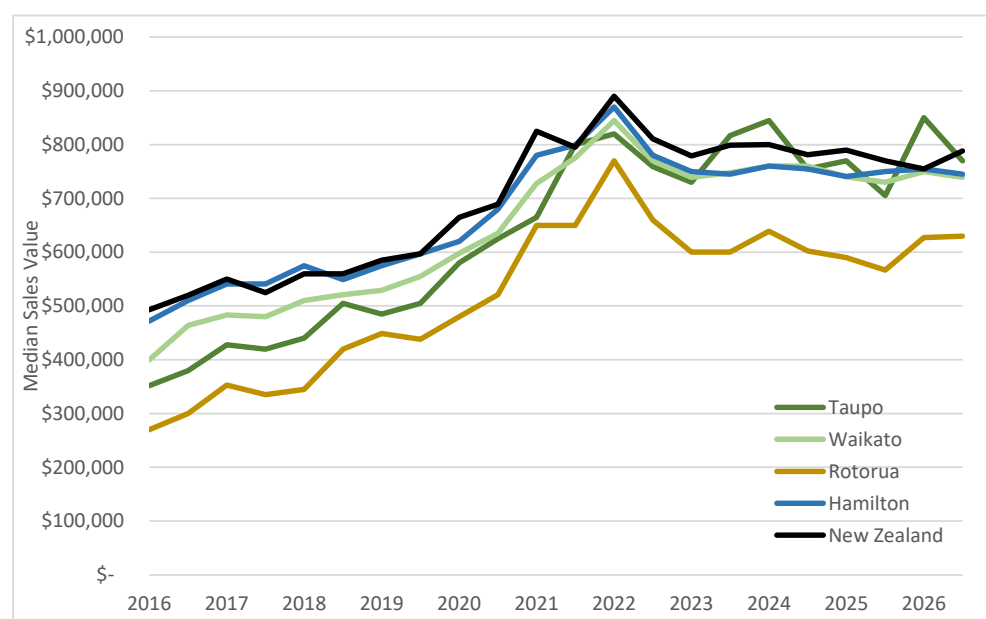
4.1 Market sales and prices

The recent rapid increase in demand has resulted in a considerable change in the residential market in Taupō District. House prices have increased significantly over the last seven years, rising from a median of \$380,000 in 2016 to \$770,000 in 2026, an increase of 103%.²⁸ However, in the last 3 months the median house price has decreased by 9%, driven by rising interest rates and an increasingly negative short term outlook cooling activity in the market (see Figure 4.1).

Over this period, Taupō's median house sales value has shown considerably stronger growth than the wider region (Taupō has grown 73% faster) and national (+99%) growth rates. The Taupō District median price caught up to and overtook the Hamilton, Waikato, and New Zealand median price in late 2021, before retreating back to a level slightly below the national average following the recent decline.

That recent decline in Taupō median sales values reflects the national trend, where a period of significant growth saw prices peak at record highs in late 2021 to early 2022, before declining and stabilising over the last 5 years.

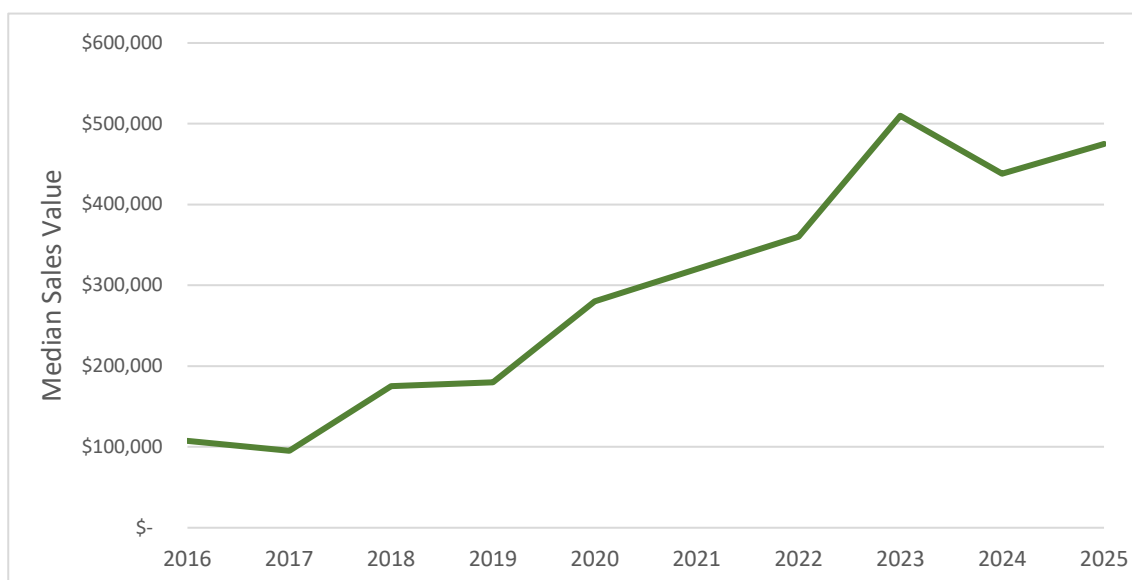
Figure 4.1: Median house price sales for Taupō, Waikato, Rotorua, Hamilton, and New Zealand



²⁸ REINZ (2026) Monthly Property Report – Median Sales Value by Region and Territorial Area (Feb).

The median sales value in Mangakino has increased even more rapidly than Taupō over the last ten years, from \$100,000 in 2016 to over \$475,000 in 2025 (Figure 4.2).²⁹ While median sales values have increased 340% over a short period, the prices in Mangakino are still relatively affordable compared to the wider market in Taupō. However, the affordability of dwellings for local residents will have deteriorated considerably over the period.

Figure 4.2: Mangakino median house price sales



Looking at the individual sales in Mangakino indicates that prices have increased most significantly for newer dwellings and those that are closer to the river and golf course. The older dwellings and those further back from the natural amenity areas have seen smaller increases in sales prices. It is likely that much of the increase in sales values will have been driven by temporary residents, who generally have higher ability to pay for dwellings with amenity.

We also note that the number of properties sold in Mangakino has dropped from around 10% of dwellings per annum to less than 4% in 2025. There are currently 37 dwellings listed for sale on Trademe (less than 5% of the dwelling stock), and a large share have prices listed above \$400,000.³⁰ This decrease in sales volumes during a time of increasing median sales values indicates that properties are being held more tightly, requiring purchases to pay a premium to get into the Mangakino market, and reflecting the increasing attractiveness of the town as a place to live and holiday. Also, for vacant residential land sales the days to sell for listing has decreased from an average of 140 days in 2020 to 50 days in 2021 and further to 30 days in 2022.³¹

²⁹ Corelogic (2023) Residential Sales – Mangakino.

³⁰ Trademe (2026) Residential Dwellings for Sale as at 22nd April 2025.

³¹ REINZ (2023) Vacant Residential Lot Sales in Mangakino.

Generally, when the volume of properties for sale and days to sell drops then this can indicate that the market is tight, with insufficient supply to meet demand. In this case house prices can rise rapidly, which is what has been observed in the sales prices that have been achieved in Mangakino. We consider that the lack of supply and the rapidly increasing house prices indicates that the market is tight. If more supply is provided this could help to relieve the pressure in the market and improve affordability within the town.

4.2 Market rentals and rents

The number of active bonds in the local area around Mangakino has increased from around 100 in 2017 to around 147 in 2026.³² Most of these rentals are likely to be in Mangakino, with a small share in other rural parts within the wider area. Based on 2023 Census we expect that around 38% of permanent residents in Mangakino live in a rental dwelling.

While the supply of rentals has increased over the last few years, there is very little stock currently available for rent. A local letting agent has advised that there were few properties listed for rent in Mangakino in 2023³³ and our search of Trademe confirms that there is very limited stock available, with two rentals listed in Mangakino.³⁴

Historically in Mangakino around 50-55% of residential tenancies turnover per annum. In the past this would mean a reasonable number of vacant dwellings would have been available to rent. The lack of stock indicates that there is likely to be unmet demand in the area, and that the area has become a more popular place in which to rent, as well as to buy.

³² Ministry of Housing and Urban Development (2026) Rental bond data.

³³ Westerman Property Solutions (2023) Mangakino Rental Information as at 29 March 2023.

³⁴ Trademe (2026) Rental Search as at 22nd April 2026.

Figure 4.3: Active Bonds in Mangakino area (Marotiri SA2)



Median rents in the Mangakino area have increased from just under \$400 per week in 2016 to \$685 per week in 2025. The increase in weekly rent has occurred across the market, with both more affordable dwellings (Lower Quartile) and higher cost dwellings (Upper Quartile) increasing at a similar rate over the period.

The data clearly shows that there is limited supply of rentals available within Mangakino. According to local property managers many of the older dwellings within Mangakino won't meet the Residential Tenancy Healthy Homes requirements, therefore cannot be used to supplement the supply of rentals.³⁵ Also the rents have been steadily increasing, which means that housing affordability is deteriorating. We consider that if more supply is not provided that the situation could be expected to worsen.

We note that rents tend to increase more slowly than sales prices because of the time periods in rental contracts. For the most part existing rentals tend to increase incrementally, with larger increases in rents generally occurring when there is a turnover of the tenant. This means that the lodged bond data tends to underestimate the change of rents within the market, with rents tending to be higher for new tenancies. Therefore, the change in affordability may be worse than is displayed above, and could deteriorate as old tenants move out and new tenants move into Mangakino.

4.3 Findings – market outcomes

Residential sales prices and weekly rents in Mangakino have both increased considerably since 2016, which means that the housing affordability has deteriorated in the town. Most significantly, the sales

³⁵ Westerman Property Solutions (2023) Mangakino Rental Information as at 29 March 2023.

prices of dwellings has increased by 340% over this short period. Rents have also increased, however to a small extent with a 70% increase over the same period.

The volume of dwelling stock available to buy and rent has declined over the last year. This situation suggests that the residential market within Mangakino has become tighter, and that increases in both sales prices and weekly rents is likely to continue in the town in the future. However, as discussed in the previous section, we would expect that the market will develop more capacity in the future which may alleviate the tightness of the market and improve housing affordability.

WMI, as a key stakeholder in the performance of the town, is considering several options for providing additional housing in Mangakino, which could contribute to providing for the demands of the community and the temporary residents.

5 Conclusions

Residential demand within both Mangakino and Taupō District has increased over the last five years. We would expect that the market will seek to provide additional residential supply within Mangakino (and Taupō) in the coming decade in recognition of this high demand, and that this supply will be considerably higher than what was previously planned for by TDC and the land zoned for GRZ in the town is unlikely to provide sufficient development potential to meet the demand.

The market outcomes for Mangakino show that the expected demand is likely to be greater than the available residential capacity. There are already pressures in the market, with sales prices and rents increasing, which has resulted in significant consequences for housing affordability in Mangakino. There is limited stock available, either for sale or rent, which means that the expected demand cannot be accommodated, and sale prices and weekly rents are likely to continue increasing in the future.

While the future is uncertain, we consider that it would be prudent for TDC and key stakeholders (such as WMI) to plan to provide more capacity within Mangakino to provide for both the needs of the local community and also temporary residents.

Our assessment of demand for both permanent residences and temporary holiday and short stay accommodation, suggest that there would be combined demand in the range of 255 to 362 additional dwellings by 2053, or around 7 to 10 residential lots per annum. The projected demand for an additional 255-362 dwellings by 2053 is much higher than the TDC previous planned capacity. Also we consider that the new projection of dwelling demand may be conservative, as there has been high demand over the last five years. This outcome suggests that demand for holiday homes in Mangakino could be higher than is shown in our projection.

We acknowledge that TDC has now revised their resource consent for Wastewater treatment plant to allow capacity for a further 300 lots, which would be sufficient to meet the estimated demand from both permanent and temporary residents in our assessment of Mangakino. Furthermore, TDC's updated capacity and demand data from the current growth model (19 May 2026), shows that there is already a shortfall in Mangakino and that this is expected to increase until the potential greenfield developments at 57 Lake Road and Karamu Street are zoned for development.

Therefore, the evidence suggests that the remaining capacity enabled in the GRZ from the proposed PC44 is unlikely to be sufficient to meet the expected demand. Importantly, councils demand projections suggest that there may well be a short fall in Mangakino. We consider that it would be prudent to provide more development potential in Mangakino, and that this would be provide via the zoning of additional GRZ land. The FDS sets out actions, which includes the intention to undertake

review of whether rezoning of the greenfield growth areas is required each time Residential Chapters are refreshed. PC44 has not included a review, and only mentions rezoning potential for LRZ.

Importantly, both 57 Lake Road and Karamu Street are identified in the FDS as greenfield growth areas and both would satisfy all elements of the rezoning criteria outlined in the s32 report, notwithstanding that they are identified for LRZ rezoning. Accordingly, rezoning this land for GRZ would be consistent with the assessment framework adopted by TDC.

Given the expected growth trajectory and the relatively limited remaining supply in Mangakino, it is likely that both 57 Lake Road and Karamu Street will need to be brought forward for development. At a projected growth rate of approximately 7-10 dwellings per annum and an estimated remaining capacity of around 25 lots, existing capacity would be exhausted within the next 2–3 years.

This indicates a potential shortfall emerging in the short term, likely around 2028-2029. On that basis, there appears to be a clear need for additional zoned land to ensure supply remains aligned with demand. Accordingly, rezoning via PC44 of at least 57 Lake Road should be progressed now as a minimum response to address the anticipated capacity constraint. We also consider that rezoning Karamu Street would be beneficial, as it would help ensure an adequate supply of residential capacity and provide additional flexibility to respond to demand.

Finally, we note that demand and supply are to some extent circular, and the provision of increased supply in a particular part of the market, such as areas proximate to the river for holiday homes, may stimulate demand for that type of product, whereas a shortage of supply will mean that little new demand is able to be satisfied in that segment. However, the trend revealed across the mid-North Island reveals that holiday homes have become increasingly popular, and we expect that Mangakino properties will continue to be popular with purchasers from across the North Island, given the town's attractiveness as a lifestyle destination, and increasing abilities to work from home, and so if TDC enables more capacity then it may stimulate more demand, and growth in the town. Therefore, we consider that development activity in the future could be higher than noted in this report.

Addendum 1 – Residential Sub-markets

The National Policy Statement on Urban Development (NPS-UD) places specific planning requirements on local authorities that have an Urban Environment³⁶. Taupō meets the criteria set out in the NPS-UD, with a population of around 25,000 people and being predominately urban in character, therefore TDC is required to implement the NPS-UD.

As a Tier 3 local authority, TDC must meet the requirements in Policy 2 which requires local authorities to “at all times, provide at least sufficient development capacity to meet expected demand for housing and for business land over the short term, medium term, and long term.” This policy requires that councils provide at least sufficient capacity to accommodate growth, which is a threshold or a minimum level that is required, but not a maximum. Generally, the high growth councils (Tier 1 and 2) provide more than the bare minimum, to ensure that there is sufficient variety of development options.

Importantly, the NPS-UD has a wider set of objectives than simply providing a minimum level of capacity to meet the demands. Policy 1 of the NPS-UD requires councils to consider whether their decisions contribute to Well-functioning Urban Environment, which includes aspects such as enabling a variety of homes, supporting the competitive operation of land markets, affordability, etc. This means that there may be a number of reasons for providing more capacity than the minimum, and that potential options to provide more capacity can be considered on their merits.

Also, Policy 5 of the NPS-UD requires TDC to consider enabling intensification in the urban environment that is commensurate to the relative demand and accessibility. In the case of Taupō this would include some intensification in Taupō itself, but less so within the outlying towns (such as Mangakino).

Given the requirements of the NPS-UD, it is evident that TDC should not assess capacity or demand for dwellings as a single market, i.e. not all housing is fully substitutable. TDC should consider the demand needs and capacity at least in terms of standalone and attached dwellings, existing and new urban (clause 3.2). Importantly, TDC should not rely on the provision of capacity of one type of dwelling supply (i.e. intensification) as providing for the entire needs of the community.

The assessment in the body of this report suggests that there is expected to be a demand for 255 to 362 dwellings by 2053 in Mangakino in total. This Addendum provides advice on the split of demand between greenfield capacity (i.e. standalone dwellings in new urban areas) and intensification capacity (i.e. attached dwellings in existing urban areas), with a particular focus on Mangakino. This assessment

³⁶ Defined as an urban area which is predominantly urban in character and there is a housing and labour market of at least 10,000 people.

is important for WMI, as it will enable them as a significant stakeholder to meet the expected demands via their landholdings in Mangakino.

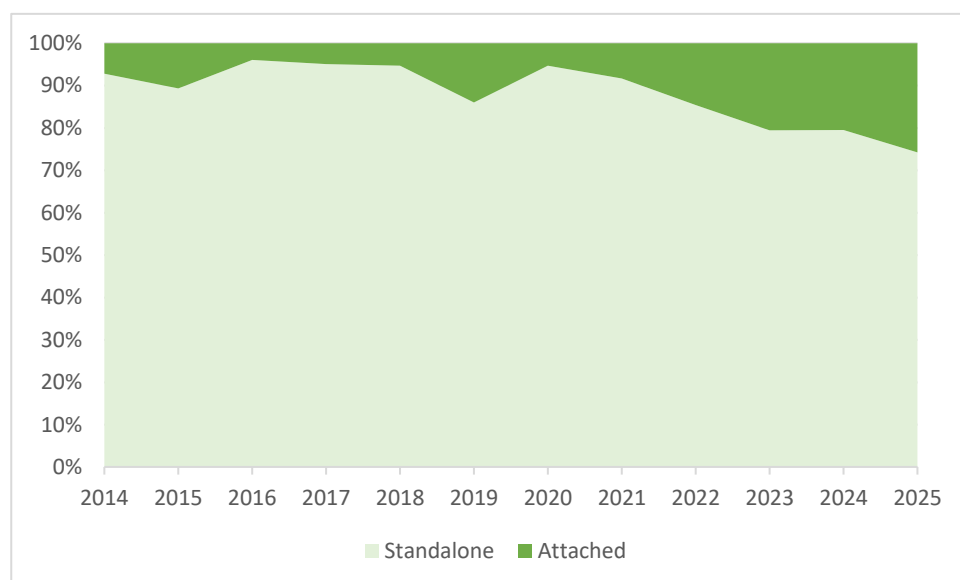
A1.1 Standalone and Attached

First, the NPS-UD requires TDC to consider demand and capacity in terms of dwelling type – “standalone” and “attached” as set out in clause 3.2(1)(b). Broadly, most attached dwellings will be accommodated in small brownfield developments via intensification. Conversely, most standalone dwellings will be accommodated in large greenfield developments via new urban areas. While there will be some standalone dwellings provided via infill in existing urban areas and some attached dwellings provided in greenfield developments, these will be the exception rather than the norm.

We have reviewed the new dwelling building consent data which shows that the share of new dwellings that are standalone has consistently been over 80% for the Taupō District up until mid-2023.³⁷ The data clearly shows that most demand has been accommodated via traditional standalone dwellings.

Conversely, the share of dwellings that are attached has been mostly below 20%, although that share has been increasing in recent years to reach 26%. Most of the attached dwellings have been located in Taupō city (over two thirds), and Tūrangi (around a quarter), with small numbers in Acacia Bay, Mapara, and the other settlements north of Taupō. While there has been an increase in the share of demand accommodated via new attached dwellings, it is still not a large part of the market.

Figure A.1: Taupō District New Dwelling Consents 2014-25 – Shares of Standalone and Attached



³⁷ Statistics New Zealand (2024) New Dwelling Building Consents.

The data also shows that in the case of Mangakino, less than 6% of new dwellings consented were attached in the last 10 years, and more than 90% were traditional standalone dwellings.

Importantly, the assessment in the body of this report suggests that 50-60% of future dwelling demand in Mangakino is expected to be for temporary holiday and short stay accommodation. Given the nature of this demand, we would expect that this part of the market will mostly be accommodated via standalone dwellings.

We also expect that 40-50% of future dwelling demand in Mangakino will be for permanent residents. A small share of this demand may be accommodated via attached dwellings, however most will be accommodated via standalone dwellings. Even if preferences shift significantly in Mangakino and reach the levels seen in Taupō city then at most 9-11% of the demand would be attached dwellings, although such a large shift is unlikely, given the nature of this part of the market in Mangakino.

Both the historic building consents data and the demand projections suggest that at most 10% of new dwellings in Mangakino could be attached dwellings. It is likely that more than 90% of the demand in the future will be accommodated via standalone dwellings.

Therefore, of the demand for Mangakino around 26 to 35 additional dwellings by 2053 may be attached, or less than 1 dwelling per annum. The remaining 229 to 327 additional dwellings by 2053 may be standalone, or approximately 8 to 12 dwellings per annum.

A1.2 Existing and New Urban Area

Second, the NPS-UD requires TDC to consider demand and capacity in terms of types of urban areas – “existing” and “new” as set out in clause 3.2(1)(a). As noted above, broadly development in existing areas will mostly be accommodated via development of attached dwellings as urban intensification. Conversely, greenfields development in new urban areas will mostly be in the form of standalone dwellings. While there will be some standalone provided via infill in existing urban areas and some attached provided in greenfield developments, these will be the exception rather than the norm.

While the available dwelling demand and supply information provided by TDC is several years old it provides some indication as to the approach adopted by council to accommodate growth in “existing” and “new” urban areas.³⁸ The most TDC recent economic study suggests that less than 19% of dwellings are provided in existing urban areas and 81% in new urban areas. These shares are broadly consistent with the demand by typology discussed above, which suggests that for Taupō most demand will continue to be accommodated in greenfield development in new urban areas.

³⁸ Property Economics (2021) Taupō Residential Dwelling Demand Addendum Report.

However, the proposed PC44 does not provide for any additional greenfield development and only provides some additional capacity being enabled in the existing urban area which could result in a larger share of demand for dwellings being accommodated in the residential zones.³⁹

For Mangakino there is limited ability to provide for demand, either in new or existing urban areas. While TDC has provided no assessment of this location, the statements by their experts shows that the share of capacity is skewed towards the existing urban area, which is the opposite of what would be expected for an urban area like Mangakino.

Counterintuitively, there is likely to be a higher reliance on intensification in the existing urban area in Mangakino than what is anticipated in Taupō city. Given the role and location of Mangakino, as compared to Taupō city, one would expect the opposite to occur, i.e. more provision for new urban in Mangakino than Taupō city, as a share of total demand.

A1.3 Residential Sufficiency

Third, the NPS-UD requires TDC to consider demand and capacity in terms of a set of time periods – “short term, medium term, and long term” as set out in clause 3.2(1)(c). These time periods are 3 years, 10 years and 30 years respectively.

The publicly available information from TDC experts provided in evidence suggests that there is insufficient capacity to meet expected demand for all time periods:

*Comparing the projected housing demand with housing supply using supply indicate that there is enough District-wide housing capacity for around 20 years +/- 5 years.*⁴⁰

This means that there is a shortage in supply for the long term, and council may not be meeting the requirements of the NPS-UD. Also, TDC experts made the following finding for Mangakino: “very limited developments, mostly infills, are currently earmarked in Marotiri (Mangakino)”⁴¹.

Also, the NPS-UD requires TDC to consider capacity in terms of a set of criteria – “plan enabled”, “infrastructure-ready”, and “feasible and reasonably expected to be realised” as set out in clause 3.2(2)(a)-(c). No publicly available data exists to ascertain whether these aspects have been considered in the TDC assessment.

³⁹ This change provided for an increase in building coverage from 35% to 40% for residential zoned land, which could enable more attached dwellings to be developed in the existing urban areas.

⁴⁰ Philip Caruana (2023) Proposed Plan Changes: PC38 Strategic Directions – Statement of Evidence, 25th August, paragraph 24.

⁴¹ Ibid, paragraph 25.

As noted by TDC's economic expert "This final step anticipates that not all feasible residential development will occur over a given timeframe (e.g., families wanting to retain their backyards, historical ownership, other site-specific constraints)."⁴²

This is particularly important for Mangakino, as there is no evidence that intensification will be "feasible and reasonably expected to be realised" as required in the NPS-UD. Given the available data, it is likely that there is limited Plan Enabled capacity in Mangakino and that much of this capacity may not be developable. While there may be some infill potential there has been no assessment of whether this development could be reasonably expected to be realised or whether it would be commercially feasible to do so.

Therefore, it would not be sensible to place reliance on this supply to meet a large share of the demand for Mangakino. This is both because the demand is likely to continue to be focused on standalone dwellings and because the theoretical intensification supply enabled in Mangakino is in practice untested as an alternative to standalone housing.

A1.4 Variety of Supply

Finally, the NPS-UD requires councils to ensure that there is a variety of development options. In the case of Mangakino there is clearly limited variety enabled either in existing or new urban areas. It would be reasonable to provide for more capacity than is needed to ensure that demand is accommodated, and no shortage occurs, whilst still meeting the objectives of the NPS-UD.

Specifically, it would be sensible to provide for both intensification options within the existing urban area and greenfield options in new urban areas. The costs of providing for a small additional capacity will not be significant, but it would ensure that the community's needs are met.

Importantly, the NPS-UD requires high growth councils (Tier 1 and 2) to include a competitiveness margin on top of demand. Tier 3 councils are "strongly encouraged" adopt this approach (clause 1.5). TDC economic experts have adopted this approach in the past, which means that council planning has required more capacity than the minimum.

For Mangakino the council could consider adopting a 100:20 split policy which would be consistent with the NPS-UD competitiveness margin. This 100:20 split, would provide for 100% of demand in new greenfield development⁴³ and 20% within existing urban areas⁴⁴.

⁴² Tim Heath Property Economics (2021) Proposed Plan Changes: PC37 Nukuhau – Statement of Evidence, 20th October, paragraph 28.

⁴³ This is consistent with what has occurred in Mangakino in the past, where most capacity has been provided as new lots from greenfield.

⁴⁴ This is consistent with the level observed in Taupō city recently and it would be conservative to use this share as it is unlikely that Mangakino will reach this level in the future.

This would mean planning for 255 to 3562 additional dwellings by 2053 in new urban areas and 50 to 70 additional dwellings by 2053 in the existing urban areas.

Allowing for more supply than the minimum will provide a greater variety of options, which can be expected to have positive impacts on competition, affordability, and other aspects that will contribute to the objectives of the NPS-UD.



Proposed Subdivision – Lakes Road

Mangakino

Landuse Capability Survey

Wairarapa Moana Ki Pouakani Inc.

March 2024

LandVision Ltd

WHANGANUI

1 Summary

A detailed land resource inventory (geology, soils, slope, erosion, and vegetation) and Landuse Capability survey at the paddock scale (1:6,000) was completed for WMI's proposed subdivision on Lakes Road, Mangakino. Its purpose is for determining LUC class for the NES Highly Productive Land.

The block contains two LUC classes – 9.1 ha of class 3 land and 5.9 h of class 6 land.

2 Table of contents

1	SUMMARY	1
2	TABLE OF CONTENTS	2
3	PURPOSE	3
4	LAND RESOURCES	3
4.1	LAND RESOURCE INVENTORY SURVEY.....	3
4.2	LAND USE CAPABILITY ASSESSMENT	3
5	APPENDIX 1: LANDUSE CAPABILITY TABLE	4
6	APPENDIX 2: LAND RESOURCES	6
6.1	ROCK TYPE.....	6
6.2	SOIL RESOURCES	7
6.3	SLOPE CLASSES.....	10
6.4	SUMMARY OF SLOPE CLASSES.....	11
7	MAPS	12
7.1	LOCATION MAP	12
7.2	SOIL RESOURCES MAP	13
7.3	LANDUSE CAPABILITY MAP	14

3 Purpose

The purpose of this report is to show the LUC classes present on the block as part of the NES highly productive land.

4 Land Resources

A detailed paddock scale (1:6,000) assessment incorporating land use capability and land resource inventory was undertaken for the proposed Lake Road Subdivision as per the LUC Handbook (3rd ed.) and a summary of the results are shown in the sections below. Detailed maps and descriptions are contained in Appendix 1, 2 and 3.

The LRI system involves mapping landscape units according to five inventory factors (rock type, soil unit, slope class, erosion type and severity, and vegetation).

From the LRI assessment, the area was then classified as LUC, which further groups similar units according to their capacity for sustainable production under arable, pastoral, forestry or conservation uses across the region. The LUC code is broken down into three components, which show the general capability (I-VIII classes), the major limitations (four subclass limitations of wetness, erosion, soil and climate), and the capability unit to link with regional classifications and known best management practices.

4.1 Land Resource Inventory Survey

The proposed Lake Road subdivision has a total area of 15.0 ha of which approximately 47% is flat to undulating, 14% is undulating to rolling, and 39% is moderately steep to steep hill country.

The vegetative cover currently comprises of approximately 8.2 ha of effective area and 5.9 ha is in exotic forestry or indigenous bush. The remaining 0.9 ha comprise of houses/buildings and a silage stack.

The parent rock material of the hill country is predominantly younger Taupo ash and airfall pumiceous lapilli overlying older weathered ashes. These are overlying hard ignimbrite deposits which are in places exposed at the surface. The flatter terraces are formed from pumiceous alluvium reworked by river systems or pumiceous colluvium washed off from the adjacent hill country.

Five dominant soil types were identified on the property formed from the underlying parent rock material. No erosion was recorded on the block.

4.2 Land Use Capability Assessment

Eight different land use capability units were identified over the property. The proportion of the farm in each LUC unit is summarise in the table below. A map and detailed descriptions of the units are shown in Appendix 1 & 2 respectively.

LUC Class	Area (ha)	%	LUC Unit	Area (ha)	%
Class III	9.1	61	IIIe6	2.1	14
			IIIs6	7.0	47
Class VI	5.9	39	VIe9	5.9	39
Total	15.0 ha	100 %		15.0	100 %

5 Appendix 1: Landuse Capability Table

LUC and Description	Total Area (ha)	Parent Material	Dominant Soil Type	Slope Degree	Dominant Vegetation (Area ha)	Erosion Degree and Severity		Strengths	Limitations	Land Use Suitability	Conditions of Use
						Actual	Potential				
IIle6 Undulating to gently rolling slopes with soils formed from a moderately deep mantle of Taupo ash over more weathered ashes. 	2.1	Kaharoa & Taupo ash (Kt). Pumiceous alluvium (Tp). Ashes older the Kaharoa/Taupo Ash (Mo).	Tpls.	4-15	Pasture (2.1 ha).	Nil to slight sheet.	Moderate sheet rill and gully when cultivated.	Contour. Access.	Moderately strongly leached soils.	Multiple land use options.	Care with cultivation.
IIIs6 Flat extensive terraces with soils formed from coarsely textured Taupo breccia. Soils are subject to periods of soil moisture deficiency and are of low natural fertility. There is a potential for slight gully erosion and a potential for slight wind erosion when cultivated. 	7.0	Pumiceous alluvium (Tp).	Yp. 9	0-7	Pasture (6.1 ha). Other (0.9 ha).	Nil.	Slight gully.	Free draining soils. Good wintering country for cattle. Contour. Access.	Potential for slight wind erosion when cultivated. Soils are subject to severe summer drought. Low natural fertility.	Intensive pastoral farming. Forestry. Care with cultivation to minimise risk of sheet, rill and gully erosion. Consider contour cultivation and/or minimum tillage/direct drill techniques. Maintain vegetative cover on ephemeral waterways.	Care with cultivation to minimise risk of sheet, rill and gully erosion. Consider contour cultivation and/or minimum tillage/direct drill techniques. Maintain vegetative cover on ephemeral waterways.

LUC and Description	Total Area (ha)	Parent Material	Dominant Soil Type	Slope Degree	Dominant Vegetation (Area ha)	Erosion Degree and Severity		Strengths	Limitations	Land Use Suitability	Conditions of Use
						Actual	Potential				
Vle9 Moderately steep hills with a deep mantle of Taupo ash over stable rock types in the higher rainfall zone. 	5.9	Ashes older the Kaharoa/Taupo Ash (Mo). Kaharoa & Taupo ash (Kt). Lavas & welded ignimbrites (Vo).	NaH + TpH	20-35	Indigenous bush & exotic trees (5.9 ha)	Nil.	Moderate sheet and soil slip.	Erosion control plantings. Biodiversity.	Erosion potential.	Pastoral farming with soil conservation. Forestry.	Maintain woody vegetative cover for erosion control.

Note: the photos in the table above are generic from WMI land but not necessarily from the proposed subdivision.

6 Appendix 2: Land Resources

6.1 Rock Type

The main rock types found on the property are shown in the following table:

	Kaharoa and Taupo ashes (Kt) is found on the flat to easy hill country slopes. It is described as loose to compact, fresh to moderately weathered rhyolitic ash with some lapilli (Lp). A surface or near surface deposit approximately 40 cm or more deep. Deposited as a result of eruptions from the Okataina (Kaharoa ashes) area 900 years ago, and from the Taupo areas approximately 1800 years ago. Typically, this tephra would be mapped as a stratigraphic sequence overlaying older, weathered ashes (Mo). This rock type is subject to sheet, wind and rill erosion and only occurs when exposed. Picture (left): Note the numerous lapilli (see below) fragments within a matrix of younger ash or tephra. Throughout the property this overlies the more ancient tephra (Mo) (also see below).
	Pumiceous lapilli (Lp): Described as loose to unconsolidated pyroclastic pumice granules between 2 – 64 mm in diameter as compared to volcanic ash which is <2mm. Prone to sheet, wind and rill erosion if vegetative cover is removed.
	Ashes older than Taupo ash (Mo) is found on the flat to easy hill country slopes. It is described as compact to very compact, moderately to completely weathered clay-rich, surface or near surface, bedded or massive, ash and some lapilli. Grassed and forested slopes formed on tephra are generally stable where less than 20 degrees. Slopes steeper than 20 degrees are subject to sheet erosion while soil slip or slump erosion may occur with slip planes on weathered layers or tephra interfaces. The soils formed from this ash are typically yellow-brown loams.

	Lavas and welded ignimbrites (Vo): weak to extremely strong, typically fine to medium grained basaltic to rhyolitic volcanic rocks; lavas, welded ignimbrite, shallow intrusives and minor inter-layered pyroclastics. Tertiary age or younger volcanics whose topographic expression (constructional cones, flows, plateaus, domes and sheets) are largely determined by primary layering and jointing. This rock is typically stable and often forms steep bluff slopes. Rockfall and scree are common where the rock is relatively fresh. With deep weathered mantle, soil slip and sheet erosion are common. Picture (left): Note the younger tephra (orange brown colours) conformably overlying the more ancient (dark reddish brown) hard ignimbrites.
	Taupo and Kaharoa breccia and pumiceous alluvium (Tp) is a very loose to compact, fresh to moderately weathered pumiceous block lapilli and ash, which is typically poorly sorted, frequently containing charcoal material, and is found as a surface or near surface deposit. This was deposited from the Taupo volcanic centre, and locally in the Okataina area, approximately 1800 years ago, along with pumice alluvium derived from these deposits. Typically, this tephra would be mapped on its own or in association with Kaharoa and Taupo ashes overlying ashes older than Taupo ash. Since this tephra is loose and the pumice can float, it is prone to fluvial erosion processes such as gully, tunnel gully, stream bank and sheet erosion.

6.2 Soil resources

The block contains five dominant soil types, and these are described in the following table and shown on the Soil Resources Map in Appendix 3.

	Name: Waipahihi sandy loam LUC map symbol: Yp Parent material: younger tephra and patchy lapilli over ancient tephra. Drainage status: Well drained. Soil consistence: Very friable. Degree of topsoil development: Moderately developed. Pugging susceptibility: Low. Profile description: 15cm: moderately developed, very friable, fine crumb and medium nut structure, dark brown sandy loam. 10 cm: weakly developed, very friable, fine crumb and medium nut structure, strong brown loamy sand with few small lapilli fragments. On: weakly developed, very friable, fine crumb structure, yellow brown. loamy sand to sand. Comments: Predominant soil found on the flats where airfall pumice has been reworked. Management considerations: Care with heavy cattle as the friable topsoil is prone to pugging.
	Name: Taupo loamy sand LUC map symbol: Tpls Parent material: Younger tephra and lapilli over ancient tephra. Drainage status: Well drained. Soil consistence: Very friable. Degree of topsoil development: Weakly developed. Pugging susceptibility: Low. Profile description: 20 cm: moderately developed, very friable, fine crumb and fine to medium nut, dark brown, loamy sand with few to many small and medium lapilli fragments. 10 cm: weakly developed, very friable, fine nut and crumb structure, orange brown, loamy sand. On: loose, structureless, pumiceous sand with many small and medium lapilli. Comments: Predominant soil found on the rolling hills. Management considerations: Care with heavy cattle as the friable topsoils are prone to pugging.

	Name: Taupo hill soil LUC map symbol: TpH Parent material: Younger tephra overlying ancient tephra. Drainage status: Well to excessive. Soil consistence: Very friable. Degree of topsoil development: Moderately developed. Pugging susceptibility: Low. Profile description: 15-20 cm: moderately developed, very friable, fine nut and crumb structure, black to very dark brown loamy sand. 20 cm: loose, structureless, gravelly pumice. On: moderately developed, very friable, medium nut structure, orange brown sandy loam. Comments: Predominant soil found of the easy hill country. Management considerations: Prone to slight sheet erosion. Continue to maintain a good pasture sward to control this erosion.
	Name: Ngakuru hill soils LUC map symbol: NaH Parent material: Ancient tephra Drainage status: Well drained. Soil consistence: Very friable. Degree of topsoil development: Moderately developed. Pugging susceptibility: Low. Profile description: 20 cm: moderately developed, very friable, medium nut structure, dark brown sandy loam. 10 cm: weakly developed, very friable, fine crumb structure, black sandy loam. On: weakly developed, very friable, fine nut and crumb structure, orange brown loamy sand. Comments: Along with the TpH it is the dominant hill soil on the block. Found where there is little to no Taupo airfall tephra coverage. Management considerations: Prone to slight sheet erosion. Continue to maintain a good pasture sward to control this erosion.

	Name: Soil 9 LUC map symbol: 9 Parent material: Tephra alluvium and colluvium Drainage status: Imperfectly drained. Soil consistence: Friable. Degree of topsoil development: Moderately developed. Pugging susceptibility: Moderately. Profile description: 15cm: moderately developed, friable, fine nut and crumb structure, brown sandy loam. On: weakly developed to structureless loamy sand with many gravelly pumice fragments and brown mottles. Comments: Management considerations:
---	--

6.3 Slope Classes

The definitions of the slope classes mapped on the Land Resources Map are shown in the tables below, along with a summary of the various slope classes found on the property.

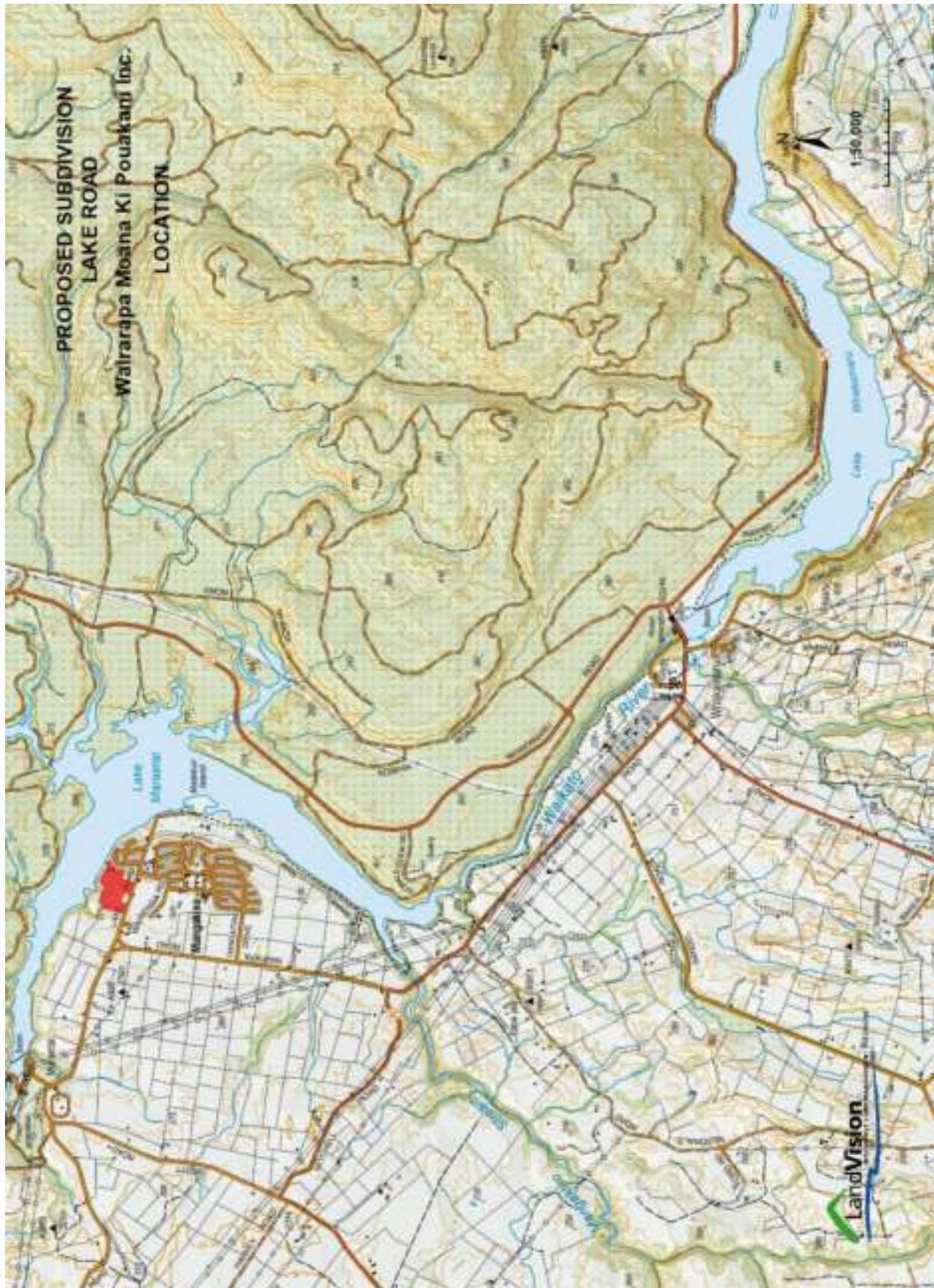
Slope class	Degrees	Slope description	Access suitability
A	0-3°	Flat to gentle undulating	Tractor
B	4-7 °	Undulating	Tractor
C	8-15 °	Rolling	Tractor
D	16-20 °	Strongly rolling	Some tractor, four-wheel bike
E	21-25 °	Moderately steep	Two-wheel bike
F	26-35 °	Steep	Walking and some two-wheel bike
G	>35	Very steep	Walking
+	<i>Indicates a compound slope</i>		
/	<i>Indicates average slope is borderline between two slope classes</i>		
‘	<i>Indicates a dissected slope</i>		

6.4 Summary of Slope Classes

Slope class	Area (ha)	Proportion (%)
A, A+B	7.0	47
B+C'	2.1	14
E+F	5.9	39
Total	15.0 ha	100 %

7 Maps

7.1 Location Map



7.2 Soil Resources Map



7.3 Landuse Capability Map



Wairarapa Moana ki Pouakani Incorporation

Consultation Summary Report

200723
20 May 2026

1. EXECUTIVE SUMMARY

The following document provides an overview of the consultation that Wairarapa Moana ki Pouakani Incorporation (WMI) has done to date in relation to the proposed zone change in Mangakino for additional residential land. For the last couple of years WMI has been investigating the potential of utilising some of its land for residential purposes, during this process three potential parcels of land have been identified as suitable for a zone change. Thorough investigations have been undertaken to understand the feasibility of this proposal. Once reaching a level of confidence that the demand was there, and it was feasible, consultation was the next step in the process.

The purpose of this document is to outline the process that has been undertaken to date as well as providing a summary of feedback received to date.

2. CONSULTATION

Consultation has been undertaken with Pouakani Trust, Tūwharetoa Māori Trust Board and Raukawa. Specifically a hui was held with Pouakani Marae Kaumatua Craig Ahipene, Eli Paerata, Timu Paerata and WMI representative Michael Allan on 13 October 2023. This hui discussed the cultural assessment of Mangakino and WMI lands. A transcript of this kōrero is provided in Appendix 2.

Consultation has also included a Public Hui which invited members of the community and various other organizations and groups to attend.

Consultation has also occurred with The Lines Company, Taupō District Council Asset Managers and Policy Team. Additionally discussions have been held with various community groups such as Mangakino Rowing Club, Waikato River Trails etc.

3. PUBLIC HUI DETAILS

The public hui was held on Friday 23rd February 2024 at the Pouakani Marae, Mangakino. The public hui started with a Pōwhiri to welcome the visitors (community) onto the marae followed by a morning tea before the formal component of the Hui began. The public hui was also accessible via livestream for those that could not attend in person.

The public hui was advertised at the following places:

- WMI website
- Mangakino Watersport Community (Facebook group)
- Mangakino Community Noticeboard (Facebook group)
- Invitation was provided to relevant Taupō District Council Staff
- Invitation via email was provided to Pouakani Board of Trustees
- Mangakino Rowing Club was invited directly via email

In addition to the hui being advertised at the above locations, WMI received approximately 60 RVSP for the event. 19 of which were from Mangakino residents/section owners indicated their interest in attending in person (7 indicated interest in joining via livestream). There were also numerous groups that indicated their interest in attending, these included:

- Mercury
- Waikato River Trails
- Mangakino Gospel Chapel
- WMI representatives
- Mangakino School
- Mangakino Pouakani Representative Committee
- Lake Maraetai Lodge
- Mangakino Rowing Club
- Taupō District Council
- Mangakino Golf Club
- Tutahataha Te Maari Trust
- AgVance Consulting
- AB Equipment

It is noted that not all those that RVSP actually attended.

The hui included a presentation from WMI on the proposal from WMI Group General Manager (Anaru Smiler) followed by a presentation by Cheal Consultants Limited (Catriona Eagles) on the planning investigations that had occurred to date, combined with a presentation from Narrative Landscape (Josh Hunt) regarding the Outstanding Landscape component of the proposal. After the presentation it was open to the public for questions/discussion. The presentation documents are provided in Appendix 5.

The public hui presentation discussed three sites being Lake Road, Karamu Street and Taniwa Street.

4. FEEDBACK RECEIVED

A feedback form was provided at the public hui with printed versions available for in person attendees and a link/QR code provided for those to complete the form online. A large amount of the feedback received from the public hui was verbally during the public question/discussion component of the hui. However, since the hui, a few written responses have been received via the public feedback form (Appendix 6).

The tables below provide summaries of the feedback received both at the hui and after.

4.1. Public Hui Feedback

Generally, the feedback heard from those who spoke at the public hui was not supportive of the proposed land rezoning. It is acknowledged this is not necessarily a complete reflection of every attendee's feedback but its summaries the key matters raised by those who spoke. The table below outlines the key feedback taken away and the relevant commentary associated with that matter from various community members.

Key Issues Raised	Key Comments Received by Attendees
Inadequate living conditions	10 plus people living in three-bedroom homes. - Shortage of rental availabilities - Affordability of housing for the community
Existing houses and vacant land currently available	- It was raised by numerous attendees that there are many houses for sale and vacant sites not selling, therefore, WMI should consider purchasing those rather than adding more residential zoned land for a demand that the community feels could be addressed by using the available supply. - Questions were raised over the accuracy of the demand projections given that there is housing/vacant site availability that have not managed to be sold. - Recognition of the need for families/the community to have more supply options but preference was from the available supply than rezoning iwi land
Employment availability and opportunity	- Points were raised that if you want to introduce an increased residential supply then employment opportunities need to be increased. - Many attendees commented that there is a lack of job opportunities with the area and currently a lack of incentive for businesses to set up shop in Mangakino. - Concerns raised that it would be a wasted supply of residential land if there were no increased job opportunities
Rates	- Concerns were raised that if this development occurred it could result in a significant increase to the rates paid in Mangakino. - Increased rates could result in further poor living conditions, if the community cannot afford this.
Residential living on land historically used as a landfill	Many attendees raised concerns over the health and safety of the community if development was to occur on a known contaminated site.
Consideration for more industrial zoned land instead of residential	- A point was raised a few times that the community would like to see more industrial zoned land to enable a range of industries to establish in the community. - It was thought by enabling more industrial land, it would help increase job opportunities in the future
Shareholder disputes over management of the subject parcels of land <i>(It is noted that this matter is a separate civil matter to the rezoning, but it still has significance in feedback received).</i>	- This is one the most prominent matters raised at the hui with many shareholders, family members and iwi raising concerns over WMI management of the land and consultation with shareholders on the authority of WMI to progress this. - Questions were raised over WMI ability to make these decisions about shareholder land without shareholder approval (WMI AGM minutes can be provided on this matter)

	There was significant dispute over the potential of selling of the land and who is funding this rezoning if it were to progress.
Issues with the process that has occurred to date	- There was an overall feeling from the community that the decision has already been made on the long-term plan for this land. - There was slight disagreement on the process of obtaining cultural impact information during the preliminary phase of this rezoning project. Particularly over who was approached for their historic account to identify any sites of significance and whether the 'correct' parties were approached. - Closely linked to the shareholder concerns over land management, there was a consensus that consultation with shareholders should have been done prior to the public hui. It is noted that WMI states this was done at WMI AGMs but there were attendees who were not aware of the project and how far into the process it had gotten.

4.2. Written Feedback (Post Hui)

The below table provides a summary of the written feedback forms that have been received since the public hui. A total of four responses have been received to date, a copy of these are included in Appendix 2.

Mangakino Local or Holiday Homeowner	Supportive or not	Key Feedback Received
Local	No	Concerns as a shareholder that WMI is selling the land in a way that does not benefit the community (specifically the local iwi)
Holiday Homeowner	No	The following concerns were raised: - Should not be rezoning land when there are houses and empty sites for sale that could be purchased instead. - Questions the demand for housing there is, if properties are for sale, lack of job supply and minimal shops to support the current population. - Health and safety concerns with one the proposed sites for rezoning being the location of a historic landfill. - Considers the Taniwha Street land as having potentially significant impacts on existing property owners. - Councils' involvement and whether they will be consulting with the ratepayers/locals.

		• Raised concerns about rezoning land that is part of a wider grievance between iwi therefore should remain in ownership of the tangata whenua.
Local	Partial	The following feedback was received: • Without job availability and better infrastructure what demand is there really for additional housing. • Are the demand projections based on holiday makers/retires or working families trying to relocate to the community • Concerns with Lake Road parcel of land as existing sections within the recent Lake Road subdivision are not selling. Therefore, what demand is there if they aren't selling. • Was supportive of the idea that Karama Street parcel of land could be an appropriate area to develop whanau/kaumatua/social housing to address an already apparent inadequate living conditions. • Questions why available and vacant sites cannot be purchased for struggling whanau before a Council rezoning process is undertaken
Local	Partial	The following feedback was received: • Generally, was supportive of the development as long as existing residents' natural views were not impacted. • Specifically opposed to the Taniwha Street rezoning as it will detract from the existing residents' views and when people purchased these properties, they did so knowing the adjacent land was zoned rural. • Concerns that the development at Taniwha Street would detract from the natural beauty of the lake/cycle trail area.
Holiday Homeowner	Partial	The following feedback was received: • Raised concern about the necessity of the additional residential land while there are a number of empty houses and sections in Mangakino. • Was supportive of the Lake Road and Karamu Street parcels of land being rezoned on the basis that there was demand and vacant sections/homes existing were not an option • Considers the Taniwha Street land as having potentially significant impacts on existing property owners. • Fears the new development will create a segregation between 'new' and 'old' Mangakino

4.3. Summary

As evident from the above summary, the public hui raised a range of issues and identified a consensus that there currently is a housing inadequacy within the community. It was not disputed that providing more housing opportunities and at an affordable price point would be favourable to the community, rather the concerns raised were largely focused on the internal operating of WMI, along with questions regarding process and actual demand.

Unfortunately, it was slightly lost in translation that to even be able to have a robust discussion on how best to utilise the land, rezoning needed to come first. However, it provided a good starting point of discussions and will help inform the next steps.

The post hui feedback largely came from landowners adjoining the Taniwha Street site who were not in favour of this site being developed.

It is worth noting that the responses heard at the hui and after, do not reflect all the communities, ratepayers or shareholders opinions as not everyone was available to attend.

5. CONSULTATION WITH IWI

In addition to the Public Hui, further consultation is being undertaken with the following parties of whom have an interest in this proposal, using a Consultation Executive Summary (Appendix 7).

Tūwharetoa Māori Trust Board

Consultation to date includes:

- Invitation to attend the Public Hui, no one was in attendance.
- A letter offering to meet for consultation was emailed and posted in hard copy on the 19th April 2024, a copy of the letter is provided in Appendix 3. No response has been received yet.
- Further emails were sent on the 9th May 2024 and 22nd May 2024, response was received on the 29th May 2024 from Tūwharetoa Māori Trust Board which confirmed that the Trust Board was comfortable with WMI engaging with Manu whenua.
(Appendix 3)

Raukawa

Consultation to date includes:

- Invitation to attend the Public Hui, no one was in attendance.
- A letter offering to meet for consultation was emailed on the 19th April 2024, a copy of the letter is provided in Appendix 4. A response from the Regional Strategy Manager- Te Uraura was received on the 24th of April 2024 which suggested that a meeting online to discuss the proposal.
- Meeting with Raukawa was held in person on 20 October 2024. Information was received from Raukawa regarding soil contamination recommended practices.
(Appendix 4)

Pouakani Trust

A letter of support has been provided from Pouakani Trust (Appendix 1)

CHEAL CONSULTANTS LIMITED

Appendices:

1. Pouakani Trust Letter of Support
2. Pouakani Cultural Kōrero
3. TMTB Feedback
4. Raukawa Feedback
5. Public Hui Presentation - February 2024
6. Public Hui Feedback Forms
7. Consultation Executive Summary

Appendix 1

Pouakani Trust
Letter of Support



info@pouakani.co.nz
pouakani.co.nz
PO Box 615 Taupō 3330

14 June 2024

Hilary Samuel
Senior Policy Adviser
Taupo District Council

Tēnā koe Hilary

WAIRARAPA MOANA KI POUAKANI INCORPORATION – PROPOSED ZONING CHANGE FROM RURAL TO RESIDENTIAL FOR 3 KARAMU STREET AND LAKE ROAD MANGAKINO

Please receive this letter as a statement of support from Pouakani Trust for Wairarapa Moana Ki Pouakani Incorporation (WMI) in their request for a zoning change from rural to residential, for their land blocks at 3 Karamu Street and 47 and 57 Lake Road, Mangakino.

Nāku noa, nā

Craig Ahipene
Chair, Pouakani Trust

Appendix 2

Pouakani Cultural Kōrero

Wairarapa Moana Ki Pouākani Incorporation

Recording of a Kōrero in Mangakino on 13th October 2023.

Present: Craig Ahipene, Uncle Eli Paerata, Aunty Timu Paerata, and Michael Allan

The purpose of the kōrero was to both obtain information to be used in a Cultural Impact Assessment for an area of land at Mangakino Township that Wairarapa Moana Ki Pouākani Incorporation plans to develop into residential lots, and to have a record of landforms and sites of cultural significance on the Wairarapa Moana Ki Pouākani forestry and dairy farming estates. This record of the kōrero will be held in the archives of Wairarapa Moana Ki Pouākani Incorporation and Pouākani Trust.

Introduction

Kia ora Michael, thanks for having us here today. My name is Craig Ahipene and with me are my koroua Eli Paerata and kuia Timutetai Paerata.

What gives me the ability to be able to give a cultural assessment today? A couple of things; I whakapapa from Hiriti Te Paerata who was a Chief of his time for this area and my elders present are from that same whakapapa. I was born and raised in Mangakino, and my mother is the descendant of Hiriti Te Paerata but interestingly my father is Ngāti Kahungunu ki Wairarapa from Managakino. So, I'm from both sides of the fence.

The last several years I've taken an in-depth interest in understanding the history of the Pouākani lands. This history is pre-European, and during the colonial period as well. The reasons why I have taken an interest, and it is of importance for me to know this, is I am the hapū trustee for Ngāti Te Kohera, which is the principal hapū at Mōkai Marae, Mōkai. We need to understand the history so that we can engage appropriately with our other hapū that we are related to, and also other iwi and also when it comes to claims with the Crown.

In proper Māori fashion we start from the beginning. I'm not going to go back to the very, very start, but I'll start with Māui.

Māui

Māui, most people know the story of Māui who fished up the North Island. So, if we're going to talk about the whenua we start there because according to our legend it was Māui who fished up the North Island, hence the name of the North Island is Te Ika-a-Māui (the great fish of Māui). We should take some stock even though the myth may sound fanciful in that if we can read into the lines of myths, there are some truths. What I believe is that when a canoe travels towards land it will appear as though it's coming out of the sea itself literally and so the captain of the canoe was attributed and given the mana being the captain of personally fishing up that particular island. We don't know for sure if it was Māui himself, whether it was a descendant of Māui or some other relationship to Māui. But that is the kōrero.

The particular area that we are talking about, is the Central North Island. This area, one of the major geographical parts of the wider area is Lake Taupō and, the volcanic mountains in the volcanic plateau. With regards to the story of Māui, Lake Taupō is considered the heart of the fish of Māui. With that then, who were the first people's here, in this area. From a Māori world view we would say "He iwi maunga" which means the mountains were the first tribe. And then we would have "He iwi manu" the birds would have followed, and both those tribes are still here today.

Ngāti Hotu

In terms of the actual first humans here, according to what I know in the upper Waikato Valley it was the Ngāti Hotu people. So, the Ngāti Hotu people were physically distinct from what you would normally understand a Māori to look like. They were shorter and they had fair skin, fair hair and fair eyes. Now, we also must talk about another fanciful story that relates to the actual name Pouākani itself. I'm not too sure when this actually happened but it must have been at a time maybe when there were no people here or maybe the first people came through here. Who knows?

Kani

Back in Hawaiki in the Islands the Māori ancient homeland there was an ancestor called Kani. This ancestor was said to have taken his spear and cast it and he said to his descendants go forth into the world and find where my spear has landed. So, again we must take it with a grain of salt as to actually how we read that story. But nonetheless, subsequently we believe as Pouākani people the descendants of Kani eventually came here with several waka and basically found the spear that their ancestor had thrown from Hawaiki. That we say is this area. Interesting to also say is the that the geographical magnetic centre is at Pureora. So just something interesting to take into consideration with that story.

Tia and Ngātoroirangi

We must talk about Tia. Tia was a Chief that came on the Te Arawa waka. Now the Te Arawa canoe, their final resting place was at Maketu in the Bay of Plenty and several chiefs from that waka went inland to explore. In terms of this kōrero, the two chiefs that we must speak about are Ngātoroirangi and Tia.

Ngātoroirangi more so, his journeys took him to the lake itself – Lake Taupō – and to the volcanic peaks to the south of the lake.

Tia has a more direct relationship to this volcanic area. Tia, he lived at Titirapunga Maunga. Essentially that is where the Te Arawa lineage comes through into this area is through Tia. There are four lineages in terms of the Pouākani people. There is the Te Arawa through Tia and also other tupuna but mainly Tia, there is the Te Arawa again but through Ngāti Tūwharetoa, the Tūwharetoa lineage. And then we have lineages through the Tainui waka but through the ūwi of Ngāti Maniapoto and Ngāti Raukawa. The Pouākani people have all those lineages that make them as a people.

Tia settled at Titirapunga, and he is actually buried there. He is buried there and his uri, his descendants, never left. They have been here ever since he came here. Now, in terms of the Ngāti Hotu people, were they here at the same time? Maybe, but I understand that they were in the valley, the river valley, which is distinct in area to Titirapunga Maunga. So maybe they were within the same landscape. Did they overlap? I don't know, but we do know at a later stage there were Ngāti Hotu people living at Kēkaho which is to the southwest of Titirapunga Maunga.

Now, subsequently other people's came through, another ancient tribe. This tribe is called the Ngāti Kahupungapunga people, and they came up into the upper Waikato Valley and displaced the Ngāti Hotu people, pushed them back up towards the lake. Ngāti Hotu people they actually did occupy the lake; however, they did also occupy the upper Waikato River but the Kahupungapunga people came through and took over that upper part of the Waikato Valley.

Who are the Kahupungapunga people? Well, no one knows their origins but what we can say is that they were very distinct in appearance. They were taller, lanky, big boned, and had Melanesian

features. Frizzy hair, dark and strong brows, and big wide flat noses. Almost Melanesian in resemblance and aboriginal in appearance, but that's another story. I don't want to go into it here and that's to do with Manuwa people and related peoples, originally related to the Taranaki generations before. They, maybe an offshoot from those peoples.

Tidraupenga Maunga

None the less this area here (pointing to Map A attached at **Appendix A**), especially the ranges. The ranges Whakamaru, Maungaiti, Rangitoto, Tidraupenga Maunga, Pureora and also the Mōkai uplands were covered in forest. Some of the most beautiful, best forests that were mainly tātara, Rimu and Māhāi. However, this particular area (points to Mōngakino area on Map A at **Appendix A**) that we're talking about the land around Mangakino, what we call the Pouākani 2 Block was open land, this was all open land, there was no forest here. It was basically open scrub, native grassland, tussock. And this particular land was called the Hora-aruhe Block. The full name is Te Hora-aruhe o 'Pouākani', which means the bracken lands of the Pouākani people, so that was a staple kai, the bracken root. The lands going up to the base of the mountain was covered in bracken that was a natural source of food. This particular block actually was called Hora-aruhe after that name. The two blocks Pouākani and Hora-aruhe really derive from the same narrative story.

Ngāti Raukawa

There was a sister of a Raukawa chief, his name was Whaita. Whaita's sister's name was Kahukore. Kahukore was married to a Ngāti Kahupungapunga chief called Rakahore and they lived here (points to Map) near the river. That was one of the villages of the Kahupungapunga people. One of their centres was at Whakamaru.

Being a Princess, she was quite demanding, especially of her husband's people and the Whakamaru area was known for its bird life, it was prolific with birds, and it was somewhat coveted by the Raukawa people because of that resource. When the Kahupungapunga people would go into the forest, Kahukore would say to them "get me some birds for my people". She would make them go get birds for her Raukawa people.

Now after a while they took that as an insult upon their mana and they contrived amongst themselves to do away with Kahukore and apparently the husband was in on it. Subsequently they burnt Kahukore's house with her in it, so she died in the fire however her attendant escapes and he wasn't a Kahupungapunga person, he came with Kahukore when she went to live with her husband's people. The Kahupungapunga people realised that he was missing and sent out a search party for him because least he gets to the Raukawa people and let them know what they did to Kahukore.

They went after him and there's a story this relates to how the township of Putāruru got its name and the name of the attendant of Kahukore was Ruru, so in the area of where Putāruru township is today, he hid and he waited for the Kahupungapunga search party to go past and they went past and he came out and when you appear the Māori word for that is 'puta', it's the appearance of Ruru – Puta-a-ruru. Subsequently he went back to Kōwhiri where the Raukawa people were based, he told them what had happened to Kahukore, and a war party was raised to exact vengeance. This ultimately resulted in the annihilation of the Ngāti Kahupungapunga people, they were subsequently annihilated, and they were driven out of their lands, there are a few remnants that ended up in Rotorua but the majority of them were killed to avenge.

Actually, there's a kōrero of the flat areas just to the west of Ōngāroto village there used to be a pile of stones and those stones were said – two stories I've heard were – the stones used to cook the Kahu-pungapunga chiefs that fell or marked the places where the Kahu-pungapunga chiefs fell. And up until within a lifetime ago they were still there, I don't know where they are now.

That's how Ngāti Raukawa came into this area. After the annihilation of the Kahu-pungapunga people Ngāti Raukawa moved into this area and settled, but not exactly here [points to Mangakino Township on the Map]. They settled further to the Northwest of here at Wharepūhunga. The block that is north of the Pouākani Block is called the Wharepūhunga Block. It was the main village of the Kahu-pungapunga people, and it subsequently became the main centre of those Raukawa people who came to live in this area.

Tūwharetoa People

Then we have the Tūwharetoa people. The Tūwharetoa people for their own reasons came into the Taupō Lakes area, they too fought with the Ngāti Hotu people and over a number of generations killed them, assimilated them, married them but the identity of the Ngāti Hotu people as a people failed to continue to exist. So that's how the Tūwharetoa people came into this space. Now what we then have is, we have a proximity of two tribes, which is the Ngāti Tūwharetoa and the Ngāti Raukawa and through subsequent marriages first starting with Te Rangihūa who is a Tūwharetoa chief and Waitapu who is a Raukawa chieftainess and subsequent marriages between the two tribes we have the main line of the Pouākani people. But not to miss the fact there are Te Arawa lines and there are also lines that come in from Maniapoto into the whakapapa.

When we talk about another Te Arawa line, we talk about a chief called Hākuhanui. Hākuhanui lived at Kākaho, but the Ngāti Hotu people had already lived there beforehand, they were already there. He came and they were there, and they lived peaceably together for a while but then the relationship deteriorated, and they ended up fighting each other and Hākuhanui prevailed. Apparently, he was said to have come to Kākaho via Kawhia but what I do know of his whakapapa is that he is a descendant of Rungowhakaata and a descendant of Apa. Apa is a descendant from the Te Arawa canoe.

Kōrero

Maybe if I can follow some of the questions that you have Michael, we can bring them into this space in more detail.

Michael – Craig, thank you for your introduction. For me it is amazing to hear the history. Maybe we should start with the significance and the association to Mangakino of both Ngāti Kahu-pungapunga and Ngāti Raukawa. I think you've probably covered Ngāti Raukawa in some ways.

Craig – What I can speak to is that I can give a bit more detail to that and this area in terms of Ngāti Raukawa is through the Pouākani people. The Pouākani people are Raukawa, the Pouākani people are Tūwharetoa, the Pouākani people are Maniapoto, the Pouākani people are Te Arawa as I've already alluded to. It doesn't cover all of Raukawa, there's only a certain select sub-tribes, hapu that are associated with this area from Raukawa. In the Pouākani settlement in the 1880's there was 10 hapū that were identified, there are only 5 that are extant today. I won't talk about those that are not extant because those ones are so called extinct, they are only extinct in terms of their identity being carried here. We are those other hapū. I can't say they are extinct because we are those, we just don't use those hapu names anymore, but I will say when it comes to here there are 5 hapū of Ngāti Raukawa that also have Tūwharetoa links, not all of them but at least 4 of them did. Ngāti Hā is

said to have come from off Hākuhanui, that's the name of the sub-tribe takes from Hākuhanui's name, Ngāti Ha. You have Ngāti Moekino, Moekino was one of the wives of Upokotiti, who was a great Raukawa chief. His descendants, he has a sub-tribe that is extant today Ngāti Moekino. We have Ngāti Wairangi and again Wairangi is a Raukawa chief, and he had two wives and from those wives come many descendants and those of us who are here today descend from both of those marriages, Ngāti Wairangi.

Then you have Ngāti Te Kohera. We talked about Te Rangiita, we talked about Waitapu. They had 8 children, 4 being female and 4 being male. The oldest child Parekawa. She had a son, Te Kohera and he is the ancestor of Ngāti Te Kohera. She married Ngahianga who was a great grandson of Wairangi. Basically, from the inter-marriage of Te Rangiita and Waitapu you then have the same inter-marriages reflected in subsequent generations. That's why we say you cannot separate the Raukawa and the Tūwharetoa of the Pouākani people.

Then we have Ngāti Whāita. Remember the story about Kahukore, Whāita was the brother. The descendants of Whāita live currently at Ōngāroto upstream from here, there is a whare there 'Whāita' and it harks back to Whāita the man himself, who is a Raukawa chief. Those are the five hapū, that's Raukawa.

Ngāti Kahungunu

In terms of Kahungunu I know a little bit about this because I am also Kahungunu, but I would say Wairarapa Moana Incorporation they would know the cultures and principles of Kahungunu. What I must say is that it all went back to the 1880's when the native land courts were looking at the titles of the lands bringing Māori lands into a title system and what we do know and this practise that happened right across the country is that the Crown-imposed survey costs upon Māori. Māori didn't have any money or had very little money or means to pay, and in lieu the Crown demanded land for payment of survey costs. What we do know is that and also too it is recognised that in the Crown's practise of incurring survey costs upon Māori was wrong however it is part of the history of how Ngāti Kahungunu came to be in this area. What happened is that Pouākani 2 Block I understand which is the block that Wairarapa Moana Incorporation now administer was taken as payment for survey costs for the wider Pouākani Block and believe it's about 20,000 acres or something, it's quite big. Some time passed and this is going back to I think 1899 when about that time the turn the century down in Wairarapa, Ngāti Kahungunu were living in the Wairarapa area, they had issues with farmers over the annual flooding of Lake Wairarapa. The Māori of the Wairarapa area relied heavily on the tuna, the tuna (eels) migration for their subsistence. That meant at a certain time of the year the river mouth discharged into the sea was blocked so that eels could be harvested. This created flooding around the fringes of Lake Wairarapa and many farmers who had taken up farms around the lake did not like losing pastures because of the land flooding. It got very tense.

There was a conflict between the hapū of Wairarapa Moana Māori down in Wairarapa and the farmers around the edges of lake and the Government basically stepped in and over time they negotiated with a number of chiefs it was decided that the Government would buy the lake and therefore relieve the tension. Part of the payment was cash; I believe it was about £2,000 at the time and there was supposed to be some land. However, that took 50 years, actually about 20 odd years before the Government, after Wairarapa Moana people following them up, they said they have actually got some land and the decision was made that they had a bit of land up here, the Pouākani land. The Government said, why don't you have this block as payment? What I do understand is that the Wairarapa people were initially reluctant because they knew that they were going to be slotting into someone else's area, another tribe's area and given that, that land was confiscated land. They

were reluctant but they knew if they said no they would get nothing. They said yes and you're talking hundreds of miles from Wairarapa so it created problems for the Wairarapa people, not to mention some animosity between the Pouākani people and the Wairarapa Moana people for them actually being here.

The actual first settlement of the land didn't take place until 20 odd years after they agreed to the land, after the 2nd World War. After the 2nd World War the first families were the ones that came up and starting breaking in the land and hence you get the land developed into what it is today. In terms of whakapapa there are whakapapa between Raukawa and Kahungunu. The tupuna Raukawa, original the first Raukawa he is the son of Tōronga who comes off the Tainui waka and Mahinārangī. Mahinārangī is Ngāti Kahungunu. There's a whakapapa there, her father is Tūaka, he comes off Takitimu waka.

What I'm saying is a couple of generations back from Raukawa is the ancestor [Te Aomatarahi] that went from Hawkes Bay down to the Wairarapa and the Wairarapa people. There is a greater whakapapa, we can actually point (I have this written somewhere) where the Wairarapa people come off the ancestor to Raukawa. They don't come off Raukawa, but they come off the same line – the Kahungunu line – Mahinārangī.

Another thing to remember for the Tūwharetoa people, is that back in the 1820's there was a war between Raukawa and Kahungunu. A section of Raukawa, some of our people went down to Heretaunga to Kahungunu for the intent of actually settling there. However, there was a subsequent war with the help of Ngāpuhi the Kahungunu people pushed out the Raukawa people that prevented them from settling there. The refugees from that war fled back to Lake Taupō and fled back to a place called Omākū-kara at Oruanui. There a pa at Oruanui called Omākū-kara. Back in the 1820's the Raukawa refugees came and stayed at that pā with their Te Kohera kin. That's the whenua of the Ngāti Te Kohera.

Parahi was one of the chiefs of the Kahungunu raised a war party and followed the refugees from Heretaunga to Lake Taupō and attacked the people at Omākū-kara and destroyed the pā, killing many and taking many captive. You have for a while a Ngāti Kahungunu war party rampaging around this area, around Lake Taupō. From Omākū-kara to the north they went to the west to a pā at Tihā called Tūtakamoana. Tūtakamoana was impregnable, it couldn't be taken from a frontal assault. However, there was a tupuna Te Kohika, who at the time was hunting birds in Tītiraupenga mountain and when he came back, he found that his pā was besieged by Kahungunu and because he was out in the open by himself, he was subsequently killed. He was the only person killed in that particular confrontation.

The Kahungunu people, they couldn't take the pa and feeling that they could be attacked by a war party, they were in the open, decided to then leave that particular area and go elsewhere. Ultimately and subsequently peace was established between Ngāti Tūwharetoa and Ngāti Kahungunu through the two chiefs, Parahi being the chief of Kahungunu and Te Rangiūametototu being the chief of Ngāti Tūwharetoa. Mananui gave his daughter Te Rohu in marriage to one of the chiefs of Kahungunu (Te Moananui) and so that peace was concluded through that marriage and the practise is called Te Tatau Pounamu – the Greenstone Door – once it's established its permanent and it's usually was facilitated with a marriage between the two tribes and then also a symbolic marriage between mountains from two tribes.

That's the association of Ngāti Kahungunu and Ngāti Raukawa in this area, that I'm aware of. There are other whakapapa connections which I can perhaps provide later if these are required.

Michael – I will show you a map of where Wairarapa Moana is considering development (Map B at Appendix B). You can see Mangakino and that there is part of Form 1, this used to be housing down here during the old days when the town was booming.

Craig – I remember walking over this land and seeing the old pavements and parts of the roads.

Michael – That area and then this area on Lake Road which is where the old mill was. There was a mill here that you can probably see the area where the Ministry of Works building was.

Craig – This is where the slink skin factory was.

Michael – Yes that is where the slink skin factory was. The proposed development would be more down here towards the foreshore reserve. The question is – was there was ever any habitation there?

Craig – No. I can show you. Here's a wider map (Map D at Appendix D), the area that you've shown me is basically here. The closest actual village was at Sandel Road. There is a freshwater spring that crosses Sandel Road. At that point there was a village called Whakatangianga and our koroua Takiwa Te Momo was known to have a pig farm there. That's the closest village or habitation to Mangakino township and to the area that you propose. There is a track that goes through some of Pouakani 2 area, and I can speak to that later but as far as I know and aunty here or uncle here may have information to the contrary but what I do know is that there was no actual settlement that I know in these areas that you have pointed out.

Michael – I've got an article on the history of Mangakino written from the Ministry of Works point of view (Appendix E) and a lot of it brought back memories of how you were saying in an earlier conversation that there was that narrow gorge at what is now Whakamaru where that was the only way you could cross the river. It says in the article that before Mangakino was built all the country on the west side of the river was covered in tea tree and tussock.

Craig – Yes, which I alluded to – that open country.

Michael – I think we've covered occupation and habitation off. You are saying that no one really lived at Mangakino until the Crown transferred that land to Pouakani No 2 Trust.

Craig – We are yes. The closest occupation to this area was at Sandals Road.

Michael – I wondered whether there might have been temporary structures.

Craig – There may have been because we would have utilised the area for hunting and fishing and gathering of resources.

Aunty Timu – Another thing is that when they were travelling from Mōkai to Tīraupenga, they would travel this way along the river and across the Mangakino River (Stream).

Craig – As far as we know the main usage of this land by our people was as a thoroughfare when they were travelling into the Waikato area.

Aunty Timu – And Wharepūhanga (Waikato) especially, as that was where they had pō.

Craig – We had pō and relatives and Wharepūhanga which is the block just north of Mangakino and this was our transit area was through here. Not to say that we would have had temporary dwellings for hunting and fishing and gathering.

Aunty Timu – That same road, same track would have led them to Ōrākau.

Craig – This is the track (points to Map C provided by Aunty Timu at *Appendix E*). Whakamaru Village, the name of the village we called it Papa Ōpihi and there was a track that went to Whakatāngitangi which is at Sandel Road that we talked about and that's where the present school [Whakamaru] is now and up through Kahu Road and then it crossed the Mangakino Stream. And that's when we talked about this and here but when you get to that I'll talk to you about that. You probably could use this map for your purposes, and you've also placed a couple of mountains. I see there's mountain references here and you can see where the track went in proximity, so it was a thoroughfare.

Michael – I'll photograph that.

Aunty Timu – I have a better map that I'll send to you.

Michael – The roots from the fern; where would the ferns have been growing?

Craig – Yes basically from Tihoi to the base of Titirapunga and Rangitoto Ranges, basically all that land to the river was open land with manuka and tussock.

Michael – And the mānuka and tussock was removed for pasture development once rabbit was identified as the missing trace element.

Craig – Yes.

Landmarks of Significance

Michael – I wrote down landmarks that I naturally presumed might be of cultural heritage significance such as Mount Kahu.

Craig – There is misnomer with Mount Kahu. I will discuss that when we talk about the significant landmarks.

Maunga Kahu [Whakakāho]

Aunty Timu – This is Whakakāho (points to photograph at *Appendix F*). It is all Whakakāho. It is like someone sleeping.

Craig – I can speak of Whakakāho and Maunga Whakamaru as they're one in the same. There's a story of a woman and there's two versions but the version I put forward is the accepted Raukawa version. Which is Kahupeka who married Ue and Kahupeka is a descendant of Takataura who was the tohunga on the Tairāni canoe. Ue is a direct descendant of the captain of the Tairāni canoe Hoturoa. They had a son Rakamaomao. It was said that soon after Ue died Kahupeka accompanied by her son Rakamaomao travelled through this area and on the other side of the river you'll see the fire lookout on the top, that is Whakamaru. The village take its name from that feature and the full name is Te Whakamaru o Kahu. Because at that place Kahupeka was said to have built a shelter for herself. Whakamaru means to make a shelter or shelter yourself.

In terms of the misnomer of Mount Kahu the full name Te Whakakāho o Kahu, the reason being was in that area she was collecting reeds to make a shelter. Te Whakakakaho means to gather reeds.

Pureora

Pureora was said to be another landmark that was associated with the travels of Kahu. And according to Raukawa version she was sick when she got to the top of the mountain, and she remained there

until she recovered and hence the name Pureora o Kahu. That's Pureora mauunga, so Pureora is to do with the cleansing or healing ritual.

There is an alternative narrative that talks about another kahu, Kahukeke and was said to have been married to Rakataura the tohunga of the canoe and in that narrative, it talks about him undertaking a purification on that hill and hence again Pureora, that's where the name comes from the purification ritual and also associated with the naming of those other mountains are other features that I've talked about.

Titiraupeunga

Titiraupeunga, I do recall an elder of mine who's passed now – Mātangi Hept – saying it was Te Titiraupeunga which he says meant the spear of Raupunga. However, I'll also heard a story regards to Titiraupeunga, titi being the mutton bird, raupunga a certain type of trap that was used to trap mutton bird. What we don't realise is that even in the centre of North Island we're not that far away from the sea and that the mutton birds every evening would travel from their foraging in the seas and fly in and and they would nest in the forest of the mountains. Titiraupeunga was said to been one of the mountains that they rested, hence the name Titiraupeunga.

Pouākani Totara Tree

Pouākani the Tōlora tree – I can't tell you any particular information about that tree myself although it's an ancient tree and that my people would before colonisation and the alienation of the Pouākani took from them and it would have been a significant landmark for them, being the size and its age.

Urupā

Michael – What about urupā? We are aware of the urupā at the cemetery which was started when the Mangakino Township commenced. . We are not aware of any other urupā of Mangakino. Are you aware of other urupā?

Craig – No, not in the area of your operations.

Aunty Timu – There are lots of urupā around here but they're further out from Mangakino.

Michael – What about canoe landing sights. I suppose they all got flooded when the river was dammed.

Craig – You have to understand that this particular stretch of the river had a lot of rapids and I'm not saying that they never would have used waka, because we did use waka particularly upstream where I think there was less rapids, but this particular area here I believe had rapids, so it was safer to travel by foot. And like I said we used to cross the Waikato River near where the Whakamaru dam is today, because there was a narrow gorge that was formed at that point.

Aunty Timu – There is a sight this side of the Waikato River near Pōhaturoa that has been identified where canoes have been dragged up on to the shore. Perry Fletcher identified all of that.

Craig – It's towards the Atiamuri end that we had more of a permanent living presence.

Michael – Atiamuri and Araratia, both have reference to Tia?

Craig – That's correct and Te Maroa-a-Tia, that also emulates or reflects the journeys of Tia as he moved through this area. It gives more to his narrative his korero.

Michael – Are you aware of any wahi tapu sites in Mangakino or in the wider area perhaps?

Craig – I'd say in the wider area, but you're probably talking outside of the Pouākani area of interest.

Aunty Timu – Coming down around Tīrirauoenga and Pureora my great grandfather Hīkiri Te Pāerata mentions all these areas where there are wāhi tapu, for that reason we have not allowed the Defence Force to use Pureora as their practice ground.

Craig – In answer to your question, there is wāhi tapu, I don't know exactly where they are, Aunty may have a better idea, but you'll find them closer to the base of the mountain – not the Mangakino Township.

Aunty Timu – And except for here, there was a big pa not far from here. (Whirara name of tā, not far from Whakakaho maunga up the Maraemānuka stream).

Craig – And there's an urupā around that area.

Michael – So locally, we're talking about Mangakino, other than the fern there was no flora?

Craig – I believe native grasses, mānuka (lea tree) and native scrub flora.

Michael – And were there wetlands?

Craig – Yes, around the area but not directly in the Mangakino Township area.

Michael – The flax would have been harvested?

Aunty Timu – The flax was actually gathered by our people, and they took it to Mangakino and sold it. That's how they earned their money.

Michael – I think that covers my questions. We don't want to be doing development in an area that is of cultural significance or anything like that. I have been told by locals that there was really no habitation here of a permanent nature and you and Aunty Timu have packed that up in this kōrero.

Aunty Timu – Not far from here you've got Aratoki, that's all a cultural area. There are other places around here towards the maunga, but I'm still doing the kind of work to identify them.

Michael – From the point of view of the farm, now that we are more aware, we will make sure that Poporo-a-raukawa continues to be respected. We will also recognise and respect Taupaki which is in the Pouakani North Forest Block. (These are marked on Map D at [Appendix D](#)).

Craig – Not far from that site Poporo a raūkawa. (Map D [Appendix D](#)) The village Whakatangitangi, the area we are talking about is here, Dillon Road comes in here. Have you ever heard of the name Watson's Crossing which is the bottom of Dillon Road. You go to the very end of Dillon Road and go to Mangakino Stream, that place is called Watson's Crossing. That's the old Māori crossing, and you can see the track right here (Map C). You've got it here, on your Map D). You have Taupaki, if you go southwest of Taupaki, basically the track comes through here, the old Māori track would have come through here. (Points to Taupaki on Map D)

Aunty Timu – Along those tracks would have been kāinga and it would have been urupā. (Points to an area east of the Mangakino Stream).

Craig – Also the name Mangakino comes from, there's a certain place where the currents hold all the pumice together and people would be mistaken to believe it to be solid ground. When they went to walk over it, they would go straight through. That's where the name Mangakino comes from – bad stream. But it's to do with the pumice.

Michael – The land block of Wairarapa Moana has one boundary along the Waiteti Stream, and the other boundary is along the Mangakino Stream, up to the area where the Mangakino Stream and the Mihinanga Stream intersect and then it follows the Mihinanga Stream. (Map D Appendix D)

Craig -It's about here where our cultural interests get intense. (Sandel Road, Mihinanga Road and Huiarau). What I do know about Huiarau, and I don't know exactly if this the right place where Huiarau is because that's not Whakamaru, Whakamaru is actually here (Points to Mount Whakamaru on Map A).

Huiarau

The mountain Huiarau as we have a farm partnership called Huiarau Farms Partnership which tells me that it's in the vicinity but what it came from it means 'many huia birds'. It was obviously traditionally a place where you found many huia birds.

Michael – Yes, I think Huiarau farms are on Mihinanga Road and I think the partnership also bought a farm owned by a Pōkehā family and added it to their holding.

Craig – That area was known for its many huia birds.

Aunty Timu – That has urupa around that area.

Craig – Wairarapa Moana Ki Pouākani is in a position in terms of where there are very few significant sites of cultural importance. The sites are on the lands around you and not on the land you occupy.

Michael – For a cultural impact assessment it's not just about the identifying wāhi tapu and the areas of significance, it's also about how the development would impact on these sites and the people who are connected to them. When you think of the development that occurred in Mangakino by the Ministry of Works in the 1940's and 1950's it was done without a cultural assessment and consideration of what mattered to the peoples you have talked about.

Fortunately, the area of Mangakino Township itself did not have the wāhi tapu, urupa and the Pa site the area closer to the Maunga Tīroupanga did, and these remained held in trust and protected.

Craig – I know this kōrero today is part of process, this is a requirement, the cultural assessment but the fact that Wairarapa Moana has reached out to us and asked us the mana whenua to give our stories and to speak to this particular area is appreciated.

Michael – Thank you Craig, Uncle Eli, and Aunty Timu. We are grateful to you. Wairarapa Moana's journey to Mangakino started in 1916. That is when the Crown handed over 10,695 hectares of the land at Pouākani as compensation for their failure to provide land in the Wairarapa, as part of the Wairarapa Moana Exchange.

I was in the Wairarapa last weekend because we had our AGM in Greytown. We were welcomed to Papawai Marae and that is where the signing with the Crown happened and the action that started the journey.

Thank you again. This kōrero has been significant for Wairarapa Moana Ki Pouākani Incorporation and will remain treasured.

Map A – Appendix A





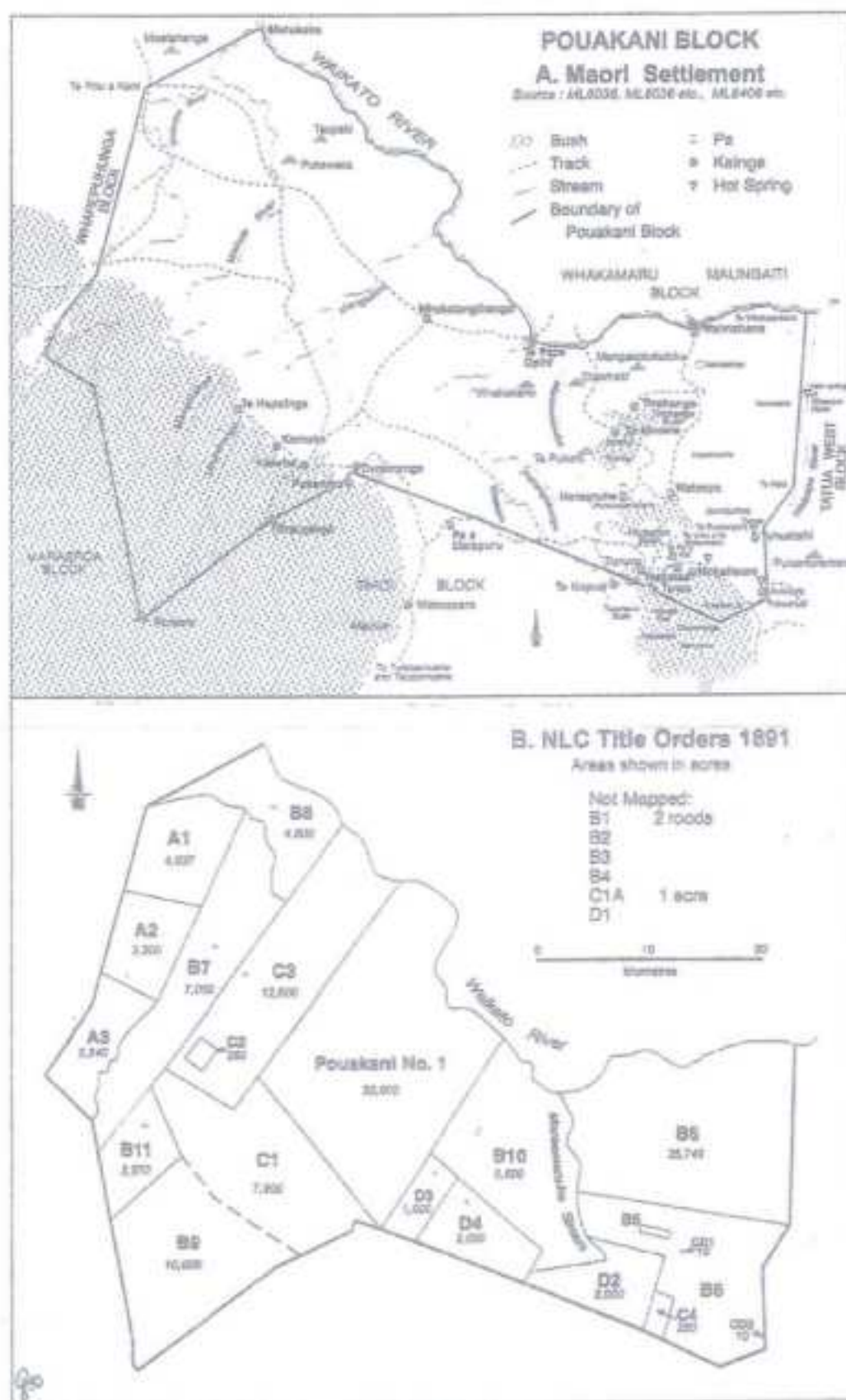


Figure 25

Map D – Appendix D



Extract from:

Appendix E

MANGAKINO IN PERSPECTIVE THE STORY OF A HYDRO TOWN 1945 - 1965

By Cynthia Hasman

from page 7

By 1945 the preliminary investigations had advanced far enough for a decision to be made that the site was suitable and that work should proceed as soon as the plans were prepared. Up to that time the surveyors' only access to the site was along a difficult track through the pine plantations between there and Tokoroa. It was a two-hour journey which ended with the crossing of a narrow gorge in the Waikato at Whakamaru. There the river rushed at the rate of 7,000 cubic feet a second through what was known as "the Gut". Across the raging torrent there was a precarious bridge consisting of a single hand-hewn slab of timber twenty feet long and just over a foot wide. This rested on two petrol drums filled with stones, which were anchored with fencing wire. Later, when surveying for the township of Mangakino was being done, supplies and men crossed the river on a punt. Before Mangakino was built all the country on the west side of the river was covered in tea tree and tussock. The surveyors camped near the river shared the wilderness with wild horses, some of which they quickly tamed for riding and carrying supplies. Two years later there was a road from Tokoroa and a proper bridge over the river. Mangakino was well on the way to being established, and a start had been made on the excavation of the diversion tunnel for Maraetai.

Maunga Kaahu [Whakakāho]



Photograph by Wairarapa Moana Ki Pouakani Incorporation

Photograph taken from Whakamaru Village

Appendix 3

TMTB Feedback

Mary Chappel

From: Notifications Tuwharetoa <notifications@tuwharetoa.co.nz>
Sent: Wednesday, 29 May 2024 11:49 am
To: Catriona Eagles
Subject: RE: Consultation documents - Mangakino Rezoning on WMI land

Tena koe Catriona,

Thank you for keeping us in the loop, the Tūwharetoa Māori Trust Board are comfortable with you engaging with mana whenua.

Naku iti nei

Notifications
 Tūwharetoa Māori Trust Board

From: Catriona Eagles <CatrionaE@cheal.co.nz>
Sent: Wednesday, May 22, 2024 4:13 PM
To: Notifications Tuwharetoa <notifications@tuwharetoa.co.nz>; Cher Mohi <Cher@tuwharetoa.co.nz>
Subject: RE: Consultation documents - Mangakino Rezoning on WMI land

Ahiahhi Marie

A quick followup to see if TMTB have any feedback on this proposal for residential zoning in Mangakino.

WMI are keen to korero with TMTB on this if there are any questions or interest in a discussion.

Īmēra mai mehemea he whakaaro ōu mō taua kaupapa

Ngā mihi

Catriona Eagles
Cheal Consultants Ltd

From: Catriona Eagles
Sent: Thursday, May 9, 2024 12:40 PM
To: Notifications Tuwharetoa <notifications@tuwharetoa.co.nz>; Cher Mohi <Cher@tuwharetoa.co.nz>
Subject: Consultation documents - Mangakino Rezoning on WMI land

Ahiahhi marie

Cheal Consultants are working with Wairapapa Moana ki Pouakani Inc to investigate the rezoning of two Rural parcels to Residential zone in Mangakino.

Please see the attached documents which includes a letter to TMTB and an Executive Summary document with more information on investigations underway and scope.

WMI welcome feedback and comment from Tūwharetoa Maori Trust Board on this proposal. The rezoning will provide additional residentially zoned land which could be used for a range of housing opportunities in Mangakino.

WMI have also had ongoing discussions with Pouakani Marae. Discussions with Raukawa are underway with a meeting to be held in the next 2 weeks. A public hui was held at Pouakani Marae in February.

We welcome the opportunity to meet with TMTB, provide more information in person or via phone/email on this proposal. Alternatively if TMTB have no comments or concerns please advise for our records.

Ngā mihi

Catriona Eagles
Technical Lead - Planning
Cheal Consultants Ltd

DDI +64 7 376 1476 | M +64 274 226 785
E: catrionae@cheal.co.nz
Level 1, 4 Horomatangi Street, Taupō 3330
Post to: PO Box 165 Taupō 3351



CAUTION!! This message contains information that is confidential and may be subject to legal privilege. If you are not the intended recipient, you must not peruse, use, disseminate, distribute or copy this message. If you have received this message in error, we apologise and ask that you notify us immediately and destroy the message from all locations. We do not accept responsibility for any changes to this email or its attachments.

Appendix 4

Raukawa Feedback

Mary Chappel

From: Catriona Eagles
Sent: Monday, 16 December 2024 7:28 pm
To: Andrea Julian; Joseph Kaponga
Cc: Michael Allan
Subject: RE: WMI - Consultation with Raukawa - Meeting Notes 29 Oct 2024

Andrea

Hope you are well leading up to the end of the year.

As a last follow up before the end of the year, do you have any alterations to the notes below as a record of consultation.

Po marie, Ngā mihi

Catriona Eagles
Cheal Consultants Ltd

From: Catriona Eagles
Sent: Sunday, 10 November 2024 7:46 PM
To: Andrea Julian <andrea.julian@rauakawa.org.nz>; Joseph Kaponga <joseph.kaponga@rauakawa.org.nz>
Cc: Michael Allan <michael@wairarapamoana.org.nz>
Subject: WMI - Consultation with Raukawa - Meeting Notes 29 Oct 2024

Kia ora Andrea & Joseph

Thank you for your time on 29 October to meet and korero with Michael Allan and I regarding Wairarapa Moana Inc project to rezone land in Mangakino to Residential. Consultation with Raukawa on this project is an important component of this project to WMI. We appreciate your time and your feedback.

I made the following notes from our meeting – please review and advise any alterations or additions to this as a record of consultation

At our hui, we went through the presentation that was shown at the public hui undertaken at Pouakani Marae in Mangakino in February Hui. We have provided you with the PDF of that presentation. Please do circulate that as needed, in conjunction with the Executive Summary previously provided.

From your feedback through out that presentation we understand

1. The treatment of soil contamination is recommended to follow Raukawa's protocol, which you have provided to us since.
2. Connectivity to the Waikato awa is supported, Raukawa are keen to see walking or cycling access to the awa and/or awa views
3. Restoration of the area adjoining the awa is supported by Raukawa, We talked that WMI can restore area inside the development area however the area between the boundary and the awa is within the ownership of LINZ
4. Archaeological discovery protocol is required to be in place for earthworks
5. The new Urban form adjoining existing village is supported
6. Raukawa is interested in the performance of the Mangakino WWTP. We discussed TDC's proposed upgrade to the plant whereby WMI has been advised by TDC wastewater asset manager that the plant will cater to the additional 30yr growth. There are options for additional land associated with the additional volume. Raukawa has an interest in treated effluent phosphorus levels, which WMI also raised with TDC.
7. Raukawa are also Interested in wetland treatment of ww – TDC treat and dispose of the wastewater, it is disposed to ground within the disposal area
8. We outlined the consultation with Pouakani Marae and kaumatua, we agreed and have since forwarded you the record of that interview
9. Overall, subject to the feedback above, Raukawa has no other concerns.

We welcome your confirmation of these matters, and any others, to take forward as a record of consultation with Raukawa on this project.

Ngā mihi

Catriona Eagles
Technical Lead - Planning
Cheal Consultants Ltd

DDI +64 7 376 1476 | M +64 274 226 785

E: catriona@cheal.co.nz

Level 1, 4 Horomatangi Street, Taupō 3330

Post to: PO Box 165 Taupō 3351

Mary Chappel

From: Andrea Julian <andrea.julian@raukawa.org.nz>
Sent: Wednesday, 6 November 2024 4:46 pm
To: Catriona Eagles
Subject: RE: Kaiapo Rd proposal : Mokai Marae

As discussed on our phone call, having given this some thought, I think the best way for you to get a response from mana whenua from Mokai will be for you to send the information to me, requesting I send it on to our Marae Chair and Trustee and others who have expressed interest.

I can do a short preamble briefing them on Raukawa's involvement to date and also attach the earlier response that our Pūtake Taiao team sent to the owner of the western property. I'll invite them to let me know if they want to be directly involved.

Andrea Julian

Regional Strategy Manager – Te Uraura

 07 885 0260
 0800 728 5292
 803
 027 455 5317
 andrea.julian@raukawa.org.nz
 www.raukawa.org.nz

From: Catriona Eagles <CatrionaE@cheal.co.nz>
Sent: Wednesday, 6 November 2024 4:23 pm
To: Andrea Julian <andrea.julian@raukawa.org.nz>
Subject: Kaiapo Rd proposal : Mokai Marae

Caution: This email originated outside of the Raukawa network. Do not click on any links or attachments unless you trust the sender. If you're unsure whether an email is legitimate or not, please contact Raukawa's IT support team.

Hi Andrea

You advised in our meeting, that the two people highlighted should be contacted directly regarding this proposal.

Can you please confirm email addresses of the other two people you recommended?

I would like to get this information out to them this week if possible.

Ngā mihi

Catriona Eagles
Cheal Consultants Ltd

From: Patai <patai@tknt.maori.nz>
Sent: Thursday, 30 May 2024 9:55 AM
To: Catriona Eagles <CatrionaE@cheal.co.nz>
Subject: Re: Mokai Marae

Kia ora Catriona,

Please find below are the current contact emails for the Mokai Marae hapuu.

Ngati Moekino

Trustee: wiari@tknt.maori.nz

Alternate: paeratak@gmail.com

Ngati Parekaawa

Trustee: ngapunaowairere@gmail.com

Alternate: gpatena@gmail.com

Ngati Tarakaiahi

Trustee: hinemoana66@gmail.com

Alternative: miriamamatene2@gmail.com

Ngati Te Kohera

Trustee: craigahipene@gmail.com

Alternative: stephinieverlinden@yahoo.com

Ngati Wairangi

Trustee: pouakani.2@gmail.com

Alternative: mlandrews.mokai@gmail.com

Ngā mihi

Tangiariki Wanikau

Te Pae Manaaki | Administrator

TE KOTAHITANGA O NGATI TUWHARETOA

Phone: 0800 KOTAHI (0800 568244) | Email: patai@tknt.maori.nz | 130 Atirau Road / PO Box 315 Turangi
3353, Aotearoa New Zealand | Website: www.tekotahitangaotuwharetoa.co.nz

CAUTION: This email and any attachment(s) contains information that is both confidential and possibly legally privileged. No reader may make any use of its content unless that use is approved by Te Kotahitanga o Ngati Tuwharetoa in writing. If you are not the intended recipient you are notified that any use, dissemination, distribution or copying of this message or data is prohibited. If you received this email in error, please notify us immediately and erase all copies of the message and attachments. We apologise for the inconvenience; kia ora.

From: Catriona Eagles <CatrionaE@cheal.co.nz>

Date: Wednesday, 29 May 2024 at 10:18 PM

To: Patai <patai@tknt.maori.nz>

Subject: Mokai Marae

Kia ora

Could you please provide the current contact details for Mokai Marae hapu reps and Chair?

Ngā mihi nui

Catriona Eagles
Technical Lead - Planning
Cheal Consultants Ltd

DDI +64 7 376 1476 | M +64 274 226 785

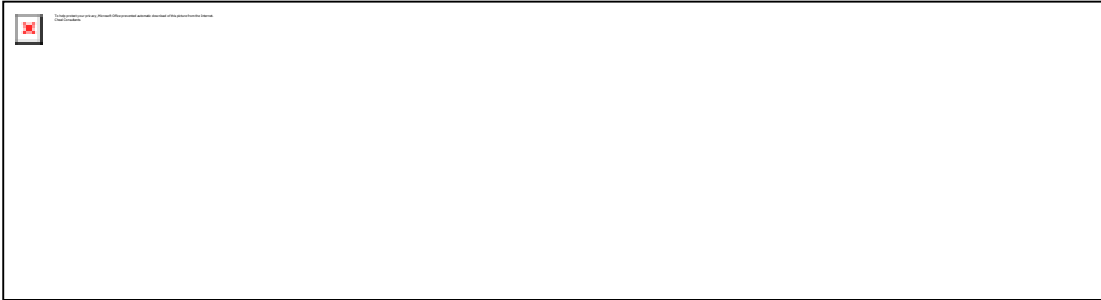
E: catrionae@cheal.co.nz

Level 1, 4 Horomatangi Street, Taupō 3330

Post to: PO Box 165 Taupō 3351



CAUTION!! This message contains information that is confidential and may be subject to legal privilege. If you are not the intended recipient, you must not peruse, use, disseminate, distribute or copy this message. If you have received this message in error, we apologise and ask that you notify us immediately and destroy the message from all locations. We do not accept responsibility for any changes to this email or its attachments.



CAUTION!! This message contains information that is confidential and may be subject to legal privilege. If you are not the intended recipient, you must not peruse, use, disseminate, distribute or copy this message. If you have received this message in error, we apologise and ask that you notify us immediately and destroy the message from all locations. We do not accept responsibility for any changes to this email or its attachments.

Mary Chappel

From: Andrea Julian <andrea.julian@raukawa.org.nz>
Sent: Monday, 4 November 2024 11:28 am
To: Catriona Eagles
Subject: Raukawa contaminated soils preferences

Here are the preferences for managing contaminated soils that I mentioned to you at our hui last week.

Mana whenua have considered contaminated soil management at other sites and expressed the following preferences:

- Soil be retained, where possible, within the Raukawa takiwā,
- Soil be rehabilitated in preference to disposal,
- Soil where contamination is below the limit for recreational areas be used in green spaces above flood levels.
- Plantings on contaminated soils should be with native plants that are not edible or medicinal.

This was for subdivisions where there was provision of recreational reserves.

Andrea Julian

Regional Strategy Manager – Te Uraura



 07 885 0260
 0800 728 5292
 803
 027 455 5317
 andrea.julian@raukawa.org.nz
 www.raukawa.org.nz

1-11 Raukawa Way | Tokoroa | 3420 - Private Bag 8 | Tokoroa | 3444

This email including attachments is intended solely for the named addressee. It contains confidential information that may be subject to legal and other professional privilege and to copyright, none of which is waived or lost should this message be sent to or received in error. Please advise the sender immediately and delete it from your system and do not copy or otherwise reproduce or distribute it in part or in full.

Appendix 5

Public Hui Presentation
February 2024



Wairarapa Moana Ki Pouakani Incorporation

Mangakino 2060

Mangakino Consultation Hui
Pouakani Marae
23 February 2024



Mangakino 2060

Mangakino 2060 is the name of this WMI initiative

Mangakino 2060 is about rezoning 3 blocks of land that border the town from rural to residential land

Mangakino's growth is important to WMI and needs to be included in long-term planning for farming and forestry

WMI are Mana Whakahaere and the owners of the land in the area

WMI own all the land around the Mangakino Township . The land is General Land and not Maori Freehold Land

WMI plan for the long-term. The Mangakino community is important to WMI and WMI needs to consider Mangakino's growth prospects



Mangakino 2060

WMI commissioned an independent report on the forecast growth of Mangakino. The outcomes of the report aligns with growth modelling undertaken by Taupo District Council

An average of 8 new sections a year are required to meet the demand for new building. Over the next 36 years to 2060 the demand is for 288 lots.



Mangakino 2060

- Previously the local authority designated a part of 37 Lake Road, 3 Karamu Street and the Rimu and Taniwha Street areas as future residential land.
- WMI's proposal is to have this land rezoned as residential
- The land areas proposed for re-zoning are shown on the next slide



applied innovation



Wairarapa Moana ki Pouakani Inc

Mangakino 2060 Zone Change Consultation Hui

23 February 2024

Pouakani Marae



cheal
www.cheal.co.nz

Agenda

Tīmatatanga

Kaupapa/Proposal

Hātepe/Process

Site Selection

Background Reports

Pātai/Feedback



cheal



Timatatanga

Cheal Consultants

- Catriona Eagles
- Anthony Moss

Narrative Landscape

- Josh Hunt

cheal

Kaupapa



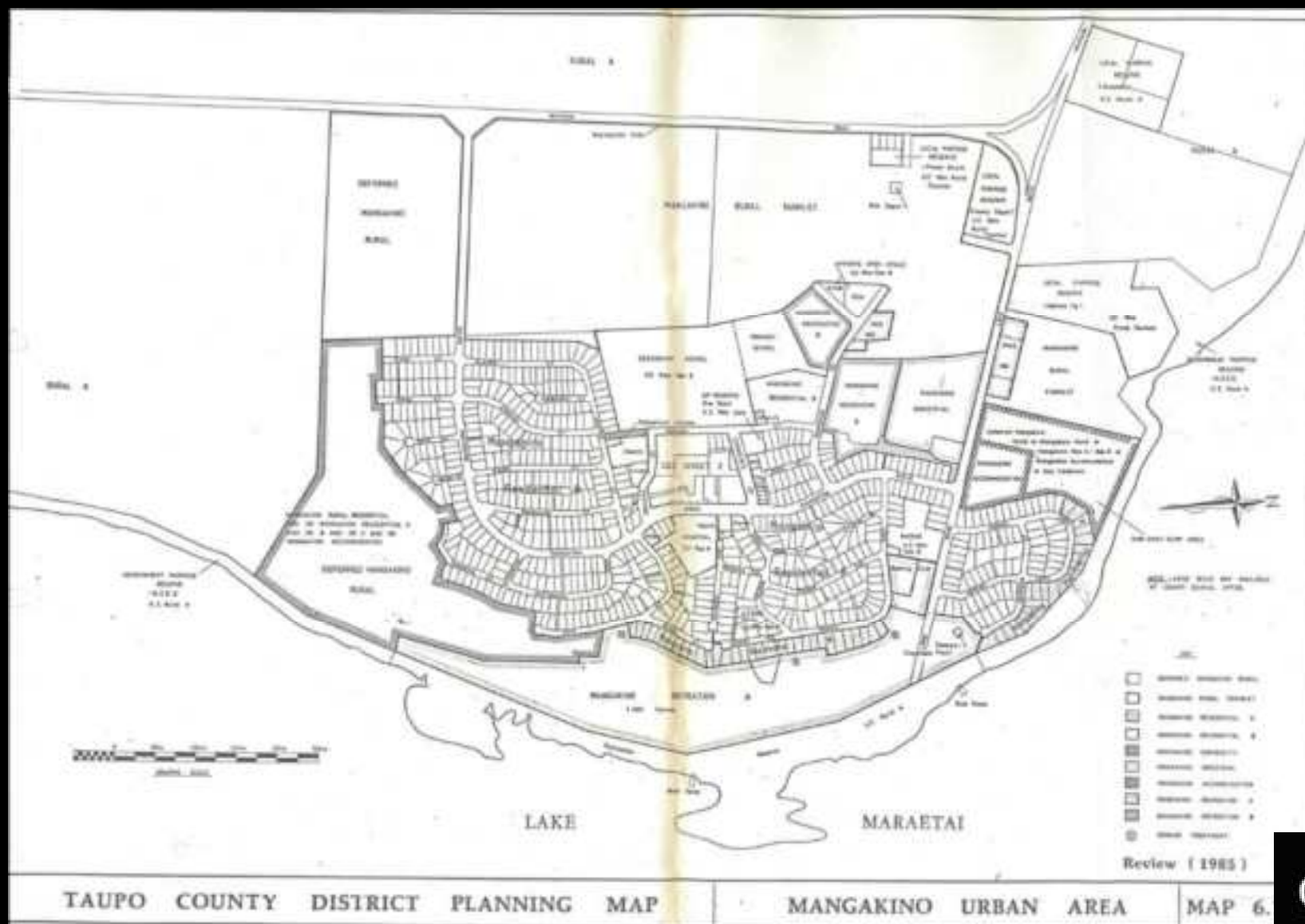
- To provide more residential housing in Mangakino
 - Three possible sites of General Land identified
 - Lake Road
 - Karamu Street
 - Taniwha Street
- (All previously developed and previously zoned for developed)

cheal

Location
2023
1963



cheal



Hātepe



- District Plan Zone Change Process
 - Assessment
 - Is land needed for residential in this area?
 - What options are there?
 - What constraints are there?
 - What is the impact on existing infrastructure?
 - Process
 - Taupō District Council Residential Plan Change in 2024/25
 - WMI supportive of the demand for residential housing
 - WMI has undertaken assessments to investigate these sites
 - WMI is advocating that land be rezoned to Residential
 - WMI intends to submit to TDC by March/April 2024
 - Once accepted, Council notify Residential Plan Change (new zoning and new rules)
 - Opportunity for submissions, then Hearings are undertaken and Decisions made
 - Approx 2 years
- Subdivision Process (after successful rezoning)
 - Assessment and Concept Design
 - Roads, earthworks, water, wastewater, stormwater, building platforms, reserves etc
 - Apply for Subdivision Consent to Council
 - Detailed Design and Construction

cheal

Site Selection

Sites selected by

- Location
 - adjoining Residential areas
 - adjoining Waikato awa
- Serviceability
- Suitability for Residential Housing

WMI Priorities

1. Lake Road – (serviceability, landscape, LUC)
2. Karamu Street – (location and serviceability)
3. Taniwha Street – (serviceability, landscape, LUC)



cheal



Lake Road

(up to 150 lots)



cheal

Lake Road



cheal

1963



cheal

A large, light teal circle is positioned on the left side of a dark teal background. The word "DRAFT" is written in white, uppercase, sans-serif font, centered within the circle.

DRAFT



Karamu Street

(up to 30 lots)



cheal

Karamu Street



cheal

1963



cheal

DRAFT



Taniwha Street

(up to 70 lots)



cheal

Taniwha Street



cheal

1963



cheal

DRAFT



Background Reports



Overarching Reports	
Economic	Favourable, shows low steady growth, 5 to 10 lots per year
Cultural Impact Assessment	Korero with Kaumatua
Wāhi Tapu/Sites of Significance	No archaeological sites No permanent habitation in area until post WWII No wāhi tapu on the sites No significant landmarks or urupa
Civil Engineering – water & wastewater	Confirmed capacity in water supply TDC Agreement to additional Capacity in wastewater plant, designed upgrade in 2027/28
Ecological	All sites are pastures, report not required
Traffic	Favourable
Power	Available

cheal



Lake Road Reports	
Geotechnical	Favourable. Some areas of constraint, works required within subdivision to address soil conditions for foundations
Soil Contamination	Favourable. Some areas of constraint, works required within subdivision to remediate or use for alternative uses
Land Classification	LUC 6e & LUC 3s (discrete and separated)
Civil Engineering	Water – serviceable Wastewater – most of site serviceable with gravity Road Stormwater – disposal within site possible House Stormwater – onsite disposal
Landscape Visual	Best suited due to surrounding constraints Defined expansion of urban form

cheal

Taniwha Street Reports	
Soil Contamination	Favourable. Very small areas of constraint, remediation possible in subdivision
Land Classification	LUC 3s
Civil Engineering	Water – serviceable Wastewater – serviceable with pumps Road Stormwater – disposal within site possible House Stormwater – onsite disposal
Landscape Visual	Consideration to be given to more expansive and productive rural landscape



Karamu Street Reports	
Soil Contamination	None
Land Classification	LUC 3 (discrete and separated)
Preliminary Civil Engineering	Water – serviceable Wastewater – serviceable Road Stormwater – disposal within site possible House Stormwater – onsite disposal
Landscape Visual	Suitable, not adjoining Waikato River OLA

cheal

Landscape & Visual Effects Assessment



- Site Context
- Consider potential for both Lake Rd and Taniwha St sites
- Landscape Classification (Adjacent to Outstanding Natural Landscape)
- Potential landscape planning controls (e.g. height restrictions)



Landscape & Visual Effects Assessment

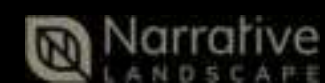


Narrative
LANDSCAPE

cheal



cheal



cheal



Narrative
LANDSCAPE

cheal



cheal



 Narrative
LANDSCAPE

cheal

Pātai and Feedback



- Now
 - Pātai
 - Korero – WMI, Cheal, Narrative
- Later
 - Email taupoadmin@wairarapamoana.org.nz
 - Online form <https://forms.gle/NM4vixpEs8nTCMtUA>



cheal

Appendix 6

Public Hui
Feedback Forms

Michael Allan

From: Administration
Sent: Wednesday, 28 February 2024 10:30 AM
To: Michael Allan
Subject: FW: Redevelopment

Nga mihi,

Mereana Aranga

FINANCE ASSISTANT & EVENTS RELATIONS MANAGER

M 021 030 3731

E mereana@wairarapamoana.org.nz

Wairarapa Moana Incorporation

From: Joanna Cooper <pikikahu1@hotmail.com>
Sent: Tuesday, February 27, 2024 4:26 PM
To: Administration <taupoadmin@wairarapamoana.org.nz>
Subject: Redevelopment

Hi my name is Joanna Cooper of Mangakino.

I was at the meeting on Friday 23 February, and have listened to your proposal for obtaining Rural into Residential land.

I am a resident on Taniwha street and strongly disapprove of the Redevelopment on the Wairarapa Moana land. I am also a shareholder.

They are suppose to be managing our land, not trying to sell it.

They only use Mangakino to sell of the land for there benefit and not

For the people.

Regards Joanna Cooper.

Michael Allan

From: Sarah Crocker <sarah@sarahcrocker.co.nz>
Sent: Tuesday, 27 February 2024 1:06 PM
To: Michael Allan
Subject: Re: Mangakino Consultation Hui 23 February 2024

Thank you, Michael. Confirming this information has been relayed to Terry Littlefair.

When you have a moment, please could you share the Cheal PowerPoint from last Friday's hui.

With thanks
 Sarah

On 26/02/2024, at 3:28 PM, Michael Allan <michael@wairarapamoana.org.nz> wrote:

Hello Sarah

The three questions in Terrys email below did not get presented to the Mangakino Consultation Hui on Friday 23 February 2024. I have answered these below. Please pass these on to Terry.

1. The Rimu Street Wastewater system is due for a revamp when the TDC upgrade is made to the Mangakino Wastewater Treatment Plant – tentatively scheduled for 27/28. There are some Mangakino properties that are still connected to the original Ministry of Works system and their wastewater is collected in the underground tanks on the reserve on Rimu Street. These are what you are referring to. The wastewater is contained in these tanks (with no discharge to land). When the tanks are near full, the contents are pumped out into a tank truck and transported to Taupo for treatment. The plan for the TDC upgrade includes a change to be made, and this is that the wastewater will be piped directly to the Mangakino Wastewater Treatment Plant and treated by that plant and discharged within the terms of the resource consent. The tanks will no longer be required. WMI are very conscious of the need to ensure there is the correct infrastructure in place to service future development in the Rimu Street and Taniwha Street area (which probably 15 to 20 years out) and for wastewater this is likely to be met by a future 'growth upgrade'.
2. Hole 13 of the disc golf is on WMI land. The WMI land borders the Council reserve. At this point WMI has no intention of 'pushing out' the disc golf however, at some future time it will be necessary to have Hole 13 reconfigured so it is on the Council reserve land and WMI can utilise its own land.
3. The Mangakino Golf Club received notice of the Hui.

Nga mihi

Michael Allan
 Wairarapa Moana Ki Pouakani Incorporation.

From: Sarah Crocker <sarah@sarahcrocker.co.nz>
Sent: Thursday, February 22, 2024 2:01 PM
To: Michael Allan <michael@wairarapamoana.org.nz>
Subject: Re: Mangakino Consultation Hui 23 February 2024

Hi Michael,

Confirming that I have shared the details of the livestream event to the 'Mangakino Watersport Community' and the 'Mangakino Community Noticeboard' Facebook Pages. The post to the later page is subject to Admin approval, so my post is noted as 'Pending' in the screen grab below.

Below are some questions that a fellow Rimu Street resident, Terry Littlefair (who is unable to attend the hui in person), would like asked/answered please.
Could I ask please that you share the questions with the MC/Moderator of tomorrow's event.

A very big thank you for going to the effort of pulling this livestream together, I for one really appreciate it.

Kind regards
Sarah

<image001.png>

<image002.png>

<image003.png>

On 22/02/2024, at 11:00 AM, Michael Allan
<michael@wairarapamoana.org.nz> wrote:

Morena Sarah

Wairarapa Moana Ki Pouakani Incorporation (WMI) will livestream from 10.30 am tomorrow 23 February 2024, the meeting component of the Mangakino Consultation Hui.

Are you able to put the notice below on the Mangakino Notice Board Facebook page. Can you please confirm to me that you have put the notice on the Facebook page.

Nga mihi

Michael Allan

**Wairarapa Moana Ki Pouakani Incorporation Mangakino Consultation Hui
23 February 2024 – Livestream 10.30am**

There have been requests to have the Hui livestreamed as several people cannot attend in person.

1. To access the livestream, you will need to go on to the WMI home page (www.wairarapamoana.org.nz).
2. There will be a button for you to click on to access the livestream.
3. The livestream will not be started (activated) until the meeting starts which may be later than the programmed 10.30 am as it will depend on the time taken by the Powhiri and the cup of tea.
4. The livestream will be closed when the meeting is finished.

From: Sarah Crocker <sarah@sarahcrocker.co.nz>
Sent: Tuesday, February 20, 2024 5:51 PM
To: Michael Allan <michael@wairarapamoana.org.nz>
Subject: Re: Mangakino Consultation Hui 23 February 2024

Thank you very much for this information, Michael.

Kind regards
 Sarah

On 20/02/2024, at 2:17 PM, Michael Allan
 <michael@wairarapamoana.org.nz> wrote:

Kia ora Sarah

You requested a map showing the location of the land that Wairarapa Moana are wanting to zone residential.

I have attached a map with the three areas marked A, B and C.

I do not have an update on the livestream option yet.

Nga mihi

Michael Allan

Michael Allan
Wairarapa Moana Ki Pouakani Incorporation
michael@wairarapamoana.org.nz
 Tel +64 29 2755 685

<240220 Map ABC Proposed Zone Changes.pdf>

Feedback

Wairarapa Moana ki Pouakani welcome your feedback on the provision of additional residential land in Mangakino by changing the zone for the three sites proposed being Lake Road, Karamu Street and Taniwha Street, from Rural to Residential to provide for residential housing in these locations.

This form can be posted to Wairarapa Moana Ki Pouakani Incorporated, PO Box 1347, Taupo 3351 or emailed to taupoadmin@wairarapamoana.org.nz or completed online at this link <https://forms.gle/NM4vixpEs8nTCMtUA>.



WMI Mangakino Zone Change Proposal



1. General Feedback on the provision of additional residential land in Mangakino

Despite the population projections is this really necessary - are we looking for holiday makers / retirees or working families. Where are the jobs?
Increased infrastructure

2. Feedback- Lake Road change to Residential zone

Why is this being looked at when the sections already available off Lake Rd are not selling?

3. Feedback - Karamu Street change to Residential zone

This would be a good area for WMI to develop for Whānau / Kaumatua / Social Housing to address the needs of people already struggling with living conditions

4. Feedback - Taniwha Street change to Residential zone

Long term maybe

5. Questions for WMI

Will you listen to the majority voice from the hui that asked for empty houses and vacant sections to be made available for Whānau housing before you proceed to Council with this application. WMI is not very visible with support for the community

6. Other Comments

Enjoyed the process and robust debate. Your notification process could have been more efficient and co-ordinated.

7. Mangakino Local

Mark only one oval.

☒ Yes

☐ No

☐ Holiday Home Owner

8. Name

Elsbeth Bunny

9. Email

Elsway@xtra.co.nz

Feedback

Wairarapa Moana ki Pouakani welcome your feedback on the provision of additional residential land in Mangakino by changing the zone for the three sites proposed being Lake Road, Karamu Street and Taniwha Street, from Rural to Residential to provide for residential housing in these locations.

This form can be posted to Wairarapa Moana Ki Pouakani Incorporated, PO Box 1347, Taupo 3351 or emailed to taupoadmin@wairarapamoana.org.nz or completed online at this link <https://forms.gle/NM4vixpEs8nTCMtUA>.



WAIRARAPA MOANA
nurturing our taonga

WMI Mangakino Zone Change Proposal



1. General Feedback on the provision of additional residential land in Mangakino

Why does the WNC think there is a need for additional housing in a town where there are currently 24 houses for sale and a large number of vacant sites for sale? Also a town where there are no jobs and where the selection of shops available do not support current population

2. Feedback - Lake Road change to Residential zone

Is this not where a previous town dump was located? Is this not a H+S issue for the community to be subjected to if this land is disturbed?

3. Feedback - Karamu Street change to Residential zone

Is this not a more appropriate piece of land to consider for housing although the town already has so many places available to buy currently?

thine st

4. Feedback - Taniwha Street change to Residential zone

This would appear to be the most difficult piece of land to develop so why would other more appropriate land be considered. The development of this piece in particular significantly affects the current ^{neighbouring} owners in a negative way. If housing is so desperately needed in the township what is the council not addressing this? What is the homeless issue in the township? ~~What~~

5. Questions for WMI

When do you plan on sending your proposal to the Taupo Council?

Will you still be doing a submission after a majority of the attending members of the community were opposed to the proposal?

When will the Council be asking for final submissions from the ratepayers + Mangakino community?

6. Other Comments

Was the land WMI are looking at rezoning part of a land swap and therefore is it not important to ensure it remains farming to its owners and not chopped up + possibly sold off?

7. Mangakino Local

Mark only one oval.

☐ Yes

☐ No

☒ Holiday Home Owner

8. Name

Dermise Miles

9. Email

newhope7974@gmail.com

Mary Chappel

From: Catriona Eagles
Sent: Monday, 11 March 2024 8:10 am
To: grhunt@actrix.gen.nz
Cc: Michael Allan
Subject: Mangakino Public Hui Feedback

Geoff

Thank you for taking the time to provide your feedback on the Mangakino rezoning proposal by WML.
We appreciate your feedback.

We will be in touch again with updated information on this proposal.

Ngā mihi

Catriona Eagles
Planning Manager
Cheal Consultants Ltd

DDI +64 7 376 1476 | M +64 274 226 785

E: catrionae@cheal.co.nz

Level 1, 4 Horomatangi Street, Taupō 3330

Post to: PO Box 165 Taupō 3351

Appendix 7

Consultation Executive Summary

EXECUTIVE SUMMARY | WAIRARAPA MOANA KI POUAKANI INCORPORATION (WMI)

LAND DEVELOPMENT POTENTIAL – 37 LAKE ROAD & 3 KARAMU STREET, MANGAKINO

Introduction:

Wairarapa Moana ki Pouakani Incorporation (WMI) are a company affiliated with Wairarapa, Ngati Tuwharetoa, Ngati Maniapoto, Ngati Raukawa and Te Arawa and who exercise authority over lands and resources. WMI holds those lands around Mangakino as a direct result of the Crown taking lands around Lake Wairarapa (Wairarapa Moana) and then failing to honour its promises. Subsequently, the lands at Mangakino which are managed by the WMI were adversely affected by the Crown's unilateral efforts to establish the Lake Maraetai power station (and hydro lake).

As a result, WMI holds these lands at Mangakino, both in trust for its beneficiaries as Māori Freehold Land under the Te Ture Whenua Māori Act 1993 and as General Freehold land. Since 1915, WMI maintain a special relationship with these lands as guaranteed by Te Tiriti o Waitangi and exercise ongoing authority of its tribal estate to ensure the continuity of association for its beneficiaries to their lands and resources. It is important to WMI that they actively maintain the ahi kaa obligations of the original occupants of the lands for present and



Image 1 – 1963 image and 2023 residential extent overlaid

future generations in accordance with obligations of Kaitiakitanga and Manaakitanga that guide their stewardship responsibilities.

Wairarapa Moana ki Pouākani Incorporation Kaupapa Wairarapa Moana ki Pouākani Incorporation was formed in 2002 being an amalgamation of Pouakani II Trust and Mangakino Township Incorporation. The core purpose of the organisation is to manage and grow the assets of the Incorporation for the benefit of the owners and their whanau. Another key driver is the need to protect and enhance the land asset with no adverse impact on the environment or on succeeding generations enjoying benefits from their assets. These benefits extend to the availability of housing within the WMI community.

Sites:

WMI are currently pursuing the potential development of two General Freehold sites owned by WMI being 37 Lake Road, and Mangakino and 3 Karamu Street (see Image 2 & 3 below).

The site at 37 Lake Road is approximately 15ha in area, and is legally described as Lot 3 DPS 43655. This parcel is currently zoned Rural Environment in the Operative Taupo District Plan where residential development is not necessarily supported by the Objectives and Policies in the District Plan.

Lake Road is adjoined by Korari Crescent to the east, Lake Road to the south which is WMI pastoral land, a gully and old land fill site to the west and Lake Maraetai to the north. In the northeastern corner of the site is land leased to the Mangakino Rowing Club. The site has access to wastewater, water and power.

The site was historically developed and utilised as part of the original Mangakino township prior to the downscaling that occurred in 1970s and 1980s and is the former site of the Mangakino Timber Mill. Therefore, the site has been urbanised historically and is currently undeveloped largely in pasture, with recently cleared blackberry.



Image 2 – 37 Lake Road (Taupo Mapi - 2021)

The site at 3 Karamu Street is approximately 2ha in area, and is legally described as Lot 3 DPS 563013. This parcel is currently zoned Rural Environment in the Operative Taupo District Plan where residential development is not necessarily supported by the Objectives and Policies in the District Plan.

Karamu Street is adjoined by Karamu Street to the east, Mangakino School to the south, Te Kohanga Reo to the west and Wairenga Road to the north. In the southeastern corner of the site is land leased to a church. The site has access to wastewater, water and power.

The site was historically developed and utilised as part of the original Mangakino township prior to the downscaling that occurred in 1970s and 1980s where housing was located. It is currently in pasture ut not grazed.



Image 3 – 3 Karamu Street (Taupō Mapi - 2021)

Proposal:

WMI are investigating the rezoning of these two blocks to a Residential zone to allow for additional residential growth in Mangakino, with yield analysis showing there may be up to 150 development lots available (inclusive of constraints areas) at Lake Road and approx. 20 lots at Karamu Street. WMI have commissioned specialist reports including soil contamination, geotechnical, landscape visual impact assessment, economic impact assessment, cultural historical korero, and civil engineering to understand the feasibility residential development on these sites.

A recent economic growth report commissioned by WMI and prepared by Formative in May 2023 shows that there is a demand of approximately 10 additional lots per year in Mangakino.

"The market outcomes for Mangakino show that the expected demand is likely to be greater than the available residential capacity. There are already pressures in the market, with sales prices and rents increasing, which has resulted in significant consequences for housing affordability in Mangakino. There is limited stock available, either for sale or rent, which means that the expected demand cannot be accommodated, and sale prices and weekly rents are likely to continue increasing in the future. While the future is uncertain, we consider that it would be prudent for TDC and key stakeholders (such as WMI) to plan to provide more capacity within Mangakino to provide for both the needs of the local community and also temporary residents.

Our assessment of demand for both permanent residences and temporary holiday and short stay accommodation, suggest that there would be combined demand in the range of 260 to 350 additional dwellings by 2053, or around 7 to 10 residential lots per annum".

Constraints:

WMI have undertaken a number of investigations which in summary show the following:

Overarching Reports	
Economic	Favourable, shows low steady growth, 5 to 10 lots per year
Cultural Impact Assessment	Korero with Kaumatua of Pouakani Marae
Wāhi Tapu/Sites of Significance	No archaeological sites No permanent habitation in area until post WWII No wāhi tapu on the sites No significant landmarks or urupa
Civil Engineering – water & wastewater	Confirmed capacity in water supply TDC Agreement to additional Capacity in wastewater plant, designed upgrade in 2027/28
Ecological	All sites are pastures, report not required
Traffic	Favourable
Power	Available

Lake Road Reports	
Geotechnical	Favourable. Some areas of constraint, works required within subdivision to address soil conditions for foundations
Soil Contamination	Favourable. Some areas of constraint, works required within subdivision to remediate or use for alternative uses
Land Classification	LUC 6e & LUC 3s (discrete and separated)
Civil Engineering	Water – serviceable Wastewater – most of site serviceable with gravity Road Stormwater – disposal within site possible House Stormwater – onsite disposal
Landscape Visual	Best suited due to surrounding constraints Defined expansion of urban form

Karamu Street Reports	
Soil Contamination	None
Land Classification	LUC 3 (discrete and separated)
Preliminary Civil Engineering	Water – serviceable Wastewater – serviceable Road Stormwater – disposal within site possible House Stormwater – onsite disposal
Landscape Visual	Suitable, not adjoining Waikato River OLA

Conclusion:

WMI is interested in pursuing options to rezone these sites to allow for residential development at 37 Lake Road and 3 Karamu Street. A yield analysis shows that the Lake Road site may generate approx. 150 development lots (inclusive of constraints areas), and Karamu Street approx. 20 lots, which will allow for the required growth of approximately 10 additional lots per year to be developed as the market dictates over time. The sites have some constraints which are assessed as being able to be managed through a subdivision application process.

WMI consider these sites to be a primary one to consider for residential development given its historic urban land use, being adjacent to land already zoned for residential use, and the demand for housing in Mangakino over the coming years to ensure the availability of housing within the WMI community.

CATRIONA EAGLES | CHEAL CONSULTANTS | 5 MAY 2024

Appendix 10

Waikato Regional Plan APP11 Assessment

NB – this section of the WRPS is subject to Plan Change 1 and its appeals. This version includes changes proposed by PC1.

The general development principles for new development are:

Principle	Assessment of Rezoning Proposal
a. support existing urban areas in preference to creating new ones;	Consistent with
b. occur in a manner that provides clear delineation between urban areas and rural areas;	Consistent with
c. make use of opportunities for urban intensification and redevelopment to minimise the need for urban development in greenfield areas;	The proposal uses land previously used for urban purposes and minimises the use of more productive urban land.
d. not compromise the safe, efficient and effective operation and use of existing and planned infrastructure, including transport infrastructure, and should allow for future infrastructure needs, including maintenance and upgrading, where these can be anticipated;	There is no impact on existing or planning infrastructure with Taupō Council having already allocated funds for WWTP upgrade to provide for additional growth.
e. connect well with existing and planned development and infrastructure;	The sites adjoin existing serviced residential areas
f. identify water requirements necessary to support development and ensure the availability of the volumes required;	No additional capacity in Mangakino Water Supply is required.
g. be planned and designed to achieve the efficient use of water;	Water use will be guided by Taupō Code of Practice and Water Asset Management Plan.
h. be directed away from identified significant mineral resources and their access routes, natural hazard areas, energy and transmission corridors, locations identified as likely renewable energy generation sites and their associated energy resources, regionally significant industry, high class soils, and primary production activities on those high class soils;	No such locations exist on the subject sites. Some of the land is LUC 3 however conversion to urban use is not prevented.
i. promote compact urban form, design and location to:	
i. minimise energy and carbon use;	
ii. minimise the need for private motor vehicle use;	

iii. maximise opportunities to support and take advantage of public transport in particular by encouraging employment activities in locations that are or can in the future be served efficiently by public transport;	Mangakino is a small rural community, readily bikeable and walkable. Its isolation from other communities and the distances to get to community and health services and workplaces is problematic. Public transport will be more viable with an increase in population in Mangakino, which this rezoning may achieve. The Lake Road location is adjoining the Waikato River Trail providing ease of access to this.
iv. encourage walking, cycling and multi-modal transport connections; and	
v. maximise opportunities for people to live, work and play within their local area;	
j. maintain or enhance landscape values and provide for the protection of historic and cultural heritage;	Landscape assessment concludes a minor effect on landscape values
k. promote positive indigenous biodiversity outcomes and protect significant indigenous vegetation and significant habitats of indigenous fauna. Development which can enhance ecological integrity, such as by improving the maintenance, enhancement or development of ecological corridors, should be encouraged;	The sites themselves are in pasture with little to no indigenous biodiversity. The development of Lake Road may provide an opportunity to connect or enhance lake edge biodiversity.
l. maintain and enhance public access to and along the coastal marine area, lakes, and rivers;	The development of Lake Road may provide an opportunity to connect Lake Road with Lake Maraetai edge.
m. avoid as far as practicable adverse effects on natural hydrological characteristics and processes (including aquifer recharge and flooding patterns), soil stability, water quality and aquatic ecosystems including through methods such as low impact urban design and development (LIUDD);	Geotechnical advice at time of subdivision will guide to ground stormwater soakage with a range of methodologies to be considered.
n. adopt sustainable design technologies, such as the incorporation of energy-efficient (including passive solar) design, low-energy street lighting, rain gardens, renewable energy technologies, rainwater harvesting and grey water recycling techniques where appropriate;	Where possible and accepted to Taupō Council's Development Engineers these may be explored.
o. not result in incompatible adjacent land uses (including those that may result in reverse sensitivity effects), such as industry, rural activities and existing or planned infrastructure;	The proposal in fact will create compatible adjacent land uses reducing the interface between rural and urban activities.

p. be appropriate with respect to current and projected future effects of climate change and be designed to allow adaptation to these changes and to support reductions in greenhouse gas emissions within urban environments;	The sites are climate change resilient and able to accommodate climate change designed stormwater volumes within each site.
q. consider effects on the unique tangata whenua relationships, values, aspirations, roles and responsibilities with respect to an area. Where appropriate, opportunities to visually recognise tangata whenua connections within an area should be considered;	WMI is mana whakahaere, having a close relationship with Pouakani Marae. No sites of significance are known on their site. The development will occur in accordance with WMI values.
r. support the Vision and Strategy for the Waikato River in the Waikato River catchment;	This conversion will remove rural activities (namely cattle grazing) from these locations, in particular the Lake Road site close to Lake Maraetai. This conversion removes stock nutrients from these locations, enabling the treatment of wastewater to occur in the Mangakino Wastewater Treatment Plant and stormwater treatment to occur in accordance with Waikato Regional Plan guidelines.
s. encourage waste minimisation and efficient use of resources (such as through resource-efficient design and construction methods); and	
t. recognise and maintain or enhance ecosystem services.	The development will also enable the consideration of stormwater reserves connecting to Lake Maraetai whereby planting may occur in these reserves enabling an improvement in ecological values.

**Submission to the Taupō District Council's Plan Change 44
By Wairarapa Moana ki Pouakani Incorporation**

TABLE OF CONTENTS

1.	INTRODUCTION	4
2.	RELIEF SOUGHT	6
3.	WAIRARAPA MOANA KI POUAKANI INCORPORATION	8
4.	SUBJECT SITES	9
4.1.	35 & 47 Lake Road, Mangakino	9
4.2.	3 Karamū Street, Mangakino	9
5.	STATUTORY FRAMEWORK.....	10
5.1.	National Policy Statements	10
5.1.1.	National Policy Statement for Urban Development (NPS-UD)	10
5.1.2.	National Policy Statement for Electricity Networks (NPS-EN)	11
5.1.3.	The National Policy Statement on Freshwater Management 2020 (NPS-FW).....	11
5.1.4.	National Policy Statement for Natural Hazards 2025	12
5.1.5.	The National Policy Statement for Infrastructure	13
5.1.6.	The National Policy Statement for Highly Productive Land	13
5.1.7.	The National Policy Statement for Indigenous Biodiversity	15
5.2.	National Planning Standards	15
5.3.	Waikato Regional Policy Statement	15
5.3.1.	Vision and Strategy for the Waikato River – Te Ture Whaimana o Te Awa o Waikato	16
5.3.2.	Waikato Regional Policy Statement - Objectives and Policies (amended by Plan Change 1)	16
5.4.	Iwi Management Plans	18
5.5.	Regional Plans.....	19
5.6.	Taupō District Future Development Strategy	19
5.7.	Relevant Strategies	21
5.7.1.	Taupō District Council Vision and Community Outcomes	21
5.7.2.	Taupō District Council Housing Strategy.....	21
5.7.3.	Climate Change Strategy & Transport Strategy	22
5.7.4.	Stormwater Strategy.....	22
5.8.	National Environmental Standards	23
5.8.1.	National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect the Human Health (NESCO).....	23
6.	ASSESSMENT AGAINST CRITERIA IN SECTION 32 REPORT	24
6.1.	Location Relative to Existing LRZ or GRZ/Consistent Existing Development Pattern	24
6.2.	Infrastructure Servicing – Council Water & Wastewater Supply	25
6.3.	Land Transport Effects.....	25
6.4.	Outstanding Natural Landscape and Significant Natural Areas	26
6.5.	Proximity to Mangakino Township	26
6.6.	Access from State Highway	26
6.7.	Geothermal Systems	27
6.8.	Natural Hazard Risk	27
6.9.	Consistency with Higher Order Planning Documents.....	27

7.	SECTION 32 STATUTORY FRAMEWORK	27
7.1.	Legislative Requirements	27
7.2.	Identification of the Issue	28
7.3.	Taupō District Plan Objectives	28
7.3.1.	Strategic Direction - Climate Change	28
7.3.2.	Strategic Direction - Fresh Water Quality.....	29
7.3.3.	Strategic Direction - Land Development	29
7.3.4.	Strategic Direction - Natural Environment Values	30
7.3.5.	Strategic Direction - Tangata Whenua.....	30
7.3.6.	Strategic Direction - Urban Form and Development	31
7.3.7.	Transport	31
7.3.8.	Natural Hazards.....	31
7.3.9.	Operative District Plan Summary.....	32
7.4.	Evaluation of benefits and costs (s32(2)(a))	33
7.5.	Economic Growth and Employment Opportunities (s32(2)(a)(i) & (ii))	34
7.6.	The risk of acting or not acting if there is uncertain or insufficient information (s32(2)(c)).....	35
7.7.	The efficiency and effectiveness of provisions (s32(1)(b)(ii))	35
7.7.1.	Efficiency	35
7.7.2.	Effectiveness.....	35
7.8.	Options Considered (s32(1)(b)(i)).....	37
7.9.	Reason for Option Chosen (s32(1)(b)(iii))	38
8.	ASSESSMENT OF ENVIRONMENTAL EFFECTS	38
8.1.	Economic Effects	38
8.2.	Ecological Effects	40
8.3.	Landscape and Visual Effects	40
8.4.	Effects on Cultural & Archaeological Values	41
8.5.	Geotechnical Effects	42
8.6.	Transportation Effects.....	42
8.7.	Infrastructure Effects.....	43
8.8.	Land Contamination Effects	44
9.	ENGAGEMENT	45
10.	CONCLUSION.....	46

Appendices

1. Development Plan
2. Background to Wairarapa Moana ki Pouakani Incorporation
3. Landscape and Visual Assessment by Narrative Landscape
4. Soil Contamination Assessment by Geohazard Environmental
5. Geotechnical Assessments (Karamū and Lake) by CMW Geosciences
6. Engineering Assessment by Cheal Consultants
7. Economic Assessment by Formative
8. Landuse Capacity Assessment by Landvision
9. Consultation Evidence
10. Waikato Regional Plan Appendix 11 Assessment

1. INTRODUCTION

To: Taupo District Council

Submitter: Wairarapa Moana Ki Pouakani Incorporation (WMI)

This a submission is made on Proposed Plan Change 44 (Residential Zones) to the Taupō District Plan ("the Proposal" or "the Plan Change", and supports the Plan change with some amendments to the text and the planning maps.

The submitter could not gain an advantage in trade competition through this submission.

Without limiting the detail of the subsequent detail of this submission, the specific provisions of the Proposal that this submission relates to is the zoning of land in and around Mangakino.

WMI generally seeks the following decisions, the detailed relief sought is set out in section 2, below.

- 17.603ha of WMI's land (Lot 3 DPS 43655, Lot 1 DPS 24879, Lot 3 DP 563.13) is rezoned from the operative General Rural Zone (GRUZ) to the General Residential Zone (GRZ);
- Some additional provisions should apply to WMI's land, by way of a development plan; and
- Some changes to the relevant GRZ provisions.

This submission demonstrates that the site meets the requirements of section 32 of the Resource Management Act 1991. Although not directly specified this submission is consistent with the specified criteria in Section 8.2 of Council's Section 32 Evaluation Report.

The submitter considers that their land satisfies criteria identified by Council, and the rezoning would represent a logical, efficient and planned extension of the Mangakino's urban area, consistent with higher-order planning direction.

This submission is supported by Appendices:

1. Development Plan
2. Background to Wairarapa Moana ki Pouakani Incorporation
3. Landscape and Visual Assessment by Narrative Landscape
4. Soil Contamination Assessment by Geohazard Environmental
5. Geotechnical Assessment by CMW Geosciences
6. Engineering Assessment by Cheal Consultants
7. Economic Assessment by Formative
8. Landuse Capacity Assessment by Landvision
9. Consultation Evidence
10. Waikato Regional Plan Appendix 11 Assessment

WMI wishes to be heard in support of its submission.



Signature of submitter

(or person authorised to sign
on behalf of submitter)

Date

(A signature is not required if you make your submission by electronic means.)

Electronic address for service of submitter: catriona@cheal.co.nz

Telephone: 073786405

Postal address : Cheal Consultants, PO Box 165, Taupō 3351

Contact person: Catriona Eagles, Technical Lead – Planning

2. RELIEF SOUGHT

The following relief is sought:

1. Proposed Plan Change 44 be amended to:
 - a. rezone Lot 2 DP 43655 & Lot 1 DPS 24879 (35 Lake Road) to unserviced General Residential Zone with a Height Restriction and Natural Hazard Overlay
 - b. rezone Lot 3 DP 563013 (3 Karamū Street) to unserviced General Residential Zone, and
2. Insert a new Development Area 14.8 DEV8 Mangakino as detailed in Image 1 & Appendix 1.
3. Insert new Rules as detailed in Table 1.
4. That any further or consequential amendments to the planning maps and provisions be made as necessary to give effect to this rezoning and the intent of this submission.

Table 1: Proposed Rules

SUB-R1 CON activities GRZ, MRZ, LRZ, NCZ	Subject to
x. <u>Subdivision in accordance with the DEV8-Mangakino Development Area Plan</u>	<u>Compliance with the 5m building height limit from ground level in the height restriction area.</u> <u>Matters of Control</u> <u>a. SUB-R2</u> <u>b. SUB-R14</u>
SUB-R8 RDIS activities GRZ, MRZ, LRZ	Subject to
x. <u>Subdivision within the Natural Hazard Area in accordance with the DEV8-Mangakino Development Area Plan</u>	<u>Design and construction must be in accordance with a geotechnical report addressing land stability</u> <u>Matters of Control</u> <u>a. SUB-R2</u> <u>b. SUB-R14</u>
SUB-R13 DIS activities GRZ, MRZ, LRZ, NCZ	Subject to
x. <u>Subdivision not in accordance with the DEV8-Managkino Development Area Plan</u>	



Image 1: Development Area Plan

3. WAIRARAPA MOANA KI POUAKANI INCORPORATION

Wairarapa Moana ki Pouākani Incorporation (WMI) has Tangata Whenua and Mana Whenua rights and are Katikati and have Mana Whakahaere status over their lands in the Mangakino District and the Mangakino Township. WMI are a community affiliated with Wairarapa, Ngāti Tūwharetoa, Ngāti Maniapoto, Ngāti Raukawa and Te Arawa and who exercise authority over lands and resource. WMI hold the ownership of all land adjoining Mangakino township and the land in the surrounding area. WMI provided the land for the Pouakani Marae and continue to work closely with the Pouakani Marae Committee and the Pouakani Trust, the latter owning land on WMI's southern boundary.

WMI holds those lands around Mangakino as a direct result of the Crown taking lands around Lake Wairarapa (Wairarapa Moana) and then failing to honour its promises. Subsequently, the land at Mangakino which are managed by WMI were adversely affected by the Crown's unilateral efforts to establish the Lake Maraetai power station (and hydro lake).

In 1915 the Native Land Court vested 30,486 acres (12,343 hectares) to the 130 original owners. The land was known as Pouakani (Wairarapa Māori) Block. The name was changed to Wairarapa Moana Ki Pouakani Incorporation (WMI) in 2002 because of a request by the owners to the Māori Land Court to bring all of the lands (both Mangakino Township, Pouakani Forest and the Pouakani Farms under one governing entity. Whilst WMI strives to manage and grow the assets of the Incorporation for the benefit of the owners and their whanau, it also wants to protect and enhance the land asset with no adverse impact on the environment or on succeeding generations enjoying benefits from their assets. WMI has multiple relationships with its lands and people and is Mana Whakahaere. WMI is also kaitiaki and its driving force is to 'nurture its taonga' (land and people) and it wants to see Mangakino thrive and be a part of the Taupo District Council's 2023 housing vision 'To be the most prosperous and liveable district in the North Island'. The following submission is made with these outcomes in the forefront. More details of WMI status are provided in Appendix 2.

WMI continue to work with the Taupō District Council for the economic, cultural, and social wellbeing of the Mangakino community both now and in the future. With the Taupō District Council, WMI promote sustainable management of the natural and physical resources of the area and have due regard for the wellbeing, health and safety of the wider Mangakino community.

The following key points WMI considered to be important in relation to the Residential Plan Change 44:

- (a) Additional residential land is required in Mangakino to provide for Mangakino's economic, social, cultural wellbeing through the sustainable use of land resource to provide for the reasonably foreseeable needs of future generations,
- (b) In line with National Policy Statement for Urban Development, Taupō's Future Development Strategy and Taupō District Plan Strategic Direction 1 (Tangata Whenua) and Strategic Direction 3 (Urban Form and Development), additional residential land is required in Mangakino.
- (c) Ongoing support to provide adequate residential development opportunities should be encouraged given Mangakino's anticipated future growth.
- (d) It is necessary for Mangakino's residents (permanent and holiday homes) that a variety of residential land is available as infill development alone is not sufficient to meet the future demand.

- (e) It is prudent to encourage more residentially zoned land to be provided for in Mangakino, where there is sufficient infrastructure to provide for that development (either in place or is being developed).
- (f) The provision of adequate residential capacity will avoid consequences of shortage of supply or offset, thereby impacting on less rural land and protect surrounding rural production consistent with the National Policy Statement for Highly Productive Land.

4. SUBJECT SITES

4.1. 35 & 47 Lake Road, Mangakino

35 Lake Road is 15.026ha and is the former site of the Mangakino Timber Mill prior to the downscaling of Mangakino in 1908s. It is currently pastureland which adjoins existing residential development to the east. The site is currently zoned Rural with its rural use being dry stock grazing.

The site adjoined by Korari Crescent to the east, Lake Road to the south after which is WMI pastoral land, a gully and old land fill site to the west and Waikato Awa/Lake Maraetai to the north. In the northeastern corner of the site is land leased to the Mangakino Rowing Club. Rimu/Taniwha Street Block is adjoined by residential housing on the west, Mangakino Golf Course to the north and east after which is Lake Maraetai, and WMI pastoral farm land to the south.

47 Lake Road is 0.6ha. The site adjoins 35 Lake Road and Lake Road itself. All references to 35 Lake Road include this 0.6ha site. The characteristics of this site are further described in the reports provided in the appendices. Yield analysis shows that the Lake Road site may generate approx. 150 development lots (inclusive of constraints areas).

These sites are not adjoining State Highways, and are not near the Wairakei Tauhara Geothermal Development System.

4.2. 3 Karamū Street, Mangakino

3 Karamū Street is 2ha on corner of Wairenga Road/Karamū Street. The site was historically developed and utilised as part of the original Mangakino township for housing prior to the downscaling in 1980s. Its' only rural use is for hay production, given its isolation and difficulty of access from the farm operations. This site adjoins Rangiamokura Te Kohanga Reo on the western boundary, the Mangakino School on the southern boundary, the existing residential area on the eastern boundary and Mangakino Rugby Ground to the north across Wairenga Road.

The characteristics of this site are further described in the reports provided in the appendices. Yield analysis shows that the Karamū Street site may generate approx. 30 development lots (inclusive of constraints areas).

This site is not adjoining State Highways, and are not near the Wairakei Tauhara Geothermal Development System.

5. STATUTORY FRAMEWORK

5.1. National Policy Statements

There are currently ten National Policy Statements being:

- National Policy Statement for Electricity Networks
- National Policy Statement for Renewable Electricity Generation
- New Zealand Coastal Policy Statement
- National Policy Statement for Freshwater Management 2020
- National Policy Statement on Urban Development
- National Policy Statement for Highly Productive Land
- National Policy Statement for Indigenous Biodiversity
- National Policy Statement for Greenhouse Gas Emissions from Industrial Process Heat
- National Policy Statement for Natural Hazards 2025
- National Policy Statement for Infrastructure 2025

The relevant National Policy Statements for this submission are National Policy Statement for Urban Development, National Policy Statement for Electricity Networks, National Policy Statement for Freshwater management, National Policy Statement for Natural Hazards, National Policy Statement for Infrastructure 2025, National Policy Statement for Highly Productive Land and National Policy Statement for Indigenous Biodiversity. These matters are addressed below.

5.1.1. National Policy Statement for Urban Development (NPS-UD)

The National Policy Statement on Urban Development (NPS-UD) recognises the national significance of having well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future, and to provide sufficient development capacity to meet the different needs of people and communities.

The NPS-UD is relevant to Mangakino, although a small rural community.. Objective 2 of the NPS-UD is key because it recognises That Planning decisions improve housing affordability by supporting competitive land and development markets. Policy 2 support this objective.

Objective 2: Planning decisions improve housing affordability by supporting competitive land and development markets

Policy 2: Tier 1, 2, and 3 local authorities, at all times, provide at least sufficient development capacity to meet expected demand for housing and for business land over the short term, medium term, and long term.

As demonstrated in the Formative Limited Economic Assessment (Appendix 7), this rezoning submission proposal supports Objective 2 and Policy 2 of NPS-UD whereby it will provide sufficient land to meet expected demand for housing over the next 30 years. The economic assessment is summarised as follows:

Given the expected growth trajectory and the relatively limited remaining supply in Mangakino, it is likely that both 57 Lake Road and Karamū Street will need to be brought

forward for development. At a projected growth rate of approximately 7-10 dwellings per annum and an estimated remaining capacity of around 25 lots, existing capacity would be exhausted within the next 2–3 years.

This indicates a potential shortfall emerging in the short term, likely around 2028-2029. On that basis, there appears to be a clear need for additional zoned land to ensure supply remains aligned with demand. Accordingly, rezoning via PC44 of at least 57 Lake Road should be progressed now as a minimum response to address the anticipated capacity constraint. We also consider that rezoning Karamū Street would be beneficial, as it would help ensure an adequate supply of residential capacity and provide additional flexibility to respond to demand.

The proposal to rezone both sites as General Residential will meet the obligation to provide a well-functioning environment in Mangakino through increasing the diversity of greenfield and infill housing, in location adjoining existing residential areas where services are able to be provided and which will support the surrounding rural industries. The provision of new greenfield development will support a competitive real estate market in Mangakino, in a location able to be designed as resilient to climate change. As such the proposal is in keeping with the Objectives and Policies of NPS-UD.

5.1.2. National Policy Statement for Electricity Networks (NPS-EN)

The National Policy Statement for Electricity Networks (NPS-EN) had recent amendments which came into effect on 15 January 2026 and apply to all electricity transmission and distribution networks. The Objective of NPS-EN is to provide for the national significance of the electricity network.

This proposal does not impact on the ability of the electricity network to provide for present and future generations, nor the ability of the network to be upgraded and improved. None of the land proposed to be rezoned has significant powerlines on it.

The Lines Company have confirmed the ability to service the future subdivisions on the sites, and the rezoning does not affect the hydroelectric capacity or operations of Lake Maraetai by Mercury Energy. Sufficient area is available on both sites for Electricity Distribution Network assets where needed, and sufficient buffers can be provided on both sites to avoid buildings impacting on the Electricity Distribution Network. As such the proposal is in keeping with the Objective and Policies of NPS-EN.

5.1.3. The National Policy Statement on Freshwater Management 2020 (NPS-FW)

The National Policy Statement for Freshwater Management (NPS-FW) manages freshwater in a manner that gives effect to the fundamental concept of Te Mana o te Wai which refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community.

Neither site has identified wetlands, or streams. The proposed subdivision rules (SUB-R1.x and SUB-R8.x) direct consideration to current assessment criteria which specifically reference 'the potential adverse cumulative effects of the subdivision or subsequent land use on the quality of Taupō District's lakes, waterways and aquifers, and the methods by which such effects can be avoided, remedied or mitigated.' Of consideration is the discharge of road stormwater from future roads. A number of stormwater methodologies may need to be employed on either site as a result of geotechnical considerations. However, there is sufficient area on each site for these solutions, and no limitation on either site to the ability to meet Taupō's Code of Practice and Waikato Regional Council stormwater requirements (and by association the conditions of Taupo District Council's stormwater discharge consent for Mangakino). Likewise, the wastewater treatment plant for Mangakino is currently being reconsented and will be upgraded to provide for growth in Mangakino. As such the proposal is in keeping with the Objectives and Policies of NPS-FW.

5.1.4. National Policy Statement for Natural Hazards 2025

The National Policy Statement for Natural Hazards (NPS-NH) seeks to manage natural hazard risk using a risk based proportionate approach. The sites are not identified in the District Plan as being within an Erosion Hazard Area, Flood Hazard Area, Hot Ground Hazard Area, or Landslide Hazard Area, nor is it located on or near a fault line.

The CMW Geoscience Geotechnical Reports (Appendix x) have identified areas of uncontrolled fill, slope creep and slope instability within Lake Road. No such hazards are identified at Karamū Street. The Geotechnical Reports undertaken for the two sites demonstrates that the proposal has been appropriately evaluated in accordance with the risk based framework required by Policy 1.

This proposed plan change submission incorporates proportionate mitigation and design responses in the proposed rules and assigned assessment criteria. These include rules requiring site specific engineering and servicing analysis and measures that address the identified risks without imposing unnecessary or excessive constraints. Accordingly, the proposal is consistent with the proportionate management approach anticipated by Policy 2.

With the implementation of the recommendations via the use of existing assessment criteria in the subdivision process, the future residential use of the sites will not be subject to high or very high geological natural hazard risk. As such, the proposal avoids inappropriate development in hazard prone areas and is consistent with Policy 3.

The primary hazard risk on the Lake Road site is slope instability on the cliff edge, and uncontrolled fill. With the application of the setback recommendations, no adjoining land is affected. The proposal therefore does not increase significant natural hazard risk beyond the site and is consistent with Policy 4.

The assessments undertaken rely on site specific geotechnical investigations, stormwater modelling, and District Plan hazard mapping, representing the best available information for the site. The proposal therefore satisfies the requirements of Policy 5.

Future stormwater modelling will be required by Taupō Code of Practice, NZ4404 and best practice to take into account climate change adjusted runoff assumptions, ensuring that long term changes in rainfall intensity and frequency have been appropriately accounted for. The proposal is therefore consistent with Policy 6.

Overall, the proposal has a low/medium level of natural hazard risk, incorporates proportionate and effective mitigation measures, does not increase risk to other sites, and has been assessed using the best available information, including climate change considerations. The proposal is therefore consistent with the NPS-NH.

5.1.5. The National Policy Statement for Infrastructure

The National Policy Statement for Infrastructure (NPS-I) applies to all infrastructure activities. NPS-I seeks to ensure the benefits of infrastructure are provided for, enabling infrastructure to support community wellbeing and support to the development and change of urban and rural environments to meet their changing needs. It also seeks to ensure infrastructure is well functioning, resilient and compatible with other activities.

Infrastructure internal to the proposal areas will be developed in accordance with Waikato Regional and Taupō Council requirements. Through discussions with Council's wastewater asset Manager, the upgrade to the Mangakino Wastewater Treatment Plant includes an high levels of treatment in and additional capacity for the long term growth in Mangakino. Water supply capacity is not impacted by this proposal and existing roads are suitable for the additional capacity. The proposal is consistent with NPS-I.

5.1.6. The National Policy Statement for Highly Productive Land

The National Policy Statement for Highly Productive Land (NPS-HPL) applies to subdivision and land use applications where located on LUC 1, 2 & 3 soils. In this area, detailed mapping has not been undertaken by WRC, nor has the RPS or Regional Plan been updated therefore the Manaaki Whenua Landcare Research/NZLRI mapping is relied on (Image 2).



Image 2: Manaaki Whenua Mapping

The 1st Edition of Manaaki Whenua mapping was undertaken between 1973 and 1980, subsequent mapping was undertaken between 1980 and 1984. Importantly at this time, Lake Road and Karamū Street were either utilised as urban land or in the process of being decommissioned as residential and industrial land, therefore the Manaaki Whenua mapping does not have LUC mapping for these sites.

To provide confidence to the Council, WMI have commissioned Landvision Ltd to undertake site specific mapping (Image 3 below) and assessments of the sites (Appendix 8). The Lake Road site is LUC 3 & 6. The Karamū Street site is shown to be surrounded by LUC 3 land. Although detailed LUC mapping is not provided for this site, given its close proximity to the surrounding LUC 3 land, its flat topography and known free draining attributes, for the purposes of this submission it is assumed to be LUC 3. There is no LUC 1 or 2 land in the area.

However, technically the sites are not LUC 1, 2 or 3 land because that term is defined as follows:

LUC 1, 2, or 3 land means land identified as Land Use Capability Class 1, 2, or 3, as mapped by the New Zealand Land Resource Inventory, or by any more detailed mapping in place at the commencement date that uses the Land Use Capability classification.

The commencement date was 17 October 2022 and as at that date there was no LUC assessment which classified the land as 1, 2 or 3. Likewise, the sites do not meet the definition of highly productive land, as it has not been mapped in accordance with the NPS, nor included in the regional policy statement.



Image 3: Landvision Mapping

Under amendments to NPS-HPL undertaken in late 2025, Clause 3.6(1) to 3.6(4) do not apply to urban rezoning of LUC 3 land. Clause 3.6(5) continues to apply. It states:

Territorial authorities must take measures to ensure that the spatial extent of any urban zone covering highly productive land is the minimum necessary to provide the required development capacity while achieving a well-functioning urban environment.

As noted above in 5.1.1 above, the proposal to rezone 17.603ha of rural land which is mostly LUC 3 is necessary for the future residential demand in Mangakino. Rezoning these smaller parcels adjoining existing residential areas assists to protect larger more productive rural parcels to be retained for rural purposes. This proposal is therefore consistent with NPS-HPL.

5.1.7. The National Policy Statement for Indigenous Biodiversity

The National Policy Statement for Indigenous Biodiversity (NPS-IB) applies to indigenous biodiversity in the terrestrial environment throughout Aotearoa New Zealand.

Very little indigenous biodiversity occurs on either site. There is vegetation on the northern boundary between the site and the lake edge. Clause 3.16 of NPS-IB specifies that:

If a new subdivision, use, or development is outside an SNA and not on specified Māori land, any significant adverse effects of the new subdivision, use, or development on indigenous biodiversity outside the SNA must be managed by applying the effects management hierarchy.

Native revegetation may occur in areas of reserve or lake edge of the site following geotechnical advice and stormwater assessment and design.

5.2. National Planning Standards

The proposed rules and development plan are in accordance with National Planning Standards.

5.3. Waikato Regional Policy Statement

The Waikato Regional Policy Statement (RPS) is a high-level, broad-based document containing objectives and policies the purpose of which is to provide an overview of the resource management issues of the region and to achieve integrated management of the natural and physical resources of the Region.

WRPS Plan Change 1 was notified on 18 October 2022. The hearing was held on 8 and 9 May 2023, and was adjourned until 23 May 2023. Decisions were publicly notified on 15 November 2023, and are still subject to appeal. This plan change incorporates the requirements of the National Policy Statement on Urban Development 2020 (NPS-UD). The plan change deletes the specific provisions relating to growth strategies prepared by territorial authorities outside of the Future Proof subregion (ie Taupō 2050). These have been replaced with generic provisions to guide preparation of, and give weight to, growth strategies.

More weighting should be applied to the Plan Change 1 than the operative RPS because it has proceeded through to the decisions stage of the statutory process, and the operative RPS is out of date with the current statutory requirements.

5.3.1. Vision and Strategy for the Waikato River – Te Ture Whaimana o Te Awa o Waikato

Under s11 of the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 and s12 of the Ngati Tuwharetoa, Raukawa, and Te Arawa River Iwi Waikato River Act 2010, the Vision and Strategy (V&S) is deemed to be part of the Waikato Regional Policy Statement. Under s104(1)(b), the Waikato Regional Council must “have regard to” the RPS when considering any application for resource consent. However, additionally, the river settlement legislation also requires that the Waikato Regional Council must have “particular regard” to the Vision and Strategy for the Waikato River when carrying out any of its functions under RMA 1991. Through case law, the V&S is acknowledged as the primary, direction-setting policy for the Waikato Awa River. Case law indicates that activities which are subject to the V&S are required to provide for the protection and restoration of the River, and that this will require “betterment” to an extent proportionate with the scale of the activity and its effects.

The guiding Vision and Strategy is for a future where a healthy Waikato River sustains abundant life and prosperous communities. All people are responsible for restoring and protecting the river's health for generations to come. To achieve this vision, the strategy focuses on the following objectives – Water Quality, Integrated Management, Holistic Health, Cultural Significance, Public Access. The Waikato and Waipā Rivier Restoration Strategy acts as an action plan for actions in erosion control, water quality, biodiversity and cultural values.

The proposal converts (again) the sites from pasture to urban use. This conversion will remove rural activities (namely cattle grazing) from these locations, in particular the Lake Road site close to Lake Maraetai. This conversion removes stock nutrients from these locations, enabling the treatment of wastewater to occur in the Mangakino Wastewater Treatment Plant and stormwater treatment to occur in accordance with Waikato Regional Plan guidelines. The Mangakino Wastewater Treatment Plant is due to be upgraded to high levels of treatment in accordance with Waikato Regional Council discharge consent conditions, and to provide capacity for the long term growth in Mangakino. Notably the consent for that Mangakino Wastewater Treatment Plant is being renewed in light of the Vision and Strategy and must be consistent with it. The development will also enable the consideration of stormwater reserves connecting to Lake Maraetai whereby planting may occur in these reserves enabling an improvement in ecological values.

5.3.2. Waikato Regional Policy Statement - Objectives and Policies (amended by Plan Change 1)

Key issues of Waikato Regional Policy Statement that the proposal addresses are the state of resources (SRMR-I1), managing the built environment (SRMR-PR4), relationship of tangata whenua with the environment (SRMR-I5), and Health and wellbeing of the Waikato River Catchment (SRMR-I6).

Objectives

There are a number of overlapping objectives under each of these relevant to this proposal.

In relation to the Integrated Management objectives (IM-O1, IM-O2), the proposal has assessments confirming that environmental effects, including transport and contamination, are limited and can be appropriately managed. The development also provides for sustainable use of land to support housing demand utilising existing infrastructure, contributing to social and economic wellbeing while maintaining environmental safeguards.

The proposal is consistent with IM-O5 (Climate Change), as development is able to be undertaken in a staged and planned manner, enabling future design to incorporate resilience. Development occurring adjacent to the existing Mangakino area provides the ability to support reductions in emissions through the potential for future improved connectivity and potential active transport links. The sites are in locations clear of the impacts of flooding and sea level rise.

The proposal is consistent with IM-O6 (Ecosystem Services) as the site has low to no ecological values, and opportunities exist to enhance ecological values through planting and design.

Consultation has been undertaken with tangata whenua with no specific requests being made on the proposal with the exception of practices relating to soil contamination remediation. WMI has Tangata Whenua and Mana Whenua rights and are Katikati and have Mana Whakahaere status over their lands in the Mangakino District and the Mangakino Township. Development of the site will be undertaken in accordance with WMI values, consistent with IM-O7 (Tangata Whenua Relationships).

The sites both adjoining Mangakino's residential areas and were once part of the Mangakino Township. A key characteristic of the Lake Road site, is its Lake Maraetai edge, views and values. The development of the site will be undertaken as the market and community needs, while maintaining overall amenity through normal residential design and appropriate servicing, consistent with IM-O9 (Amenity Values).

The site is highly modified and does not contain any indigenous biodiversity. There is opportunity for the edge planting within the Waikato River corridor to be enhanced in time, meaning ecological integrity is maintained, consistent with ECO-O1 (Ecological Integrity).

The proposal provides for integrated and planned urban development, consistent with UFD-O1 (Built Environment), notably being already included in Taupō Future Development Strategy. The proposal adjoins existing residential areas and is able to be fully serviced with water, wastewater and stormwater services. It aligns land use with infrastructure capacity through the potential for staging, supports housing supply, and recognises the need to integrate transport, water, and servicing. It also contributes to a well-functioning urban environment by providing housing choice through greenfield development in Mangakino where supply is required, seeking to meet the aspirations of WMI for urban development. The use of this particular greenfield land to achieve these outcomes, avoids for now the use of more productive urban land surrounding Mangakino for urban use.

Policies

The key objectives are achieved through a range of policies in the RPS. Those of most relevance to this particular proposal have been listed below:

The proposal is consistent with ECO-P1, as it avoids adverse effects on significant indigenous biodiversity and enables opportunities for enhancement adjoining the Waikato River. Development can occur on the sites with low impact on amenity values of the Waikato River.

The proposal is consistent with UFD-P1 and UFD-P2, as development is planned and coordinated with infrastructure, with staging abilities, ensuring servicing upgrades keep pace with growth. Critically the Mangakino Wastewater Treatment Plant is in the process of being re-consented by Waikato Regional Council. This re-consenting will include the additional discharge volume necessary for this proposal. Although delayed by recent changes in both the extension to the expiry date of the expired consent to 31 December 2027, and the new Wastewater Environmental Performance Standards, the Taupō's Long Term Plan 2024 continues to include funding for this upgrade which will occur in sufficient time for connection by the proposed sites, at the 7-10 lot rate of development.

The proposal is consistent with UFD-P18, being consistent with Taupō's Future Development Strategy, is required to meet the development demand specifically assessed for Mangakino, focuses development adjacent to an existing settlement, avoids dispersed rural subdivision, and confirmed by Council to be supported by existing (and upgraded) infrastructure. It will enable a future diversity of housing types and maintains an efficient urban form in line with RPS Appendix 11 (Appendix 10). Finally, the proposal is consistent with UFD-P19, as it is not an out of sequence growth area in Mangakino, adjoining the existing residential area, not being contrary to infrastructure planning or environmental outcomes.

Overall, the proposal is consistent with the relevant Waikato RPS objectives and policies (as amended by Plan Change 1), representing urban expansion that is serviced, consideration of the Waikato awa values, integrated, and efficient, that seeks to answer Mangakino's development needs with environmental and cultural considerations.

5.4. Iwi Management Plans

The sites are located within the areas of interest for Ngāti Tūwharetoa and Raukawa. The Lake Road Site adjoins the Waikato Awa Statutory Acknowledgement Area for Ngāti Tūwharetoa and Raukawa.

Ngāti Tūwharetoa Iwi Management Plan

The Ngāti Tūwharetoa Environmental Iwi Management Plan provides a background to and identifies key resource based issues for Ngāti Tūwharetoa. The vision of the management plan is for Ngāti Tūwharetoa to 'assert their custodial and customary right of tino rangatiratanga over their respective taonga, and Tūwharetoa collectively, will sustain and protect the life force of all tribal and inherited taonga.'

As the sites are within an existing modified rural area, adjoining an existing urban area, with no waterbodies, no identified waahi tapu, waahi taonga sites, in terms of the relevant chapters *Papatūānuku*, and *Ngā Wāhi Tapu*, it is considered that the proposal is not inconsistent with those policies and is consistent with this iwi management plan.

Raukawa Environmental Management Plan 2015

Te Rautaki Taiao a Raukawa is a statement of Raukawa issues, aspirations, and priorities in relation to the environment.

The proposal is consistent with Te Rautaki Taiao a Raukawa in that the proposal provide for connection to a wastewater treatment plant, treatment of stormwater where needed, connection to Lake Maraetai is possible, enables the removal of stock from close proximity to the river, no wetlands are affected, no sites of significance are impacted, the proposal enables more modern housing in the area providing housing for rural workers in a location largely clear of natural hazards,

Generally, the proposal is consistent with the relevant objectives.

Further assessment of any effects on cultural and archaeological values is undertaken in Section 8.4.

5.5. Regional Plans

Any development within the Mangakino Development Area will need to meet with the requirements of the Waikato Regional Plan, including for any matters associated with land development including earthworks and subsequent discharges (including stormwater and wastewater), air quality, excavation. It is expected that any development would discharge wastewater and stormwater via the Taupo District Council reticulated network and pursuant to those resource consents.

5.6. Taupō District Future Development Strategy

The Waikato Regional Policy Statement UFD-P18 recognises new urban development be undertaken in accordance with a growth strategy for the Taupō District.

Taupō's Future Development Strategy has been developed in accordance with National Policy Statement for Urban Development and replaces the former growth management strategy TD2050. It is the third growth strategy for the district. TD2050 was adopted in 2006 and updated in 2018 (which is referenced in the Taupō District Plan). The FDS uses population projections to identify how many additional people will call the district home over the period to 2060 and how many homes and business land are required to accommodate these people. Taupō's FDS identifies the district's residential, retail, commercial and industrial growth needs and the constraints it faces to meet anticipated growth. It provides guidance on where development and growth are anticipated to occur. It considers risk and helps Council to plan for infrastructure and gives the community and landowners certainty over where development is expected to be located and when.

The FDS implementation plan identifies two actions that relate to the residential chapters –

1. *Review the Residential Chapters of the District Plan to ensure that they enable different typologies and allow for intensification. Public transport routes are to be taken into account when considering intensification provisions.*
2. *Each time we review the Residential Chapters of the District Plan, undertake an assessment to determine whether future growth areas need to be rezoned.*



Image 4: FDS Mapping

The eight outcomes of the FDS relate to the ongoing management of growth:

1. A district characterised by contained urban communities, bordered by a productive, functional rural environment.
2. A strong, innovative and productive economy that provides opportunities for our people to thrive.
3. Vibrant, diverse places and spaces where people thrive and love to live, work and play.
4. Compact walking and cycling friendly urban areas where communities are connected.
5. Urban form in the Taupō District is closely aligned with Tāngata whenua values and aspirations.
6. Infrastructure provision is efficient and effective helping to minimise costs for our communities.
7. Development is managed to protect and enhance the natural environment.
8. Urban areas will be resilient to the impacts of natural hazards and the effects of climate change.

The FDS is not embedded into the District Plan. Rather the FDS Implementation Plan outlines that on review of growth data on a three yearly cycle via a Housing and Business Assessment (HBA) may then result in additional residential growth areas being proposed for rezoning via a District Plan Change. It may result also in additional residential growth areas being identified for inclusion in the next FDS. Similarly, the intensification provisions of the District Plan will also be reviewed.

Taupō District Council's Future Development Strategy (FDS) provides clear support for additional residential growth in Mangakino, although at a smaller scale than Taupō township or Kinloch. The strategy recognises Mangakino as a settlement where both infill and greenfield residential development will be required over the next 30–35 years to meet future housing demand. Mangakino is specifically identified as an area where “modest growth” is anticipated.

Importantly, the FDS expressly anticipates both infill and greenfield residential development in Mangakino to accommodate approximately 150 additional homes. While Mangakino is expected to experience smaller-scale growth, the strategy nonetheless recognises the need for additional residential capacity and future urban development opportunities within the settlement.

5.7. Relevant Strategies

5.7.1. Taupō District Council Vision and Community Outcomes

Taupō District Council's Vision is: *We will be a district of connected communities who thrive and embrace opportunities.*

Community Outcomes to achieve this vision are stated as

- Tangata whenua are acknowledged and respected
- Vibrant places and connected communities
- Resilient communities working in partnership
- Innovative, thriving economy
- Flourishing environment

The proposal seeks to both create a vibrant Mangakino and contribute to a thriving economy whilst managing effects to the environment.

5.7.2. Taupō District Council Housing Strategy

Taupō's Housing Strategy identifies the key housing issues and opportunities in the Taupō District, provides a framework to address them, and sets out what Council's role should be.

The housing strategy contains 4 goals:

- 1) More availability and choice of housing.
- 2) Homes are warm, healthy, sustainable, and resilient.
- 3) Our homes meet the diverse needs of our communities.
- 4) Housing connects and integrates communities.

This proposal contributes to achieving these goals in a number of ways. The proposal enables more availability of housing by creating more lots, and varying lot sizes provides for a choice of housing. New homes are warm, healthy, sustainable and resilient. Future homes on varying lot sizes can meet the diverse needs of communities. The proposal will provide road connection and can provide walk/cycle path connections. Accordingly, the proposal is considered to be consistent with the Housing Strategy.

5.7.3. Climate Change Strategy & Transport Strategy

Taupō's Climate Change Strategy seeks to reduce greenhouse gas emissions through improving walk and cycling networks, electric buses, supporting public transport networks, native revegetation programme.

Taupō District Council's Transport Strategy provides strategic support for planned residential growth across the district, including settlements such as Mangakino, by promoting coordinated land use and transport planning, infrastructure resilience, accessibility, and safe movement networks. That is, future urban growth must be integrated with transport planning to avoid inefficient or unplanned development patterns.

The relevance of the Transport Strategy for this proposal is its outcomes of local road connectivity, walkability, access to services and recreation, and the ability of the local transport network to accommodate modest residential growth. Residential growth in Mangakino that is contiguous with existing urban area is likely to be more efficient from a transport servicing perspective than isolated rural development as it will achieve transport efficiency, accessibility, and infrastructure integration.

Mangakino is a small rural community, readily bikeable and walkable. Its isolation from other communities and the distances to get to community and health services and workplaces is problematic. Public transport or other methods as carpooling will be more viable with an increase in population in Mangakino, which this rezoning may achieve. The Lake Road location is adjoining the Waikato River Trail providing ease of access to this cycle trail.

5.7.4. Stormwater Strategy

Taupō District Council's Stormwater Strategy supports a coordinated and infrastructure-led approach to urban growth, with a strong emphasis on managing flooding risk, protecting receiving environments, and integrating stormwater planning with future land development in urban areas.

For this proposal, the land is not subject to significant flood hazards and can accommodate appropriate stormwater design, aligning with the strategy's objectives. Furthermore the proposal has sufficient area to incorporate modern stormwater design measures such as detention, attenuation, treatment devices, low-impact design, and appropriate earthworks controls when geotechnical considerations are applied.

5.8. National Environmental Standards

There are currently the following National Environmental Standards:

- National Environmental Standards for Air Quality
- National Environmental Standards for Sources of Human Drinking Water
- National Environmental Standards for Telecommunication Facilities
- National Environmental Standards for Electricity Transmission and Electric Vehicle Charging Infrastructure Activities
- National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health
- National Environmental Standards for Commercial Forestry
- National Environmental Standards for Freshwater
- National Environmental Standard for Marine Aquaculture
- National Environmental Standard for Storing Tyres Outdoors
- National Environmental Standard for Greenhouse Gases from Industrial Process Heat
- National Environmental Standard for Detached Minor Residential Units

The relevant National Environmental Standards are National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NES-SCS).

5.8.1. National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect the Human Health (NESCS)

The National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect the Human Health (NESCS) is considered relevant to this proposal as Lake Road is identified as a Piece of Land. As a plan change, the proposal is a change in use of a piece of land. The future subdivision will eventually involve disturbing soil of a piece of land.

WMI have commissioned Geohazards Environmental Limited to undertake both a Preliminary Site Investigation (PSI) and a Detailed Site Investigation (DSI) for both sites (Appendix x).

These investigations conclude that the Karamū Street site is suitable for residential use without remediation. Lake Road site has areas where contamination is present at the site at 37 Lake Road at levels that are in excess of relevant soil guideline values for some purposes. This contamination is associated with the historic timber mill activity on the site. The soil testing results and conclusions are in the Geohazard Environmental Assessment, where a range of contaminants were found to exceed both background concentrations and residential guidelines. The extent of this contamination is on page 77 of Geohazard's report and shown again in Image 5 below.

Geohazard's advice is that a Remediation Action Plan/Site Management Plan is recommended for residential use of the site. This will include additional soil sampling to delineate the horizontal and vertical extent of any contamination. Remediation or Site Management options include a variety of measures based on the different contaminants including excavation and offsite disposal, onsite encapsulation, soil mixing, or some combination. There are no technical limitations for remediation to be successful at the site. Limitations will mostly be driven by cost and any desire to have titles clear of any site management requirements.



Image 5: Geohazard Mapping of Contaminants

Given the above, the site is considered a 'piece of land' under the NESCS and therefore future consents will be required at time of subdivision to require a remediation action plan for the development of these sites. This NESCS process is well known to Council and will be easily incorporated into the subdivision process. The remediation requirements may also influence any staging of the subdivision once more investigation as recommended by Geohazards is undertaken, and costs known.

6. ASSESSMENT AGAINST CRITERIA IN SECTION 32 REPORT

Plan Change 44 Section 32 Section 8.2 outlines a set of criteria for urban development to be successfully considered for residential development. The Section 32 focusses on Low Density Residential development provision however it is used here to demonstrate that this proposal largely meets these criteria also.

6.1. Location Relative to Existing LRZ or GRZ/Consistent Existing Development Pattern

Mangakino was developed with traditional lot sizes, largely single storey modest dwellings. The streets closest to the lake frontage have larger single storey dwellings with areas of more recent development. There are very little infill development. The centre of Mangakino has a small retail area, Council service area, community services near the school. Reserves adjoin the lake.

The subject sites are located immediately adjacent to existing General Residential land and forms a logical continuation of established urban development. Rezoning would therefore be a small yet logical extension of the urban area. Undertaking development adjoining Mangakino avoids pressure

on the surrounding rural area, yet will provide housing for a variety of purposes including for rural industry workers, aligning with the intent of PC44.



Image 6: Lake Road



Image 7: Karamū Street

6.2. Infrastructure Servicing – Council Water & Wastewater Supply

Council's Water Asset Manager has advised that there is sufficient capacity within the Mangakino Water Supply without any upgrades.

Council's Wastewater Asset Manager has advised that the Mangakino Wastewater Treatment Plant is in the process of being re-consented by Waikato Regional Council. Critically the Mangakino Wastewater Treatment Plant is in the process of being re-consented by Waikato Regional Council. This re-consenting will include both upgrade in treatment and the additional discharge volume necessary for this proposal. Although delayed by recent changes in both the extension to the expiry date of the expired consent to 31 December 2027, and the new Wastewater Environmental Performance Standards, the Taupō's Long Term Plan 2024 continues to include funding for the upgrade to the Wastewater Treatment Plant which will occur in sufficient time for connection by the proposed sites, at the 7-10 lot rate of development.

These outcomes in combination with the proposal are consistent with the Taupō District Future Development Strategy (FDS), which emphasises coordinated growth in locations able to be serviced efficiently.

6.3. Land Transport Effects

The development of allotments enabled by the proposed General Residential zoning would not result in more than minor adverse effects on the supporting land transport network. Mangakino's road network was constructed for a larger population, therefore is sufficient for the additional traffic occurring from the proposal. Access is gained from local roads, not from State Highways. Any site-specific roading or intersection upgrades can be appropriately addressed at the subdivision stage, meeting PC44's effects-based approach to managing transport impacts.

6.4. Outstanding Natural Landscape and Significant Natural Areas

Neither site is identified as an Outstanding Natural Landscape nor as a Significant Natural Area in the Taupō District Plan (Image 8). The Lake Road site is adjacent to but not in the Waikato Outstanding Natural Landscape (ONL56). The proposal therefore avoid adverse effects on nationally or regionally significant landscapes or ecological areas, and be consistent with the environmental limits recognised in PC44 and higher-order planning documents.



Image 8: Lake Road Site and Outstanding Natural Features and Landscapes Overlay

6.5. Proximity to Mangakino Township

The sites adjoin Mangakino, adjoining existing GRZ land, meaning the proposal will expand an existing urban area. Any future residents will have access to three waters reticulation, walking/biking trails, school and the small shopping/service centre. The growth in housing may enable growth in population creating better viability for employment, transport, education, services, and community facilities. This proximity meets Outcomes 3, 4, 6 & 7 of the FDS.

6.6. Access from State Highway

The site does not take direct access from a State Highway, only from local roads. Accordingly, the proposal would avoid reverse sensitivity effects on state highway infrastructure and align with district-wide objectives relating to the safe and efficient functioning of nationally significant infrastructure. The close proximity of State Highway 30 is noted with well-designed intersections of Lake Road to State Highway 30 which have been designed for much larger traffic volumes than now occur on these roads.

6.7. Geothermal Systems

The land is not located within the Wairakei Tauhara or Ōhāaki Geothermal Systems shown on Map D1. There are therefore no geothermal constraints that would preclude General Residential zoning.

6.8. Natural Hazard Risk

The land can be demonstrated to be free of significant natural hazard risk.
Any localised or site specific hazard considerations can be:

- Identified through LIM and PIM processes, and
- Appropriately managed at subdivision and building consent stages, consistent with the National Policy Statement for Natural Hazards and Council's risk based planning approach.

6.9. Consistency with Higher Order Planning Documents

The proposal is consistent with:

- National Policy Statement on Urban Development – enabling housing supply and well-functioning urban environments,
- Waikato Regional Policy Statement – integrated growth and infrastructure coordination,
- Taupō District Future Development Strategy – recognition of ongoing demand for density residential housing, and
- Proposed Plan Change 44 objectives relating to housing supply, choice, and efficient urban form.

7. SECTION 32 STATUTORY FRAMEWORK

7.1. Legislative Requirements

Section 32 of the RMA requires that before giving effect to a proposed plan change, an evaluation must be undertaken to:

- Examine whether the objectives of the proposal are the most appropriate way to achieve the purpose of the RMA; and
- Examine whether the provisions are the most appropriate way to achieve those objectives, including:
 - Identifying reasonably practicable alternatives,
 - Assessing efficiency and effectiveness, and
 - Summarising reasons for the preferred option.

In accordance with section 32(1)(c), the level of detail contained in this evaluation reflects the scale and significance of the anticipated environmental, economic, social and cultural effects.

The proposal is an amending proposal under section 32(3), as it seeks amendment to the proposed Plan Change only. Section 32(6) clarifies that where no actual objectives are stated in the proposal, the objective is the purpose of the proposal.

7.2. Identification of the Issue

The core issue is the sufficiency of housing opportunities in Mangakino. There is limited vacant residential zoned land in Mangakino. The identified need in the FDS for Residential capacity within Mangakino, as well as the capacity within the water, wastewater and roading infrastructure to accommodate more residential lots requires the consideration of more land for residential use. Therefore to achieve more greenfield housing, the General Rural Zone is not the most appropriate zoning for the sites.

As the only landowner of rural land on the edge of Mangakino, WMI have identified and assessed these two sites are most suitable for residential development due to their:

- historical use as urban activities
- inefficient size and location for rural productivity
- location on the edge of the Mangakino Township and
- freehold title status

which make them ideal for residential development.

Therefore the General Residential zone is considered more appropriate for 35 Lake Road and 3 Karamū Street than the present rural zoning as it provides for a range of future lot sizes to meet the housing need.

7.3. Taupō District Plan Objectives

This proposal does not seek to amend any Objective or Policy, accordingly the s32A tests for the proposal and amendments to the subdivision rules is whether the proposal is appropriate to achieve the existing objectives and implementing the policies.

The Strategic Directions and Objectives & Policies of the Taupō District Plan are assessed below.

7.3.1. Strategic Direction - Climate Change

Section 6.1 of the Plan contains the strategic Climate Change policy framework. The relevant provisions seek positive climate change outcomes (CC-O1), resilience to current and future effects of climate change (CC-O2), and adapt to the risks and effects from climate change (CC-O3).

The proposed rezoning of approximately 17.6ha of rural land for residential development in Mangakino is generally consistent with Objective CC-O1 because it facilitates planned and consolidated urban growth adjacent to an existing settlement rather than dispersed rural development. Concentrating growth within or adjoining the existing urban area can support more efficient infrastructure provision, support public transport and viability of services and community facilities. The proposal also aligns with Council's Future Development Strategy, which anticipates additional residential growth in Mangakino through both infill and greenfield development.

At the subdivision and development stages, opportunities exist to incorporate climate-responsive urban design measures such as efficient stormwater systems, low-impact design, water-sensitive

design, and energy-efficient housing outcomes, which would further support positive climate change outcomes. The conversion from pastoral farming removes ongoing agricultural greenhouse gas emissions, including methane and nitrous oxide, and the residential form enables household-scale mitigation measures such as solar generation, rainwater harvesting, tree planting.

The proposal is capable of achieving consistency with Objective CC-O2 through future subdivision design where stormwater management and infrastructure capacity will address climate resilience considerations. The sites are clear of flood hazards. Concentrating residential growth within an existing settlement such as Mangakino is generally more resilient than fragmented rural development patterns, as it enables coordinated infrastructure upgrades, emergency management planning, and more efficient community servicing.

The proposal is generally consistent with Objective CC-O3 because it supports proactive and planned urban growth in an area already identified for future residential expansion within Council's strategic growth planning framework. The proposal also avoids pressure on rural development that can create inefficient infrastructure servicing and increased vulnerability to climate-related hazards. By enabling coordinated residential growth adjacent to existing urban areas, the proposal supports the District's longer-term ability to adapt to climate change effects in a managed and strategic way.

Overall, the proposal delivers an efficient and resilient urban development outcome consistent with the climate change objectives of the District Plan.

7.3.2. Strategic Direction - Fresh Water Quality

Section 6.2 of the Plan contains the strategic Freshwater Quality / Te Mana o Te Wai policy framework. The relevant provisions seek that subdivision and land use is managed in a way that promotes the positive effects, while avoiding, remedying, or mitigating adverse effects (including cumulative effects) of that development, on the mauri, health and well-being of water bodies, to benefit freshwater ecosystems, the wider environment, and the community.

The proposal is consistent with freshwater management objectives, as the proposal will replace existing pastoral farming activities, resulting in a reduction in nutrient inputs to Waikato awa contributing to improved freshwater quality outcomes, consistent with the Waikato Vision and Strategy. The sites are able to be connected to wastewater reticulation. Subdivision design will be meet Waikato Regional Council stormwater guidelines and Taupō Council stormwater requirements incorporating stormwater management measures, including on-site retention and treatment, to ensure contaminants are appropriately managed and potential cumulative contaminant discharge effects are addressed.

Overall, the proposal is capable of enhancing freshwater outcomes, meeting the Waikato Vision and Strategy where a healthy Waikato River sustains abundant life and prosperous communities, maintaining and improving the mauri, health and wellbeing of water bodies and the wider environment.

7.3.3. Strategic Direction - Land Development

Section 6.3 of the Plan contains the strategic land development policy framework. The relevant provisions seek to provide for and manage urban growth (LD-O1) through recognising the appropriateness of Urban Growth Areas as a resource for planned and staged urban growth; and ensuring that any new urban development is predicated by way of Taupō District Development Plan Process and plan change (LD-O2). Any development needs to ensure the maintenance of an

appropriate and sufficient level of infrastructure within existing serviced areas (LD-O3). Any development is to avoid degradation of the Lake and waterways (LD-04), and not detract from the amenity value or qualities of the local environment (LD-O5).

The proposal achieves these provisions by detailed investigations of the sites and their constraints, going through this plan change process, demonstrating demand and sufficient servicing, avoiding degradation of water quality, and not detracting from the amenity value or qualities of the local environment. The sites are identified in the FDS however are not identified as an Urban Growth Area in APP-UGA (these areas were derived from TD2050, now redundant). As the NPS-UD and FDS are the more recent documents these are considered to be of greater guidance and weight. The proposed Development Area and Plan in Appendix 1 has been developed consistent with APP_UGA and other recent Development Areas.

It is considered the proposal achieves the objectives and policies in Section 6.3, with reference to the FDS rather than TD2050.

7.3.4. Strategic Direction - Natural Environment Values

Section 6.5 of the Plan contains the strategic directions for Natural Environment Values. The relevant provisions seek to recognise the importance of the District's natural values and landscapes and their significance to the Taupō District's communities and identity (NEV-O1), protect areas of significant indigenous vegetation (NEV-O2), enhance indigenous biodiversity values (NEV-O3), protect outstanding landscape areas from inappropriate subdivision, land use and development (NEV-O5), recognise the relationship of tangata whenua with the natural values of their ancestral lands, waterbodies, cultural landscapes (NEV-O6), and preserve and enhance the natural character of riparian margins (NEV-O7).

The sites are not identified as an Outstanding Natural Landscape or Significant Natural Area, meaning the proposal avoids direct adverse effects on protected landscapes and indigenous biodiversity, while still maintaining overall landscape character of residential activity adjoining the Waikato River through appropriate dwelling scale and integration with topography and vegetation.

In the subdivision process, indigenous biodiversity values (NEV-O3) may be developed via planting and connection to the lake edge creating ecological value and enhancement of riparian areas (NEV-O7). Appropriate dwelling scale and location can be established in the subdivision process. Largely due to the location of the sites on areas of previous urban use and adjacent to existing urban form, the proposal avoids inappropriate development adjoining Natural Environment values consistent with the intent of the Natural Environment Values objectives.

7.3.5. Strategic Direction - Tangata Whenua

Section 6.6 of the Plan contains the strategic directions for Tangata Whenua. The relevant provision seeks that the values, rights and interests of Taupō District mana whenua are recognised and protected.

The proposal acknowledges the importance of mana whenua relationships with land, water and natural values by avoiding identified culturally significant areas and supporting enhancement of natural systems, thereby aligning with kaitiakitanga and the protection of environmental taonga. WMI is mana whakahaere and has undertaken and will continue engagement with mana whenua consistent with the principles of te Tiriti o Waitangi.

7.3.6. Strategic Direction - Urban Form and Development

Section 6.8 of the Plan contains the strategic directions for urban form and development. The relevant provisions seek that the district develops in a cohesive, compact and structured way (UFD-O1). The effective functioning of rural zones is protected, and the efficient use of zoned and serviced urban land is co-ordinated with the provision of cost-effective infrastructure (UFD-O2). Development of land in appropriate locations which demonstrates social and/or cultural benefits is recognised and provided for (UFD-O3). The development is serviced by an appropriate level of infrastructure (UFD-O4), and is designed to avoid, remedy or mitigate adverse effects on the environment and occurs in a sequenced and coherent manner (UFD-O7).

The proposal achieves these provisions by utilising existing infrastructure where capacity exists or is planned for and being in locations on the edge of Mangakino maintaining cohesive urban form (as viewed from the roads and Lake Maraetai). The assessment of effects concludes adverse effects on the environment will be avoided, remedied or mitigated, particularly avoid significant sites. The proposal will enable wellbeing benefits in that there will be more supply of residential land available for development meeting a clearly demonstrated demand in Mangakino assisting the community and rural industry in the wider area. The possible increase in population will provide for commercial and employment benefits to the wider community also.

It is considered the proposal achieves the objectives and policies in Section 6.8.

7.3.7. Transport

Section 7.3 of the Plan contains the objectives and policies for transport. The safe and efficient operation of the roading network, and movement of traffic, including cyclists and pedestrian within the District is desired (TRAN-O1). Effects on the movement of traffic (including pedestrian flow and parking in Mangakino must also be considered (TRAN-O2).

No traffic assessment has been undertaken. As is known, Mangakino was once a larger community, with a roading pattern and intersections designed for that larger community. As such the roading network and intersections are now more than adequate for the existing population and the proposed additional traffic volume. The existing intersections and road formations are in good condition and have good visibility. As such no wider or Mangakino network issues are likely to occur as a result of additional housing. This matter is applicable to both sites.

Accordingly, the proposal will achieve Objectives and policies in Section 7.3.

7.3.8. Natural Hazards

Section 8.3 of the Plan contains the objectives and policies for natural hazards. The relevant objectives are the protection of activities, development and life from the adverse effects of natural hazards (NH-O1), and activities and development do not create, accelerate, displace or increase the effects of a natural hazard (NH-O2).

The geotechnical assessment concludes that that natural hazard risks are well understood, internal to the site and can be effectively managed through site-specific design. Therefore, the proposal is consistent with this objective and associated policies in Section 8.3.

7.3.9. Operative District Plan Summary

There are a significant number of objectives and policies within the Taupō District Plan relevant to this proposal.

The proposal works towards the climate change outcomes by enabling a development adjoining an existing urban area, improving viability of public transport from Mangakino, reducing agricultural emissions, and thereby reducing the pressure for rural development. Similarly it supports freshwater quality objectives through the reduction of pastoral nutrient inputs, provision of reticulated wastewater, best practice stormwater management, and opportunities for native revegetation in reserves and lake edges.

For land development, the proposal is consistent with Taupō's FDS, and through consideration of WML's options, the proposal seeks planned and serviced urban growth through the plan change process. This submission notes that the proposal meets Council's criteria for additional land rezoning.

The proposal is consistent with natural environment values objectives by avoiding impacts on significant natural areas and outstanding landscapes while enabling lake edge biodiversity enhancement. It also recognises tangata whenua values through ongoing engagement, and alignment with kaitiakitanga to be exercised by WML.

Overall this proposal supports urban form and development objectives with rezoning occurring alongside the existing urban area where environmental effects are managed, while achieving transport and natural hazard objectives through safe access and suitability of the land for development.

The proposal is considered to achieve the respective objectives of the Taupō ODP.

7.4. Evaluation of benefits and costs (s32(2)(a))

Benefits	Costs
Economic	
• Supports housing supply and responds to identified demand for Mangakino residential land. • Generates economic activity through land development and construction, and rates • More efficient use of existing infrastructure networks including public transport • More efficient use of wider services – medical, education • Supports local economy	• Development costs including infrastructure upgrades, though these are minimal • Loss of some marginal farming land (albeit small parcels) and associated reduction in farming outputs
Social	
• Increased housing choice and availability for the community • Supports community growth and wellbeing • Supports viability of services within Mangakino including shopping centre, Council service centre, school and public transport	• Change in local amenity experienced by neighbouring residents
Cultural	
• Opportunity to incorporate kaitiakitanga through ecological enhancement and land management • Development occurs on land with no identified sites of significance	• Potential effects on unidentified cultural values
Environmental	
• Consolidation of development adjacent to existing urban areas, reducing pressure for dispersed rural subdivision • Opportunities to enhance indigenous biodiversity through native planting, ecological restoration • Reduction in agricultural greenhouse gas emissions (methane and nitrous oxide) through the conversion of pastoral farming to residential use • Decrease in nutrient inputs to Waikato Awa, contributing to improved freshwater quality	• Potential edge effects on adjacent ecological areas (eg weeds, domestic animals) • Increased impervious surfaces • Continued reliance on private vehicle relative to higher density environments. • Loss of rural character and open landscape values.

7.5. Economic Growth and Employment Opportunities (s32(2)(a)(i) & (ii))

The proposed rezoning of approximately 17ha of rural land to residential zoning in Mangakino will provide for a modest but sustained level of growth, enabling approximately 7–10 residential lots per year. This scale of development is consistent with the strategic growth anticipated by Taupō District Council's Future Development Strategy and will contribute positively to the economic and social wellbeing of Mangakino and the wider western Taupō District.

The proposal will generate direct economic benefits through:

- subdivision and civil construction activity,
- housing construction,
- infrastructure installation,
- surveying, engineering, planning, and related professional services,
- and ongoing property investment.

The staged release of residential lots over time will support a steady pipeline of work for local contractors, builders, tradespeople, and service providers, rather than creating short-term boom-and-bust development pressures.

Based on Formative's Assessment approximately half the dwellings will be permanent residents. Additional residential growth in Mangakino will also help support the viability of existing local businesses, community services, schools, and recreational facilities by increasing the permanent resident population and broadening the local rating base. Increased population can improve demand for retail, hospitality, maintenance, health, and community services, supporting local employment opportunities and economic resilience.

The proposal may also assist in addressing housing supply constraints within Mangakino by providing additional residential development opportunities in a planned and serviced location. Increased housing availability can support workforce retention and attraction within the wider district, including workers associated with tourism, forestry, agriculture, construction, and local service industries. Importantly, the scale of growth proposed is moderate and proportionate to Mangakino's anticipated future growth trajectory. The development is therefore unlikely to generate significant adverse infrastructure or labour market pressures, while still contributing positively to local economic activity and long-term settlement sustainability.

Overall, the rezoning will support:

- incremental and sustainable economic growth,
- ongoing employment opportunities during development and construction,
- increased housing supply and investment,
- improved community resilience,
- and the long-term vitality of Mangakino as a rural township within the Taupō District.

7.6. The risk of acting or not acting if there is uncertain or insufficient information (s32(2)(c))

There is no uncertain information or insufficient information about this proposal, therefore an assessment of risk of acting or not acting is not considered necessary.

However it is noted that not acting would fail to implement Taupō's FDS and Housing Strategy, failing to provide a competitive housing market where needed allowing Mangakino's rent and housing prices to increase, resulting in negative effects on community wellbeing.

7.7. The efficiency and effectiveness of provisions (s32(1)(b)(ii))

7.7.1. Efficiency

The rezoning of the Mangakino sites to Residential is considered efficient for the following reasons:

- **Efficient use of land and infrastructure:** The sites adjoins existing Mangakino urban area. The sites are in close proximity to established infrastructure networks where there is either sufficient capacity or planned capacity. This avoids the need for new, standalone infrastructure systems and reducing overall capital and environmental costs to the wider community.
- **Avoidance of inefficient development patterns:** Rezoning enables a planned and coordinated urban expansion, avoiding fragmented and ad hoc rural subdivision that would otherwise occur through the resource consent process, which is typically less efficient and results in poorer outcomes.
- **Benefits to Environment:** The transition from pastoral farming reduces greenhouse gas emissions and nutrient inputs to the Waikato Awa, creating environmental gains at a relatively low cost when compared with continued rural land use.
- **Economic outcomes:** Economic gains will result from the conversion of low value dry stock grazing land to residential dwellings, resulting in economic expenditure relating to land development, infrastructure upgrades, contractor employment, and housing construction. The increase population (permanent or visitor) will result in increased spending in the community to the benefit of businesses and services.
- **Alignment with infrastructure funding mechanisms:** Development contributions ensure that growth pays for growth, minimising fiscal burden on the wider community.

While there are costs associated with the loss of rural land, infrastructure upgrades, and potential environmental effects, these are moderate, well understood, and able to be internalised by the developer or mitigated through design and consenting mechanisms.

7.7.2. Effectiveness

The proposal is considered highly effective for the following reasons:

- **Directly addresses housing supply issues:** The proposal provides substantial residential capacity for Mangakino (approximately 180 lots) to meet the longterm supply for this township. The sites are immediately adjacently to the township and will support its growth. This capacity will meet a demonstrated demand, provide flexibility in housing typologies and contribute modern housing for permanent and visitor population, supporting a well-functioning urban environment.

- Delivers planned urban growth: The proposal provides a structured and coordinated framework for development through the District Plan as required by the FDS, rather than relying on less certain and less integrated consent-based development pathways.
- Strong alignment with strategic objectives: The proposal achieves climate change, freshwater, infrastructure, urban form, and natural environment objectives by enabling development in an appropriate location with manageable effects.
- Effectively manages environmental effects: The scale and nature of effects are well understood and can be avoided, remedied or mitigated through subdivision design, consent conditions, and best practice environmental management.
- Supports resilient and adaptive development: The low-density format enables site-specific responses to natural hazards, climate change, and future adaptability, increasing the long-term effectiveness of the development.
- Provides certainty and clarity: Rezoning provides a clear planning framework for landowners, Council and infrastructure providers, improving certainty and enabling better long-term planning outcomes.

7.8. Options Considered (s32(1)(b)(i))

Option 1: Status Quo The existing Rural Zone and related provisions applying to the sites would be retained and non-complying consent would be required.	Continuing to apply Rural Zone provisions to the identified areas of land will not assist in achieving the ODP's objectives relating to ensuring sufficient residential development capacity and providing for sustainable growth. Any consent would be high risk, with uncertainty as residential development in rural zones is not supported by the objectives and policies. Consequence could be increased demand for infill housing however this is a style of housing with more limited appeal.
Option 2: Rezoning the sites as General Residential without the development area plan	This option would not provide a coordinated and integrated framework for development. The development area plan addresses connectivity, connectivity needs, and site specific natural hazards. The development area plan allows environmental constraints to be identified and appropriately managed upfront.
Option 3: Lodge a private plan change request to rezone the sites General Residential with a development area plan.	This option was seriously considered, however would be inefficient when the Council has already notified Plan Change 44, and would be much more costly for the applicant. The same outcomes would be achieved as per this submission for this proposal.
Option 4: Rezone the sites as Low Density Residential	Zoning the sites low density residential may not require sewer reticulation or WWTP upgrade, reducing costs for development. However this zoning would be an inefficient use of serviceable land.
Option 5: Rezone alternative sites – Taniwha Street	This option was seriously considered. Taniwha Street was similarly developed with housing in 1950s and is also in close proximity to roading and waters infrastructure. These attributes are not materially different to the current proposal and so do not provide a rational basis for choosing to rezone Taniwha Street instead of the proposed sites. Furthermore, the Taniwha Street land is also part of a larger dairy farm unit efficiently farmed and has potentially greater impacts on adjoining landowners views.

7.9. Reason for Option Chosen (s32(1)(b)(iii))

This submission on Council's Proposed Plan Change 44 to rezone 35 Lake Road and 3 Karamū Street to General Residential, supported by a development plan, is the most appropriate option because it utilises an existing and commenced statutory process specifically designed to consider residential zoning changes, ensuring timely and efficient decision-making without the need for a standalone private plan change.

As per Council's Section 32 evaluation, this submission reduces duplication of process, cost, and delay. Incorporating a development plan within this submission further strengthens the proposal by demonstrating comprehensive and coordinated planning, including how infrastructure, access, and environmental constraints will be managed.

Together, this approach provides a balanced and efficient pathway that achieves the benefits of integrated development planning while leveraging the broader strategic and policy framework already being progressed through PC44, making it a practical, effective and cost-efficient method of securing rezoning outcomes.

8. ASSESSMENT OF ENVIRONMENTAL EFFECTS

This submission outlines WMI's request to rezone two sites from General Rural to General Residential. WMI have undertaken their own assessment of potentially suitable sites for residential zoning. Although not limited to these sites, WMI's assessment identified two sites as suitable options for residential zoning, when assessed against residential housing criteria. These two sites are being 37 Lake Road and 3 Karamū Street in Mangakino.

Detailed reporting has been undertaken on both these sites including Economic, Ecological, Visual Landscape, Cultural, Geotechnical, Transportation, Infrastructure, Soil Contamination, and Land Classification to determine whether there are any significant constraints to the sites being developed for residential use or effects associated with the conversion to residential house.

This submission provides supportive investigations in summary form to address the matters outlined in Taupō District Plan APP-UGA as required for rezoning of land to residential. Full assessments are available in Appendices 3 to 8.

8.1. Economic Effects

WMI engaged Formative Limited to provide an economics assessment of the predicted growth in supply and demand in Mangakino (Appendix 7). This assessment also assesses the benefits of a diverse housing market where greenfield and infill housing is offered.

The assessment concludes that sustained growth is anticipated with demand from both local and temporary residents expected over the next 30 years, suggesting there would be combined demand in the range of 255 to 362 new dwellings by 2053. This suggests that there is demand for around 7 to 10 residential lots per annum. This assessment informed the scale of this proposal, informing the decision to not pursue Option 5 (Taniwha Street - as noted in Section 7.8) at this time.

For rentals, around 38% of permanent residents in Mangakino live in a rental dwelling and Median rents in the Mangakino area have increased from just under \$400 per week in 2016 to \$685 per week in 2025. Overall Residential sales prices and weekly rents in Mangakino have both increased considerably since 2016, which means that the housing affordability has deteriorated in the town.

Given the expected growth trajectory and the relatively limited remaining supply in Mangakino, it is likely that both 57 Lake Road and Karamū Street will need to be brought forward for development. At a projected growth rate of approximately 7-10 dwellings per annum and an estimated remaining capacity of around 25 lots, existing capacity would be exhausted within the next 2–3 years.

This indicates a potential shortfall emerging in the short term, likely around 2028-2029. On that basis, there appears to be a clear need for additional zoned land to ensure supply remains aligned with demand. Accordingly, rezoning via PC44 of at least 57 Lake Road should be progressed now as a minimum response to address the anticipated capacity constraint. We also consider that rezoning Karamū Street would be beneficial, as it would help ensure an adequate supply of residential capacity and provide additional flexibility to respond to demand.

(page 25 Formative Report)

The addendum to the report provides advice on the split of demand between greenfield capacity (i.e. standalone dwellings in new urban areas) and intensification capacity (i.e. attached dwellings in existing urban areas), with a particular focus on Mangakino to address the requirements of Clause 3.2 of NPS-UD. The capacity assessment (under Clause 3.2) consider capacity in terms of a set of criteria – “plan enabled”, “infrastructure-ready”, and “feasible and reasonably expected to be realised”, as well as the . The recommendations are that

Given the available data, it is likely that there is limited Plan Enabled capacity in Mangakino and that much of this capacity may not be developable. While there may be some infill potential there has been no assessment of whether this development could be reasonably expected to be realised or whether it would be commercially feasible to do so.

For Mangakino the council could consider adopting a 100:20 split policy which would be consistent with the NPS-UD competitiveness margin. This 100:20 split, would provide for 100% of demand in new greenfield development and 20% within existing urban areas.

This would mean planning for 255 to 3562 additional dwellings by 2053 in new urban areas and 50 to 70 additional dwellings by 2053 in the existing urban areas.

(page 30 & 31, Formative Report)

In conclusion, there are potential adverse effects of not rezoning additional land to Residential, whereby insufficient housing capacity would occur further decreasing affordability in Mangakino.

Wider economic effects of additional housing and a resulting increase in permanent and holiday house population are increased spend at local businesses, decreased costs associated with travel for rural industry workers, construction income and increased efficiency public transport.

8.2. Ecological Effects

Lake Road

Lake Road is largely in pasture with a recently cleared area returned to pasture from blackberry. A small portion of the site (the northern embankment) has some mid quality native bush. Due to the slope this embankment is undevelopable as identified in the geotechnical report. Therefore this bush could be retained via covenant or other protection. Due to the significant area of pasture and the inability to develop this area, no detailed ecological assessment is considered warranted.

Karamū Street

Karamū Street is similarly in pasture. According no ecological assessment has been undertaken as there are considered no effects on floral and fauna at these sites. A positive benefit of the proposal for Lake Road is the likely provision of stormwater reserves with pedestrian access, where native revegetation will likely occur. Therefore a positive benefit is the likely increase in biodiversity from future native revegetation and general residential property landscaping. Consideration of possible future native revegetation is provided for in the Development Plan Key Outcomes DEV8.2 (Appendix 1) and in current assessment criteria to which subdivision applications will be subject to (SUB-R14.f & i).

8.3. Landscape and Visual Effects

WMI engaged Narrative Landscape Limited to provide a landscape and visual assessment of the two sites (Appendix 3), with Lake Road directly adjoining Lake Maraetai/Waikato Awa (OLA56).

Lake Road

Given significant modifications to the area, the main landscape issues are considered to be;

- *Potential adverse landscape and visual amenity effects on nearby residential properties; and*
- *Ensuring that the treatment of perimeter development appropriately integrates with the receiving environment (be that neighbouring residential properties, roads, escarpments or the lake/river edge).*

(page 28, Narrative Report)

The Conclusions of the LVA are:

Based on the above assessment of landscape and visual amenity effects, it is considered that the two proposed WMI rezoning sites would be capable of accommodating a Residential Environment zoning.

The rezoning itself won't cause an adverse landscape effect. However, to ensure future development is well integrated into the receiving environment, it is recommended that an Outline Development Plan is prepared for the WMI Lake site.

A significant contributing factor, which has diminished potential adverse landscape and visual amenity effects, is the historical context relating to the Pouākani Block and Mangakino Hydroelectric Dam Village. With both of the sites having previously held an urban landuse.

It has been concluded that the level of landscape and visual amenity effect, as a result of rezoning to General Residential Zone, does not exceed a Low-Moderate adverse effect (Minor) for the Lake Rd site, or exceed a Low adverse effect (less than minor) for the Karamū St site.

(page 29, Narrative Report)

Narrative's report has made recommendations for measures to be incorporated into the Outline Development Plan for consideration in subdivision design. These and the recommended Height Overlay are incorporated into the Development Plan Key Outcomes DEV8.2 (Appendix 1).

Karamū Street

Narrative's assessment does not recommend any particular landscape measures for Karamū Street.

8.4. Effects on Cultural & Archaeological Values

An interview has been held with Craig Ahipene, Eli Paerata and Timutetai Paerata, kaumatua for Ngāti Te Kohera. No cultural sites of significance or areas of historical occupation have been identified on the lands in question in this interview (Appendix 10).

No archaeological sites have been identified on NZAA Arch Site on these lands either. This assessment relates to both blocks. Consultation with Raukawa and Ngāti Tūwharetoa raised no concerns about sites of significance. It is possible that the damming of Waikato River by Maraetai Dam to form Lake Maraetai flooded sites of significance which are likely to have been in closer proximity to historical location of the river.



Image 9 – Extract from NZAA Arch site mapping

8.5. Geotechnical Effects

WMI have commissioned CMA Geosciences to undertake geotechnical assessment for both sites (Appendix 5).

Lake Road

CMW Geoscience undertook a geotechnical investigation of Lake Road including onsite testing of Lake Road. Due to its topography (sloping with steep northern embankment) and its previous use for timber mill with sawdust disposal, this report identifies the following constraints:

- Slope Stability Hazard zones for specific assessment and appropriate setbacks
- Cut/Fill Batter gradients for this location
- Excavation of uncontrolled fill or Specific Engineer Design pile foundations
- Void management for foundation design
- Bulk earthworks will be needed to create engineered fill
- Onsite soakage is not recommended for sites close to steep natural slopes and cut batters
- A range of other stormwater methodologies are also recommended

Section 8 of the Lake Road report outlines further work to advance development plans and resource consent application. These measures are normal practice in land development, and have been incorporated into the Development Plan Key Outcomes DEV8.2. With the slope stability hazard zone and historic sawdust stockpile identified clearly as a Natural Hazard Zone in the Development Plan and associated requirements detailed, the development of the site is possible with a clear rule framework to provide assessment of geotechnical recommendations in a subdivision consent. With measures incorporated, the Natural Hazard Risk for this site is deemed to be low.

Karamū Street

CMW Geoscience undertook a desktop preliminary geotechnical assessment of 3 Karamū Street. Due to its topography (flat) and lack of steep slopes or fault lines, and its previous use for housing, the main geotechnical considerations are erosion cavity features (voids/tomos) and unsuitable fill. Standard subdivision investigations and construction measures are anticipated to be suitable.

Section 8 of the Karamū Street report outlines further work to advance development plans and resource consent application. These measures are normal practice in land development. With measures incorporated, the Natural Hazard Risk for this site is deemed to be low. Consequently, no Natural Hazard Overlay is proposed for this site, rather the existing assessment criteria in SUB-R2 and SUB-R14 are considered sufficient to address earthworks and geotechnical matters at time of subdivision.

8.6. Transportation Effects

As is known, Mangakino was once a larger community, with a roading pattern and intersections designed for that larger community. As such the roading network and intersections are now more than adequate for the existing population and any addition of housing on land previously used for housing. As such no wider or Mangakino network issues are likely to occur as a result of additional housing. Adequacy of the road formations can be provided in an engineering assessment along with current traffic counts to confirm adequacy. Additionally consultation can occur with NZTA/Waka Kotahi to confirm if required. This matter is applicable to both sites. Detailed assessment of this matter is provided for in existing assessment criteria in SUB-R2.a and SUB-R14.I & n.

Mangakino is a small community, readily bikeable and walkable. Its isolation from other communities and the distances to get to community and health services and workplaces is problematic. Current public transport is currently the C2T Tokoroa to Taupō Bus, travelling between Tokoroa, Mangakino, Whakamaru and Taupō – in both directions, on Tuesday and Friday. Public transport will be more viable with an increase in population in Mangakino, which this rezoning may achieve.

8.7. Infrastructure Effects

WMI engaged Cheal Consultants Limited to provide a civil engineering assessment of both sites (Appendix 6).

Overall Capacity

Council engineers confirm that there is sufficient water capacity in Council water take consent for at least 200 additional lots in Mangakino over current peak demand. Any specific network upgrade or extension would be required as part of any subdivision.

Over the last four years, discussions have been undertaken with Council's wastewater asset manager. These discussions have led to the inclusion in Taupō Council's Long Term Plan 2024 of an expanded Mangakino WWTP to cater to expected growth in Mangakino being at least 180 dwellings of greenfield and some infill housing also. The Mangakino Wastewater Treatment Plant is in the process of being re-consented by Waikato Regional Council. This re-consenting will include the additional discharge volume necessary for this proposal. Although delayed by recent changes in both the extension to the expiry date of the expired consent to 31 December 2027, and the new Wastewater Environmental Performance Standards, the Taupō's Long Term Plan 2024 continues to include funding for this upgrade which will occur in sufficient time for connection by the proposed sites, at the 7-10 lot rate of development.

Any roading stormwater must be retained on-site which can be incorporated into any subdivision design whereby stormwater management methodologies will be consistent with Taupō Code of Practice and Waikato Regional Plan. The findings of the geotechnical report on this matter are also relevant.

No upgrade to existing intersections are needed. New intersections will be to Lake Road where there is excellent visibility. Connections to walking and cycling trails are able to be made.

Lake Road

Due to fall to the existing wastewater main, a small portion of the site (northeastern boundary) will require onsite wastewater pumps to access the wastewater network. Any specific network upgrade or extension would be required as part of any subdivision.

Karamū Street

Karamū Street may require a wastewater pump due to shallow fall to existing wastewater infrastructure. Stormwater may be required to be retained on site. These constraints are normal development considerations for residential housing.

The conclusion of the Engineering Assessment is:

Based upon the above review and commentary, services and access to both sites can be generally accommodated within existing networks, considering the surrounding residential environment with the Town Centre Environment a few blocks away. Final stormwater disposal may vary once more specific geotechnical assessments have been completed as some of Lake Road and potentially all of Karamū Street may allow for soakage.

Currently Taupō District Council is applying to the Waikato Regional Council for a Consent to upgrade both Wastewater Treatment Plants. Provision to service these two sites was confirmed within the proposed upgrade. Significant Developers contribution fees towards upgrade and enhancement of the water quality to the Lake and Town Supply are a mutual benefit to Mangakino Township, TDC and Developer.
(page 30, Cheal Report)

Detailed assessment of infrastructure provision and design is provided for in existing assessment criteria in SUB-R2.a & c and SUB-R14.d & l.

8.8. Land Contamination Effects

WMI have commissioned Geohazards Environmental Limited to undertake both a Preliminary Site Investigation (PSI) and a Detailed Site Investigation (DSI) for both sites (Appendix 4).

Lake Road

As detailed in Section 5.8.1 of this report, Lake Road is the former site of the Mangakino Timber Mill. DSI testing identifies a contamination area where a variety of contaminants (lead, zinc, copper and asbestos) exceed the SCS and Eco EGV requirements for residential use. Of note all results are within SCS guidelines for commercial use. A remediation action plan is recommended for residential use at the time of subdivision, with further assessment to be undertaken in 13 of the 25 sample locations.



Image 10 – Extent of Soil Contamination

Karamū Street

As also identified in Section 5.8.1, a DSI was also undertaken on Karamū Street with 30 samples taken. The report states that no remediation is required on this site.

Detailed assessment of contaminated sites is provided for in existing assessment criteria in SUB-R2.b and SUB-R14.e, and via the requirements of the National Environmental Standard for Soil Contamination as outlined in Section 5.8.

9. ENGAGEMENT

Consultation has been undertaken with a variety of stakeholders over the last 3-4 years as detailed in the Consultation Summary (Appendix 9).

Consultation was undertaken in 3 rezoning options being Lake Road, Karamū Street and Taniwha Street. Taniwha Street was an site under consideration by WMI, being a portion of the land between Taniwha Street and Mangakino Golf Course on the eastern side of Mangakino. Although previously housing in 1950s, following feedback from adjoining owners, this option was not progressed at this time.

Consultation has been undertaken with Pouakani Trust, Tūwharetoa Māori Trust Board and Raukawa. Specifically a hui was held with Pouakani Marae Kaumatua Craig Ahipene, Eli Paerata, Timu Paerata and WMI representative Michael Allan on 13 October 2023. This hui discussed the cultural assessment of Mangakino and WMI lands.

Group	Outcome
• Pouakani Marae	Letter of Support
• Tūwharetoa Maori Trust Board	Ok with engagement with mana whenua Pouakani Marae
• Raukawa Charitable Trust	Positive feedback at meeting, Guidance on soil contamination protocols provided.
• Waikato Regional Council	Discussion held with LUC team
• Mercury Energy	No feedback sought, due to location above river level
• Council Asset Managers	No concerns regarding water capacity Additional wastewater capacity planned for
• Waka Kotahi	No feedback sought, due to location of sites being on local roads.
• Adjoining Landowners	No direct consultation however some owners attended the public hui
• Wider community/interest groups	Hui held at Pouakani Marae, minutes taken Most feedback was from WMI Shareholders. Some neighbours at Taniwha street opposed development there. Few comments on Lake Road or Karamū Street. River Trails in support

10. CONCLUSION

This submission has been prepared on behalf of Wairarapa Moana ki Pouakani Incorporation in support of amending Proposed Plan Change 44 to rezone 35 Lake Road and 3 Kāramu Street, Mangakino from General Rural Zone to General Residential Zone, together with the inclusion of a Development Area Plan and associated subdivision provisions.

The proposal seeks to provide additional residential land in Mangakino to provide for Mangakino's economic, social, cultural wellbeing through the sustainable use of land resource to provide for the reasonably foreseeable needs of future generations. Given Mangakino's anticipated future growth, it is necessary for Mangakino's residents (permanent and holiday homes) that a variety of residential land is available as infill development alone is not sufficient to meet the future demand, nor provides a diversity in housing.

The proposal to rezone two sites represents a logical, efficient and planned extension of the Mangakino urban area. Both sites adjoin existing residential development, have a history of urban or urban-related use, and are no longer well suited to productive rural use. Rezoning the land will provide additional residential capacity in a location that is consistent with Mangakino's established settlement pattern and will assist in avoiding more dispersed and inefficient rural residential development.

The evidence supporting this submission demonstrates that additional residential land is required in Mangakino to meet anticipated demand. Existing residential capacity is limited, and the Future Development Strategy recognises the need for both infill and greenfield residential growth in Mangakino. The proposed rezoning will provide a staged and proportionate supply of residential lots, supporting housing choice, affordability, community wellbeing, and the ongoing vitality of Mangakino.

The proposal is consistent with the relevant higher-order planning framework, including the National Policy Statements on Urban Development, Electricity Networks, Highly Productive Land, Freshwater Management, Natural Hazards and Infrastructure, the Waikato Regional Policy Statement, Taupō District Council's Future Development Strategy, and the relevant objectives and policies of the Taupō District Plan. The proposal also aligns with Council's strategic direction for urban form, infrastructure integration, climate resilience, housing supply, and tangata whenua outcomes.

The assessments undertaken confirm that the environmental effects of the rezoning and subsequent development can be appropriately avoided, remedied or mitigated. The sites can be serviced by existing or planned infrastructure, including water, wastewater, stormwater, transport, and electricity networks. Site-specific matters relating to geotechnical constraints, stormwater design, contamination, access, and ecological enhancement can be appropriately addressed through the proposed Development Area Plan, existing District Plan assessment criteria, the subdivision consent processes, and existing regulatory mechanisms.

The proposal will deliver positive social, cultural, economic and environmental outcomes. It will support the aspirations of WMI as mana whakahaere and landowner, provide for the wellbeing of current and future residents, generate local construction and employment activity, support local businesses and services, and enable residential growth in a manner that is coordinated with infrastructure and responsive to environmental constraints.

The Section 32 assessment (in section 7 of this submission) demonstrates that the proposed rezoning is the most appropriate, efficient and effective method to achieve the relevant objectives of the District Plan and Proposed Plan Change 44. The status quo would not adequately respond to Mangakino's identified housing demand, while a separate private plan change would duplicate process, cost and time. Incorporating the rezoning into Plan Change 44 provides a practical and efficient planning pathway.

For these reasons, the submitter respectfully requests that Taupō District Council accept the relief sought and amend Proposed Plan Change 44 to rezone the identified WMI land at 35 Lake Road and 3 Karamū Street to General Residential Zone, insert the DEV8 Mangakino Development Area Plan and associated subdivision provisions, and make any consequential amendments necessary to give effect to the rezoning.

The submitter wishes to be heard in support of its submission and would consider presenting a joint case at a hearing if others have made a similar submission.

Cheal Consultants
29 May 2026

MANGAKINO RESIDENTIAL REZONING
Landscape and Visual Effects Assessment

Prepared for
WAIRARAPA MOANA KI POUAKANI INC.

April 2024

ATTACHMENT 1 - GRAPHICS PACKAGE



ATTACHMENT 1 - GRAPHICS PACKAGE





WAIRARAPA MOANA
nurturing our taonga



MANGAKINO
Residential Rezoning

Mangakino Context Map

Sheet 01

Print at A3

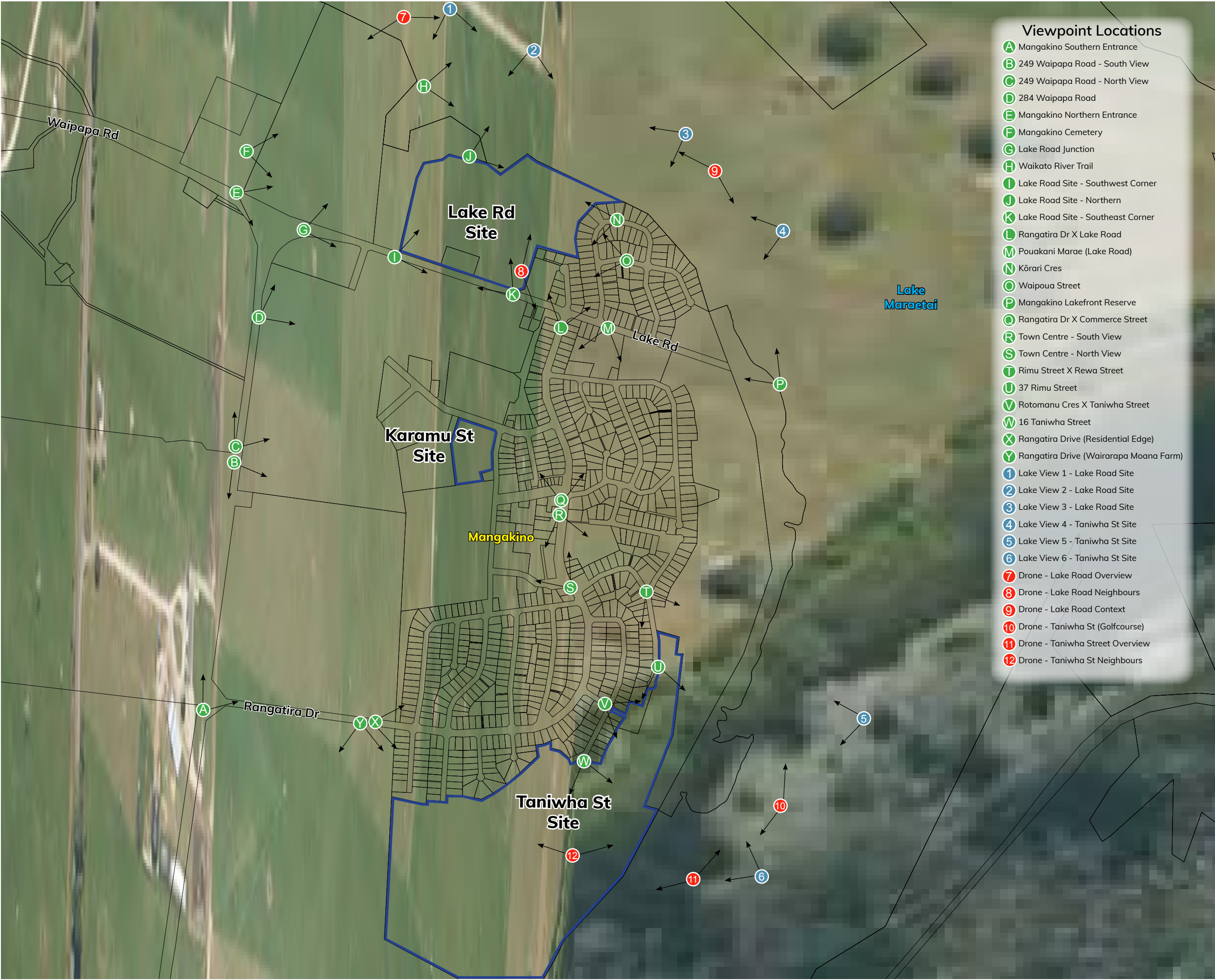
Scale 1:20,000

Date 30/04/24

Job No. 2403

Drawn JH

CONSULTATION



Viewpoint Locations

- A Mangakino Southern Entrance
- B 249 Waipapa Road - South View
- C 249 Waipapa Road - North View
- D 284 Waipapa Road
- E Mangakino Northern Entrance
- F Mangakino Cemetery
- G Lake Road Junction
- H Waikato River Trail
- I Lake Road Site - Southwest Corner
- J Lake Road Site - Northern
- K Lake Road Site - Southeast Corner
- L Rangatira Dr X Lake Road
- M Pouakani Marae (Lake Road)
- N Kōrari Cres
- O Waipoua Street
- P Mangakino Lakefront Reserve
- Q Rangatira Dr X Commerce Street
- R Town Centre - South View
- S Town Centre - North View
- T Rimu Street X Rewa Street
- U 37 Rimu Street
- V Rotomanu Cres X Taniwha Street
- W 16 Taniwha Street
- X Rangatira Drive (Residential Edge)
- Y Rangatira Drive (Wairarapa Moana Farm)
- 1 Lake View 1 - Lake Road Site
- 2 Lake View 2 - Lake Road Site
- 3 Lake View 3 - Lake Road Site
- 4 Lake View 4 - Taniwha St Site
- 5 Lake View 5 - Taniwha St Site
- 6 Lake View 6 - Taniwha St Site
- 7 Drone - Lake Road Overview
- 8 Drone - Lake Road Neighbours
- 9 Drone - Lake Road Context
- 10 Drone - Taniwha St (Golfcourse)
- 11 Drone - Taniwha Street Overview
- 12 Drone - Taniwha St Neighbours



MANGAKINO
Residential Rezoning

Viewpoint Location Map

Sheet 02

Print at A3	
Scale	1:10,000
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



-  Current Aerial Imagery
-  Historic Imagery (1963)
-  Waikato River Historic Alignment (Pre Power Station)
-  WMI Development Options



**MANGAKINO
Residential Rezoning**

Historical Imagery
1963

Sheet 03

Print at A3	
Scale	1:10,000
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



**MANGAKINO
Residential Rezoning**

Lake Road Option

Sheet 04

Print at A3	
Scale	1:2500
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



WAIRARAPA MOANA
nurturing our taonga



MANGAKINO Residential Rezoning

Taniwha Street &
Karamū Street Option

Sheet 05

Print at A3

Scale 1:2500

Date 30/04/24

Job No. 2403

Drawn JH

CONSULTATION

www.narrativelandscape.co.nz
josh@narrativelandscape.co.nz

T24Consult Page 1139 of 1585



Insert Map: Karamū Street



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint A
133 Napier Road

Sheet 06

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint B
15 Brookvale Road

Sheet 07

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint C
Brookvale Road x Guthrie Road

Sheet 08

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint D
Brookvale Road x Legome Lane

Sheet 09

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint E
Brookvale Road (Site Entrance)

Sheet 10

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint F
Brookvale Road x Woodlands Drive

Sheet 11

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint G
Brookvale Rd X Bourke Place

Sheet 12

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint H
Brookvale Road x Romanes Drive

Sheet 13

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Time:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint I
Romanes Drive

Sheet 14

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint J
Romanes Drive

Sheet 15

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint K
Romanes Drive Pathway

Sheet 16

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint L
BMX Track Entrance

Sheet 17

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint M
Water Refill Station

Sheet 18

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint N
Eastern End of BMX Track

Sheet 19

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint O
Western End of BMX Track

Sheet 20

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint P
Guthrie Park Bridge

Sheet 21

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint Q
Guthrie Park Sports Fileds (East View)

Sheet 22

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint R
Guthrie Park Sports Fields (West View)

Sheet 23

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



WAIRARAPA MOANA
nurturing our taonga



MANGAKINO
Residential Rezoning

Viewpoint S
Guthrie Park Sports Fields (West View)

Sheet 24

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint T
Guthrie Park Sports Fields (West View)

Sheet 25

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Time:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint U
Guthrie Park Sports Fields (West View)

Sheet 26

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: Canon 6D
FoV: 74° (24mm Lens)
Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpoint V
Guthrie Park Sports Fields (West View)

Sheet 27

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Lattitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint W
Guthrie Park Sports Fields (West View)

Sheet 28

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint X
Guthrie Park Sports Fields (West View)

Sheet 29

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: Canon 6D

FoV: 74° (24mm Lens)

Reading Distance: 232mm



MANGAKINO
Residential Rezoning

Viewpont Y
Guthrie Park Sports Fields (West View)

Sheet 30

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: DJI Mini 3 Pro
FoV: 74° (24mm Equiv. Lens)
Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint 1 & 2
Drone Northwest Corner

Sheet 31

[+ Return to Map](#)

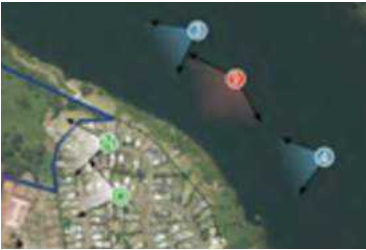
Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION

Viewpoint 3



Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: DJI Mini 3 Pro
FoV: 74° (24mm Equiv. Lens)
Reading Distance: 232mm



Viewpoint 4



**MANGAKINO
Residential Rezoning**

Viewpoint 3 & 4
Drone Southwest Corner

Sheet 32

[+ Return to Map](#)

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION

Viewpoint 5



Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: DJI Mini 3 Pro
FoV: 74° (24mm Equiv. Lens)
Reading Distance: 232mm



Viewpoint 6



**MANGAKINO
Residential Rezoning**

Viewpoint 5 & 6
Drone Southern Boundary

Sheet 33

[+ Return to Map](#)

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



Date: 24/01/2024

Tlme:

Latitude:

Longitude:

Camera: DJI Mini 3 Pro

FoV: 74° (24mm Equiv. Lens)

Reading Distance: 232mm



WAIRARAPA MOANA
nurturing our taonga



MANGAKINO
Residential Rezoning

Viewpoint 7, 8 & 9
Drone Southeast A

Sheet 34

Print at A3

Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION



[+ Return to Map](#)

Date: 24/01/2024
Time:
Latitude:
Longitude:
Camera: DJI Mini 3 Pro
FoV: 74° (24mm Equiv. Lens)
Reading Distance: 232mm



**MANGAKINO
Residential Rezoning**

Viewpoint 10, 11 & 12
Drone Southeast B

Sheet 35

Print at A3	
Scale	N/A
Date	30/04/24
Job No.	2403
Drawn	JH

CONSULTATION

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 02/06/2026
First name: Mark **Last name:** Chrisp
Organisation: Contact Energy Limited
Preferred method of contact Email
Postal address: c/- Mitchel Daysh Limited, PO Box 1307, HAMILTON 3240, New Zealand
Email: mark.chrisp@mitchelldaysh.co.nz
Daytime Phone: +64274758383
Would you like to present your submission in person at a hearing? *
 Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: PC44 General

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Contact seeks the following relief:

Approve PC44 in relation to the residential zones of the Taupō District as proposed in PC44 where they are well away from existing and consented renewable electricity generation activities.

The reason for my submission is::

Contact supports the intensification of residential development within existing zones urban areas of the Taupō District, and areas that are currently zoned General Rural that contain established development patterns consistent with Low-Density Residential and General Residential as set out in PC44. Contact's support is based on the ability for these areas to provide for residential activities in appropriate locations.

However, a key aspect of Contact's submission seeks to ensure the intensification and development in these areas are not within or in close proximity to permitted, lawfully existing and/or consented renewable electricity generation activities. There are more than 20 power stations in the Taupō District making renewable electricity generation one of the most significant activities in the Taupō District. The ongoing operation of existing renewable electricity generation activities and the development of additional renewable electricity generation capacity is one of the most important resource management issues facing the country in order to address climate change by decarbonising the economy.

If rezoning set out in PC44 is only located in appropriate locations and the changes to the relevant rules as proposed are retained, that avoids the need for Contact (and others) to seek changes to the rules and performance standards to avoid reverse sensitivity effects.

If Contact's relief sought in relation to the PC44 is not accepted, then Contact seeks alternative relief (including additional changes to the rules and performance standards relating to the Rural Lifestyle Environment) which will avoid the creation of reverse sensitivity effects.



Contact Energy Limited
Submissions on Plan Change 44
to the Taupō District Plan
Residential Zones

Date: 2 June 2026

To: Taupō District Council

Submitter: Contact Energy Limited

Address for service: C/- Mitchel Daysh Limited
PO Box 1307
HAMILTON 3240
Attention: Mark Chrisp

Contact details: E mark.chrisp@mitchelldaysh.co.nz
M +64 27 475 8383

- Contact Energy Ltd (Contact) wishes to be heard in support of this submission.
- Contact could not gain an advantage in trade competition through this submission.
- If others make a similar submission, Contact would consider presenting a joint case with them at any hearing.

1. INTRODUCTION

- 1.1. Contact Energy Limited (“**Contact**”) welcomes the opportunity to submit on Proposed Plan Change 44 (“**PC44**”) to the Taupō District Plan.

2. CONTACT ENERGY LTD

- 2.1. Following the recent acquisition of Manawa Energy (formerly TrustPower), Contact owns and operates 38 power stations across the country and currently produces 97% of its electricity from renewable hydro and geothermal resources.
- 2.2. Contact is New Zealand’s largest producer of renewable electricity from geothermal resources with the operation of its Wairākei A & B Power Station, Wairākei Binary Plant, Poihipi Road, Te Mihi, Ohaaki, Te Huka and Tauhara Power Stations (all located in the Taupō District).
- 2.3. In addition to this, the hydro schemes now owned by Contact in the Taupō District are Hinemaiaia, Wheao/Flaxy and Kurutau.

3. SUBMISSION

- 3.1. Contact supports the intensification of residential development within existing zones urban areas of the Taupō District, and areas that are currently zoned General Rural that contain established development patterns consistent with Low-Density Residential and General Residential as set out in PC44. Contact’s support is based on the ability for these areas to provide for residential activities in appropriate locations.
- 3.2. However, a key aspect of Contact’s submission seeks to ensure the intensification and development in these areas are not within or in close proximity to permitted, lawfully existing and/or consented renewable electricity generation activities. There are more than 20 power stations in the Taupō District making renewable electricity generation one of the most significant activities in the Taupō District. The ongoing operation of existing renewable electricity generation activities and the development of additional renewable electricity generation capacity is one of the most important resource management issues facing the country in order to address climate change by decarbonising the economy.
- 3.3. If rezoning set out in PC44 is only located in appropriate locations and the changes to the relevant rules as proposed are retained, that avoids the need for Contact (and others) to seek changes to the rules and performance standards to avoid reverse sensitivity effects.
- 3.4. If Contact’s relief sought in relation to the PC44 is not accepted, then Contact seeks alternative relief (including additional changes to the rules and performance standards relating to the Rural Lifestyle Environment) which will avoid the creation of reverse sensitivity effects.

4. RELIEF SOUGHT

- 4.1. Contact seeks the following relief:
- 4.2. Approve PC44 in relation to the residential zones of the Taupō District as proposed in PC44 where they are well away from existing and consented renewable electricity generation activities.

Dated: 2 June 2026

Contact Energy Limited by its duly authorised agent:

Mitchell Daysh Limited



Mark Chrisp

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 02/06/2026

First name: Scott

Last name: Devonport

Organisation: Simpli Consulting

Preferred method of contact Email

Postal address: Flat 2, 20 Tōtara Street, Taupō, New Zealand, 3330

Email: scott@simpliconsulting.co.nz

Daytime Phone: 0276059143

Would you like to present your submission in person at a hearing? *

Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Scott Devonport
Simpli Consulting Limited
2/20 Totara Street
Taupo 3330



June 2, 2026

Hilary Samuel
Taupō District Council
Private Bag 2005
Taupo Mail Centre
Taupō 3352

Re: Submission on Notified Plan Change 44 (Residential Environment) — Taupō District Plan

Submitter: Big Ball Holdings Limited

Site: 287, 351 and 387 Whakaroa Road, Kinloch, Taupō (Lot 1 DP 378264, Lot 2 DP 408156, Lot 4 DP 408156)

Relief Sought: Rezoning from General Rural Zone to Low Density Residential Zone

Dear Hilary,

Big Ball Holdings Limited (the Submitter) hereby lodges a formal submission on notified Plan Change 44 to the Taupō District Plan (Residential Environment) in accordance with clause 6 of Schedule 1 to the Resource Management Act 1991. This submission seeks the partial inclusion of 287, 351 and 387 Whakaroa Road, Kinloch (together comprising 344.216 ha) within the Low Density Residential Zone by way of amendment to the Plan Change 44 planning maps.

The subject site is located on the Whakaroa Peninsula on the western shores of Lake Taupō, near Kinloch. It is currently zoned General Rural Zone under the operative Taupō District Plan and is operated as a working sheep and beef farm. The Submitter proposes the comprehensive Te Tuhi High Country Estate development, which will concentrate up to 66 low density residential lots across three discrete residential pockets totalling approximately 44 hectares, while retaining the balance of the site (approximately 300 hectares) in active pastoral farming.

This clustered approach is demonstrably superior to the existing permitted baseline, which allows up to 66 dwellings (33 primary plus 33 minor) dispersed across the full 344 hectares through 10-hectare grid subdivision. By concentrating development in defined pockets, the proposal achieves lower adverse effects on the Whakaroa Peninsula Outstanding Landscape Area (OLA 65) and Lake Taupō Outstanding Natural Feature and Landscape (ONFL 9), retains productive agricultural land, achieves nitrogen neutrality within the Lake Taupō catchment, enables systematic natural hazard avoidance, and delivers infrastructure through efficient private shared systems with no public cost burden.

This submission is accompanied by the following technical documents, each prepared by qualified specialists:

- **Section 32 Evaluation Report** — *Simpli Consulting Limited, June 2026*
- **Infrastructure Summary Report (Appendix G)** — *Simpli Consulting Limited, May 2026*
- **Stormwater Management Plan (Appendix E)** — *BTW Company, Rev WD, April 2026*
- **Preliminary Geotechnical Report (Appendix F)** — *CORE50 Engineers, April 2026*
- **Transport Impact Assessment (Appendix H)** — *Urban Connection Limited, August 2023*
- **Landscape and Visual Effects Assessment (Appendix I)** — *LA4 Landscape Architects, May 2026*

The Section 32 Evaluation Report evaluates the proposed rezoning in accordance with section 32 of the RMA, having regard to the National Policy Statement on Urban Development 2020, the National Policy Statement for Natural Hazards 2025, the National Policy Statement for Freshwater Management 2020, the Waikato Regional Policy Statement, the operative Taupō District Plan, and the notified Plan Change 44 provisions. The Report concludes that the proposed rezoning satisfies all eight criteria established in section 8.2 of the Plan Change 44 Section 32 Evaluation Report, and that the Low Density Residential rezoning is the most appropriate, most efficient, and most protective planning outcome available for this site.

The Landscape and Visual Effects Assessment, prepared by Rob Pryor, NZILA Registered Landscape Architect of LA4 Landscape Architects, concludes that adverse effects on natural character, landscape character and visual amenity values of OLA 65 and the surrounding Taupō environment would be low (less than minor) from all nine assessed viewpoints. Building Design Guidelines and comprehensive indigenous mitigation and restoration planting will ensure future development integrates well into the rural landscape setting.

Relief Sought

The Submitter seeks the following relief from the Hearing Panel:

1. *Amendment of the notified Plan Change 44 planning maps to include parts of 287, 351 and 387 Whakaroa Road, Kinloch (Lot 1 DP 378264, Lot 2 DP 408156, and Lot 4 DP 408156) within the Low-Density Residential Zone.*
2. *Any consequential amendments to the notified Plan Change 44 provisions required to ensure the rezoned land is subject to the Low-Density Residential Zone provisions as proposed through Plan Change 44.*
3. *Such alternative, lesser or consequential relief as may be available and appropriate to recognise the site within the residential planning framework under consideration, if the Hearing Panel determines that any primary relief sought is beyond the scope of notified Plan Change 44.*

The Submitter wishes to be heard in support of this submission.

All correspondence relating to this submission should be directed to:

Simpli Consulting Limited
2/20 Totara Street
Taupō 3330,

acting as planning agents for the Submitter.

Yours faithfully,

Kind regards



Scott Devonport
Simpli Consulting Limited

SECTION 32 EVALUATION REPORT

Proposed Rezoning: Rural Environment to Low Density Residential Environment

Submission in Support of Plan Change 44

Document Title	Section 32 Evaluation Report
Plan Change	Plan Change 44 – Taupō District Plan (Residential Environment)
Requesting Party	Big Ball Holdings Limited
Property Address	287, 351 & 387 Whakaroa Road, Kinloch
Legal Description	Lot 1 DP 378264, Lot 2 DP 408156 and Lot 4 DP 408156
Current Zoning	Rural Environment
Proposed Zoning	Low Density Residential Environment
Prepared By	Prepared for Big Ball Holdings Limited
Date	June 2026
Version	1.0 – For Submission

Prepared in accordance with section 32 of the Resource Management Act 1991

Table of Contents

1. Introduction and Purpose	
1.1 Purpose of this Report	
1.2 Scope of Relief Sought	
1.3 Background	
1.4 Description of the Subject Site	
1.5 Permitted Baseline and Planning Rationale	
2. Statutory Framework	
2.1 Section 32 Requirements	
2.2 Purpose of the RMA	
2.3 Relevant National Policy Statements	
National Policy Statement on Urban Development 2020 (NPS-UD)	
National Policy Statement for Natural Hazards 2025 (NPS-NH)	
National Policy Statement for Freshwater Management 2020 (NPS-FM)	
New Zealand Coastal Policy Statement 2010 (NZCPS)	
National Policy Statements — Summary Assessment	
2.4 Waikato Regional Policy Statement	
Integrated Management	
Urban Form and Development	
Freshwater Quality and Lake Taupō	
Water Supply	
Transportation and Private Roads	
Natural Hazards	
Natural Character and Outstanding Landscapes	
Indigenous Biodiversity	
Cultural Values and Tangata Whenua	
Summary Assessment	
2.5 National Environmental Standards	
Overview of Operative NES Instruments	
2.5.1 NES for Air Quality 2004 (NES-AQ)	
2.5.2 NES for Sources of Human Drinking Water 2007 (NES-DW)	
2.5.3 NES for Electricity Transmission Activities 2009 (NES-ETA)	
2.5.4 NES for Assessing and Managing Contaminants in Soil 2011 (NES-CS)	
2.5.5 NES for Telecommunications Facilities 2016 (NES-TF)	
2.5.6 NES for Freshwater 2020 (NES-F)	
2.5.7 NES for Marine Aquaculture 2020 (NES-MA)	
2.5.8 NES for Storing Tyres Outdoors 2021 (NES-ST)	
2.5.9 NES for Commercial Forestry 2023 (NES-CF)	
2.5.10 NES for Greenhouse Gas Emissions from Industrial Process Heat 2023 (NES-IPGH)	
2.5.11 NES for Detached Minor Residential Units 2025 (NES-DMRU)	
2.5.12 Summary	
2.6 Taupō District Plan – Relevant Provisions	
2.6.1 Assessment Against Taupō District Plan Provisions	
2.7 Assessment Against Plan Change 44 Section 8.2 Criteria	
Summary Assessment Table	
2.7.1 Criterion 1 — Proximity to Existing LDR or GRZ / Consistent Development Pattern	
2.7.2 Criterion 2 — Efficient Servicing by Council-Supplied Water Infrastructure	
2.7.3 Criterion 3 — No More Than Minor Adverse Effects on the Land Transport Network	

2.7.4	Criterion 4 — Not an Outstanding Natural Landscape or Significant Natural Area
2.7.5	Criterion 5 — Proximate to the Taupō Township and/or Existing LDR
2.7.6	Criteria 6 and 7 — State Highway Access and Geothermal Systems
2.7.7	Criterion 8 — Freedom from Significant Natural Hazard Risk
2.7.8	The Purpose and Structure of the Section 8.2 Criteria Framework
2.7.9	Comparative Advantage Over the Permitted Baseline
	Conclusion on Section 8.2 Assessment.....
3.	Objectives of the Proposed Plan Change
3.1	Proposed Objectives
3.2	Assessment of Objectives.....
4.	Principal Alternatives Considered.....
4.1	Overview
4.2	Alternative 1: Status Quo (Retain Rural Environment Zoning)
4.3	Alternative 2: Medium or High Density Residential Rezoning
4.4	Alternative 3: Proposed Low Density Residential Rezoning (Preferred)
5.	Assessment of Benefits and Costs
5.1	Overview
5.2	Environmental Effects
5.2.1	Benefits.....
5.2.2	Costs and Mitigation.....
5.2.3	Landscape and Visual Effects
	Overview
	Natural Character Effects.....
	Landscape Character Effects.....
	Visual Amenity Effects
	Cumulative Effects
	Mitigation Measures
	LVA Conclusion.....
5.3	Economic Effects
5.3.1	Benefits.....
5.3.2	Costs and Mitigation.....
5.4	Social Effects
5.4.1	Benefits.....
5.4.2	Costs and Mitigation.....
5.5	Cultural Effects.....
5.5.1	Māori Cultural Values
5.5.2	Heritage
6.	Risk Assessment.....
6.1	Risk of Acting
6.2	Risk of Not Acting
6.3	Uncertainty
7.	Evaluation of Proposed Methods
7.1	Proposed Methods.....
7.2	Evaluation Summary.....
8.	Conclusion.....
9.	Decision Sought
	Appendices

1. Introduction and Purpose

1.1 Purpose of this Report

This report has been prepared in accordance with section 32 of the Resource Management Act 1991 (RMA) in support of a submission on notified Plan Change 44 to the Taupō District Plan. The submission seeks the inclusion of 287, 351 and 387 Whakaroa Road, Kinloch (together 344.216 ha) within the Low Density Residential Zone by way of amendment to the Plan Change 44 planning maps. This report evaluates the appropriateness of that relief under section 32 of the RMA, having regard to the relevant national policy statements, the Waikato Regional Policy Statement, the operative Taupō District Plan, and the notified Plan Change 44 provisions.

This report is submitted in support of Plan Change 44 to the Taupō District Plan, which is currently notified by Taupō District Council. It is intended to accompany a formal submission seeking that the subject site be included within the Low Density Residential Environment through the Plan Change 44 process.

1.2 Scope of Relief Sought

This report accompanies a submission on notified Plan Change 44 and seeks additional site-specific relief beyond the provisions as notified. In particular, the submission seeks amendment to the Planning Maps to rezone the subject site from the Rural Environment to the Low Density Residential Environment, together with any consequential amendments necessary to give effect to that rezoning through the Plan Change 44 process.

The relief sought is framed as a response to notified Plan Change 44, which addresses the Residential Environment chapter and associated planning maps. This report therefore assesses both the notified residential planning framework and the appropriateness of extending that framework to the subject site. The submitter's position is that the requested rezoning is an appropriate refinement to the notified plan change because it would apply the Low Density Residential Environment to land that is capable of accommodating low density residential development in a planned and integrated way, while achieving a superior outcome to the existing permitted baseline.

For the avoidance of doubt, the primary relief sought is: (a) amendment of the Taupō District Plan planning maps to include 287, 351 and 387 Whakaroa Road, Kinloch within the Low Density Residential Environment; and (b) any consequential amendments to notified Plan Change 44 provisions required to ensure the rezoned land is subject to the Low Density Residential Environment provisions as proposed through Plan Change 44. If the Hearing Panel determines that any part of that relief is beyond the scope of notified Plan Change 44, the submitter seeks such alternative, lesser or consequential relief as may be available and appropriate to recognise the site within the residential planning framework under consideration.

This section is intended to clarify that the present report is not limited to an evaluation of the notified provisions in the abstract. Rather, it evaluates the specific submission relief sought in response to notified Plan Change 44, including the planning rationale for why that relief is considered appropriate, efficient and effective under section 32 of the RMA.

1.3 Background

Taupō District Council is currently undertaking a second bundle of plan changes (Plan Changes 44–47) to its District Plan, covering the Residential, Open Space and Neighbourhood Centre chapters. Plan Change 44 addresses the Residential Environment and is intended to ensure the District Plan provides adequate direction for residential development, including

planning for the district's projected population growth of approximately 25,500 additional people by 2060.

The subject site is currently zoned General Rural Zone (GRUZ) under the operative Taupō District Plan, as amended by Plan Change 42. The GRUZ applies to almost all land outside urban areas in the district. As identified in Council's own Future Development Strategy (2025), there is currently insufficient spatial provision for low density or lifestyle residential development, with growth decisions being made on a consent-by-consent basis rather than through sound spatial planning. The proposed rezoning to Low Density Residential Zone (LDRZ), as proposed through Plan Change 44, addresses this gap in a planned, coordinated manner consistent with the Future Development Strategy.

1.4 Description of the Subject Site

Site Address	387 Whakaroa Road (121.154 ha), 351 Whakaroa Road (120.611 ha) and 287 Whakaroa Road (102.451 ha), Kinloch, Taupō (together: 344.216 ha across three parcels comprising the subject site)
Legal Description	Lot 4 DP 408156, Lot 2 DP 408156 and Lot 1 DP 378264
Site Area	344.216 hectares (more or less)
Current Zoning	Rural Environment – Taupō District Plan
Current Use	The site is currently used for pastoral (sheep and beef) farming and has been operated as part of a larger farming enterprise. The balance land is proposed to remain in active pastoral farming as a working farm, integrated with the residential development to create a rural lifestyle community within a productive agricultural setting.
Surrounding Uses	The site is surrounded by a rural and conservation landscape. Whakaipo Bay Reserve and other conservation land adjoin portions of the site boundary, the Kinloch settlement lies to the north-east and east beyond the wider Whakaroa / Mapara Road environment, and the surrounding land is otherwise predominantly rural in character.
Infrastructure	A Stormwater Management Plan (SMP) has been prepared for the site by BTW Company (Rev WD, April 2026) and is attached as Appendix E. The SMP confirms stormwater can be managed on-site through soakage given the highly permeable pumice soils, with green infrastructure (swales and filter strips) proposed for road drainage. The site is assessed as low flood hazard risk under the NPS-NH 2025. Internal site access will be via a private road network of approximately 5 km, commencing from the western end of Whakaroa Road (the public road end) and gated for private access. The road will remain private in its entirety and be managed under a legal instrument addressing ongoing maintenance and funding on behalf of residents. The main spine road follows

	existing formed farm tracks where possible to minimise earthworks, with a secondary road serving the low density sites in Area A below the transmission tower line. A section through a heavily planted area with steeper, narrow ground will require detailed design and cut and fill. An Infrastructure Summary Report by Simpli Consulting Limited (May 2026) confirming roading, wastewater, water supply, and other infrastructure feasibility is attached as Appendix E.
Notable Features	Active fault lines (Ngangiho and Ngangautu Faults) cross the site – further investigation by GNS Science is proposed to confirm fault trace locations and inform building platform design. ONFL65 (Outstanding Natural Feature and Landscape) overlay applies to the site. The site overlooks Lake Taupō, identified as ONFL20. Significant Natural Areas SNA277 and SNA309 adjoin the site but do not overlap the subject parcels. Some archaeological sites are identified on the NZAA database; proposed residential development has been located to avoid these areas. No flood hazard is mapped for the site on TDC GIS. The site is surrounded by Whakaipo Bay Reserve (DOC scenic reserve) and conservation land on portions of its boundary.

The subject site comprises three contiguous rural parcels: 387 Whakaroa Road (121.154 ha, Lot 4 DP 408156), 351 Whakaroa Road (120.611 ha, Lot 2 DP 408156) and 287 Whakaroa Road (102.451 ha, Lot 1 DP 378264), together totalling approximately 344.2 ha. The three parcels are treated as a single subject site for the purposes of this plan change. The site is located on a ridgeline on the northern shores of Lake Taupō, approximately 11 km west of Taupō township, near the settlement of Kinloch. It is accessed from the end of Whakaroa Road, which connects to Mapara Road approximately 2.9 km to the east and then via Poihipi Road to Taupō.

The site is generally undulating with steeper terrain towards the eastern portions. It is currently used for pastoral (sheep and beef) farming and is operated as part of a larger farm enterprise. The site is largely covered in pasture grasses, with areas of existing native and exotic vegetation, planted gullies and riparian areas, and some steeper bush-clad terrain. A Crown-owned scenic reserve (Whakaipo Bay Reserve) adjoins part of the site boundary and conservation land is present to the south. Whakaipo Bay lies to the south.

Planning Overlays and Constraints

The site is subject to an Outstanding Natural Features and Landscapes (ONFL65) overlay under the operative Taupō District Plan. The site occupies elevated land overlooking Lake Taupō, which itself is identified as ONFL20. These overlays recognise the exceptional landscape values of the site and its broader setting, including long-range views to the lake and surrounding volcanic plateau. The ONFL overlay requires that any subdivision, use and development avoids, remedies or mitigates adverse effects on the outstanding natural features and landscape values that give rise to the designation. The proposed development approach – using clustered low density pockets within a continuing pastoral farm, with building platforms positioned to minimise visual dominance and a low overall impervious footprint – is considered consistent with this objective. The contrast with the alternative permitted baseline (discussed in Section 1.4) is relevant: 10 ha grid subdivision would scatter dwellings across the full extent of the ONFL65 landscape, whereas the proposed approach concentrates built form in defined pockets and retains the majority of the landscape in its pastoral and natural character.

Significant Natural Areas SNA277 and SNA309 are located adjacent to the site but do not overlap the subject parcels. While the site is surrounded by (rather than affected by) these SNAs, the proximity reinforces the importance of maintaining the rural and natural character of the site's landscape setting. Development has been designed to maintain appropriate buffers from the site boundaries adjoining these areas.

Two active fault lines (the Ngangiho Fault and the Ngangautu Fault) traverse the site, as identified in the CORE50 Preliminary Geotechnical Report (Appendix F). These faults are proposed to be investigated further by GNS Science to refine the fault trace locations and Fault Avoidance Zones (FAZs), with the objective of confirming appropriate building platform setbacks. Proposed residential areas have been positioned to avoid known fault traces where possible, and further fault trace investigation is proposed prior to, or as a condition of, any subdivision consent. Building platforms for lots affected by FAZs will be confirmed at engineering approval stage consistent with the TDC Policy for Managing Development in Fault Avoidance Zones.

Plan Change 44 Section 32 Evaluation Report at section 8.2 establishes eight criteria against which a submission seeking inclusion of land in the Low Density Residential Zone will be assessed. Those criteria address:

- *proximity to existing LDR or GRZ zoning (or consistent development pattern);*
- *efficient servicing from Council-supplied water infrastructure;*
- *no more than minor adverse transport effects;*
- *not being an Outstanding Natural Landscape or Significant Natural Area;*
- *proximity to the Taupō township or existing LDR;*
- *no State Highway access;*
- *not within the Wairakei-Tauhara or Ohaaki Geothermal Systems;*
- *and freedom from significant natural hazard risk.*

The assessment in this report addresses each criterion in detail at Section 2.7. Section 2.6 provides the broader Taupō District Plan provisions assessment, and Section 2.7 provides the dedicated, structured assessment of each PC44 section 8.2 criterion in turn.

Two criteria require specific evidential support: the presence of the OLA 65 overlay and the presence of active faults. These are addressed directly by the Landscape and Visual Effects Assessment (LA4, May 2026, Appendix I) and the Preliminary Geotechnical Report (CORE50 Engineers, April 2026, Appendix F) respectively. Both assessments support the conclusion that the proposed plan change meets the criteria — not despite the overlays but because the proposed clustered pocket approach has been specifically designed to minimise effects on the OLA 65 landscape values and manage natural hazard risk at a site-wide, coordinated level. The proposed approach of concentrating approximately 44 ha of residential development across three defined pockets within a continuing 300 ha pastoral farming enterprise produces planning outcomes that are measurably superior to the permitted baseline of 33 dispersed 10 ha lots across the full extent of the OLA 65 landscape — on landscape metrics, productive land retention, natural hazard management, infrastructure coordination, and nitrogen management alike.

Archaeological sites recorded on the NZAA database are present in parts of the site. The proposed development has been located to avoid these areas. This is a direct benefit of the clustered pocket development approach over the alternative of uniform 10 ha grid subdivision: by concentrating development in defined areas of the site, the plan change enables proactive avoidance of archaeological sites rather than the dispersed, consent-by-consent approach that would result from subdivision under the current permitted baseline. Further archaeological assessment will be undertaken as part of any resource consent application, in accordance with the Heritage New Zealand Pouhere Taonga Act 2014.

1.5 Permitted Baseline and Planning Rationale

The Permitted Baseline: 10 ha Grid Subdivision

Under the operative Taupō District Plan (as amended by Plan Change 42), the subject site is zoned General Rural Zone (GRUZ). The GRUZ permits subdivision to a minimum lot size of 10 ha, with one primary dwelling per lot and one minor dwelling per primary dwelling. On the combined 344.2 ha site, the current permitted baseline would allow: up to 33 lots of approximately 10 ha each, each with a primary and minor dwelling – a total of up to 66 dwellings – scattered across the full extent of the three parcels. It is noted that a resource consent application for the 10 ha, 33-lot subdivision has been lodged with Taupō District Council (ref. RM260015) and is expected to be issued shortly, meaning the permitted baseline is no longer merely theoretical but a near-consented reality.

The permitted baseline would produce a fundamentally different pattern of development to the proposed plan change. Under the permitted baseline, the site would be fragmented into 33 separate 10 ha rural lots, each with its own dwelling and associated domestic infrastructure (driveway, water tank, effluent disposal field). This would: fragment the landscape across the full extent of the ONFL65 overlay; scatter built form and impervious surfaces throughout an outstanding landscape rather than concentrating it; prevent the site from operating as a single productive farm unit; increase the cumulative footprint of earthworks, driveways, and buildings across the whole landscape; and make proactive avoidance of fault lines, SNAs, and archaeological sites more difficult on a lot-by-lot basis.

The Proposed Approach: Clustered Pockets within a Working Farm

The proposed plan change seeks to achieve the same notional dwelling yield (up to 66 dwellings across 66 standalone low density residential lots) through a fundamentally superior planning approach: concentrating those lots in three defined, well-designed pockets of Low Density Residential zoning totalling approximately 44 ha, while retaining the balance of the 344 ha site as a single working pastoral farm.

Each pocket delivers a coherent residential neighbourhood with shared private infrastructure where required, coordinated landscape mitigation, and systematic natural hazard avoidance — outcomes that 33 dispersed 10 ha lots under the permitted baseline could never achieve.

This approach offers the following advantages over the permitted baseline:

- **Landscape protection:** Concentrating built form in defined pockets rather than scattering dwellings across 33 separate 10 ha lots reduces the overall visual and physical impact on the ONFL65 landscape. The majority of the site – including ridgelines, gullies, and areas visible from Lake Taupō (ONFL20) – remains in its pastoral character rather than being subdivided and developed. This better gives effect to the GRUZ and ONFL objectives to protect outstanding natural landscape values from inappropriate subdivision and development.
- **Retention of productive land:** Under the permitted baseline, 33 separate lots would each cease to function as part of a unified farming enterprise. The proposed approach retains the balance land as a single working farm, consistent with the GRUZ objectives to maintain productive rural land use and avoid the fragmentation of rural land. The GRUZ recognises that pastoral farming and residential activity can coexist in the rural environment; the proposed plan change formalises this relationship by enabling low density residential development in defined pockets while protecting the ongoing operation of the farm.
- **Avoidance of archaeological and natural hazard constraints:** A plan change with defined residential pockets allows building platforms to be deliberately positioned away from identified fault avoidance zones (or addressed through specific Geotech and Expert analysis by GNS), NZAA archaeological sites, and areas with slope stability constraints. The permitted baseline (10 ha grid subdivision assessed on a lot-by-lot consent basis) provides no such systematic avoidance mechanism. The proposed

approach enables a coordinated, site-wide response to these constraints, with further GNS fault investigation and archaeological assessment informing the final layout before any subdivision occurs.

- **Protection of adjacent SNAs:** By focusing development in defined pockets away from the site boundaries adjoining SNA277 and SNA309, the plan change can more effectively maintain appropriate buffers than a dispersed 10 ha grid that could result in dwellings and their associated earthworks and domestic activities adjacent to these sensitive ecological areas.
- **Nitrogen management:** As discussed in Section 5, the plan change enables a nitrogen-neutral outcome through coordinated pastoral retirement and advanced wastewater treatment. The permitted baseline – 33 separate lots each with individual on-site wastewater disposal and individual farming practices – does not offer the same economies of scale or quality of discharge control.
- **Infrastructure efficiency:** A single private road serving defined residential pockets, managed under a legal instrument, is more efficient and generates lower infrastructure costs than 33 separate driveway connections across the site. The communal water supply and wastewater treatment system where required is more sustainable and easier to maintain than 33 individual systems.

Consistency with GRUZ Objectives and Policies

The GRUZ objectives and policies (as amended by Plan Change 42) seek to: maintain the productive capacity of rural land; protect outstanding natural landscapes from inappropriate subdivision; enable rural activities including primary production; and avoid inappropriate fragmentation of the rural environment. The proposed plan change is more consistent with these objectives than the permitted baseline, precisely because it does not fragment the land. It enables a pattern of development that can coexist with ongoing pastoral farming, protects the ONFL65 landscape values, and avoids the piecemeal approach to constraints management that characterises consent-by-consent 10 ha subdivision.

Critically, the proposed plan change does not increase the notional development yield beyond what is already permitted. The maximum 66 dwellings across 66 standalone lots is numerically identical to the permitted baseline outcome (33 primary dwellings plus 33 minor dwellings on 10 ha lots). What the plan change changes is how that development is arranged — concentrated in three defined pockets across approximately 44 ha rather than dispersed in 33 lots across the full 344 ha of the OLA 65 landscape. That rearrangement is superior from every planning, environmental, and landscape perspective. This analysis underpins the conclusion at Section 4 that the proposed Low Density Residential rezoning is the preferred option.

2. Statutory Framework

2.1 Section 32 Requirements

Section 32 of the RMA requires that before a plan change is notified (or in this case, before a submission supporting a plan change is made), an evaluation must be carried out examining:

- Whether the objectives of the proposed change are the most appropriate way to achieve the purpose of the RMA;
- Whether the policies, rules, or other methods in the proposed change are the most appropriate way to achieve the objectives; and
- The efficiency and effectiveness of the proposed change in achieving the objectives.

Section 32(1) requires the evaluation to:

- Identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal;
- Assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the policies, rules, or other methods;
- Examine whether the principal alternative ways of achieving the objectives of the proposed change have been identified and considered; and
- State whether the proposed change is the most appropriate way to achieve the objectives.

2.2 Purpose of the RMA

The purpose of the RMA (section 5) is to promote the sustainable management of natural and physical resources. Sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while:

- Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations;
- Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
- Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

The proposed rezoning is consistent with the purpose of the RMA. It enables people and communities to provide for their social wellbeing through the provision of residential land in an appropriate location, while avoiding, remedying, or mitigating adverse environmental effects through the application of appropriate rules and standards within the Low Density Residential Environment.

2.3 Relevant National Policy Statements

National Policy Statement on Urban Development 2020 (NPS-UD)

The National Policy Statement on Urban Development 2020 (NPS-UD), as amended by the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021, is a relevant national direction instrument that must be given effect to in district plan decisions. While the NPS-UD is primarily directed at urban development within defined urban environments, its objectives and policies are relevant to this plan change for the following reasons.

Overview of the NPS-UD

The NPS-UD seeks to ensure New Zealand has well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future (Objective 1). A well-functioning urban environment is defined in Policy 1 as one that, at minimum: enables people to live close to where they want to live; has a variety of housing types and intensities; has good accessibility between housing, jobs, community services and open spaces; supports competitive land and development markets; supports reductions in greenhouse gas emissions; and is resilient to the likely current and future effects of climate change.

The NPS-UD requires local authorities to: provide sufficient plan-enabled, infrastructure-ready and commercially feasible development capacity to meet projected housing demand (Policy 2); be responsive to plan changes that add significantly to development capacity and contribute to well-functioning urban environments; and consider the principles of Te Tiriti o Waitangi in planning decisions relating to urban environments (Objective 6).

Taupō is a Tier 3 territorial authority under the NPS-UD. Tier 3 authorities must give effect to the NPS-UD objectives and policies in their district plans and resource management decisions, including by being responsive to private plan changes that add to development capacity.

Relevance to this Plan Change

The Taupō district's population is growing. The Council's own Future Development Strategy (2025) projects population growth requiring approximately 12,300 additional homes by 2060. As identified in that Strategy and confirmed through the Plan Change 42 process, the district has an identified need for additional low density residential capacity in rural fringe and lake-side locations, particularly for households seeking rural lifestyle living. The subject site, at 344 ha on the northern shores of Lake Taupō near Kinloch, offers a high-amenity rural setting approximately 11 km west of the Taupō township that is particularly suited to meeting this demand.

The proposed plan change adds to the development capacity of the Taupō district for low density residential development by enabling up to 66 standalone low density residential lots, serviced by mostly private infrastructure and managed under a legal maintenance instrument. It does so without requiring Council to fund or maintain new public infrastructure.

While the subject site is not located within the Taupō urban area as defined in the NPS-UD, the policy direction to be responsive to capacity-adding plan changes and to provide for diverse housing types is relevant. The NPS-UD requires planning decisions to avoid blunt restrictions that prevent development without good reason. Maintaining a purely Rural Environment zoning over land that can be appropriately developed for low density residential activity at the same dwelling yield as the permitted baseline, but in a more coherent and environmentally superior manner, would not be consistent with this direction.

The proposed plan change also supports the NPS-UD's objective to support competitive land and development markets. By enabling a defined and consented low density residential zone, the plan change provides greater certainty for the landowner and future residents than the alternative of 33 separate resource consent applications under the 10 ha subdivision baseline. Certainty and responsiveness in plan-making are themselves objectives of the NPS-UD framework.

The plan change contributes to a well-functioning urban/rural environment in Taupō by: providing additional housing capacity in a high-amenity location suited to rural residential demand; avoiding the inefficient scatter of dwellings across the outstanding landscape that the permitted baseline would produce; and enabling a coordinated approach to infrastructure, natural hazards, and environmental constraints that the consent-by-consent alternative cannot achieve.

Conclusion on NPS-UD

The proposed plan change is consistent with the NPS-UD's direction to be responsive to capacity-adding plan changes, to provide for diverse housing types, and to enable development that contributes to well-functioning environments. It does not conflict with any NPS-UD objective or policy. The plan change gives effect to the spirit of the NPS-UD by increasing the certainty and quality of residential development capacity in a location suited to low density rural residential use.

National Policy Statement for Natural Hazards 2025 (NPS-NH)

The National Policy Statement for Natural Hazards 2025 (NPS-NH) came into force on 15 January 2026 and is directly relevant to this plan change. The NPS-NH establishes for the first time a consistent national framework requiring local authorities to take a proportionate, risk-based approach to managing natural hazard risk associated with subdivision, use and development. It must be given effect to in district plan changes and resource consent decisions.

Scope and Key Provisions

The NPS-NH applies to seven natural hazards: flooding, landslips, coastal erosion, coastal inundation, active faults, liquefaction, and tsunamis. It does not apply to primary production or infrastructure, but applies to all residential subdivision, use and development.

The NPS-NH establishes a risk assessment framework based on two factors: (i) the likelihood of a natural hazard event occurring, and (ii) the consequence of that event for life and property. These factors are combined using the standardised risk matrix in Appendix 1 to the NPS-NH to produce an overall risk level: low, medium, high or very high. Key policy requirements are:

- **Policy 1 (Objective):** Local authorities must apply a risk-based approach to managing natural hazard risks associated with subdivision, use and development, and respond proportionately to the level of natural hazard risk.
- **Policy 2:** Risk assessments must use the likelihood and consequence framework and the standardised risk matrix. Mitigation measures may be considered in assessing risk.
- **Policy 3:** Where subdivision, use or development is assessed as presenting very high natural hazard risk, that risk must be avoided.
- **Policy 4:** Where subdivision, use or development will create or increase significant natural hazard risk on other sites, that risk must be avoided or mitigated proportionately.
- **Policy 5:** Risk assessment must be based on the best available information and decisions must be made even where information is uncertain or incomplete.
- **Policy 6:** The potential impacts of climate change to at least 100 years into the future must be considered when managing natural hazard risk.

Assessment Against the NPS-NH

The subject site is affected by the following natural hazards covered by the NPS-NH: active faults (Ngangiho and Ngangautu Faults), potential liquefaction, and flooding. Each is assessed below.

Active faults: Two active fault lines traverse the subject site. The Preliminary Geotechnical Report by CORE50 Engineers (Appendix F) has identified these faults and their approximate traces. Fault Avoidance Zones (FAZs) have been applied, consistent with TDC policy and New Zealand Standard guidelines. Further investigation by GNS Science is proposed to refine the fault trace locations and confirm FAZ extents.

Applying the NPS-NH risk matrix, the consequence category for active fault rupture beneath a habitable building would be catastrophic (potential for loss of life, destruction of structure).

However, under current mapping the likelihood of active fault rupture at any given building platform location within the FAZ is assessed as rare to very rare for any given return period relevant to the building's lifetime. For lots where building platforms are located outside confirmed FAZs, the probability of fault rupture directly affecting the building platform is very low, placing the risk in the low band of the NPS-NH risk matrix.

The proposed plan change addresses this hazard through deliberate avoidance: building platforms will be positioned to avoid known fault traces, and further GNS investigation is proposed to confirm FAZ extents before any subdivision consent is granted. This approach is consistent with Policy 3 (avoiding very high risk) and Policy 5 (using best available information, and acting even where information is incomplete by committing to further GNS investigation). The proposed plan change approach — site-wide coordinated building platform design responding to fault constraints — is superior to the permitted baseline of 10 ha grid subdivision, under which individual lots would each require separate fault assessment at building consent stage without the same systematic coordination.

Liquefaction: The CORE50 geotechnical investigation (CPTu testing at four locations) confirms the site is classified as TC1 Like for liquefaction purposes. Quantitative assessment using the Boulanger and Idriss (2014) method at ULS (Mw 6.1, 0.39g) returned Liquefaction Potential Index (LPI) = 0 and Liquefaction Severity Number (LSN) = 0 across all test locations, indicating negligible liquefaction risk with 100% low probability. Applying the NPS-NH risk matrix, the liquefaction risk for the proposed development is low. This is consistent with the assessment in Section 3 of this report.

Flooding: No flood hazard is identified for the subject site on TDC GIS maps. The BTW Stormwater Management Plan (Appendix E) assesses the site against the NPS-NH flood hazard risk matrix and concludes the site presents low flood hazard risk. The site's ridgeline topography concentrates any flooding in defined channels, all proposed building platforms have multiple flood-free locations, and the 1% AEP event assessment confirms no flooding of habitable floor areas is expected. Finished floor levels will be set in accordance with NZBC Clause E1 and the TDC Code of Practice (building platforms flood-free in a 1% AEP event and/or elevated at least 500 mm above the 1% AEP flood level). Climate change effects have been assessed using NIWA national flood hazard modelling and HIRDS V4 RCP 6.0 (2081–2100) rainfall intensities, consistent with Policy 6's requirement to consider climate change to at least 100 years into the future.

Cross-site hazard effects (Policy 4): The SMP confirms that the development will not create or increase significant flood risk on other sites. Stormwater management maintains pre-development discharge rates and locations, with peak flow controls applied for sensitive downstream catchments. The private road drainage network includes culverts, energy dissipation, and scour protection at all outlets.

Summary Risk Table

The following table assesses each natural hazard affecting the subject site at 287, 351 and 387 Whakaroa Road, Kinloch, Taupō against the risk framework established by the National Policy Statement for Natural Hazards 2025 (NPS-NH), which came into force on 15 January 2026. Risk levels are determined by combining the likelihood of a hazard event with the consequence for life and property, using the standardised risk matrix in Appendix 1 of the NPS-NH.

Natural Hazard	Likelihood	Consequence	NPS-NH Risk Level	NPS-NH Policy	Approach / Action
Active Fault — building platform within	Rare to Very Rare (>500–	Catastrophic (potential loss of	High–Very High	Policies 3 & 5	Building platforms to be relocated outside confirmed FAZs. Further GNS Science

Natural Hazard	Likelihood	Consequence	NPS-NH Risk Level	NPS-NH Policy	Approach / Action
confirmed Fault Avoidance Zone (FAZ)	5,000 yr recurrence)	life; structural destruction)			investigation to refine Ngangiho and Ngangautu Fault traces and FAZ extents required as condition of subdivision consent. Very high risk avoided through systematic platform avoidance.
Active Fault — building platform outside confirmed FAZ	Very Rare (>5,000 yr recurrence for direct rupture)	Catastrophic	Low	Policy 2	Permitted. Building platforms confirmed outside FAZ at engineering approval stage. GNS investigation to provide greater certainty on FAZ extents before any subdivision occurs.
Liquefaction	Very Rare (LPI = 0, LSN = 0 at all four CPT test locations; TC1 Like classification)	Negligible (no liquefaction-induced damage predicted)	Low	Policy 2	Permitted. Site classified TC1 Like per CORE50 geotechnical report. Quantitative assessment (Boulanger & Idriss 2014 method, Mw 6.1, ULS 0.39g) returns 100% low liquefaction probability across all test locations. No further liquefaction-specific mitigation required.
Flooding — riverine / overland	Unlikely to Very Rare (no mapped flood hazard on TDC GIS)	Negligible to Minor (ridgeline location; flooding confined to defined channels)	Low	Policies 2 & 6	Permitted. All proposed building platforms have multiple flood-free locations. Finished floor levels to comply with NZBC Clause E1 and TDC CoP (flood-free in 1% AEP event and/or 500 mm above 1% AEP flood level). Climate change assessed using NIWA national flood hazard modelling and HIRDS V4 RCP 6.0 (2081–2100) per Policy 6 (100-year horizon). Assessment in BTW SMP (Appendix E).
Landslip / Slope Instability	Possible on steeper terrain (slopes up to 70°; some evidence of existing movement near access tracks)	Minor to Moderate (localised; no large-scale failure mechanism identified)	Low–Medium	Policy 2	Building Setback Lines (BSLs) applied from slope crests: 5 m (minor slopes <15°), 10 m (moderate slopes 15–25°), 15 m (major slopes >25°). Building platforms sited on stable terrain outside BSLs. Main road cutting at CH 1700–2300 m to be subject to detailed geotechnical assessment and minimised fill as condition of engineering approval. Slope stability assessment per CORE50 report (Appendix F).
Tsunami	Very Rare (Lake Taupō is inland; no ocean tsunami risk;	Minor to Moderate (site elevated above lake level;	Low	Policy 2	Permitted. Site is located on elevated ridgeline well above Lake Taupō water level. No tsunami hazard mapping applies to the subject site.

Natural Hazard	Likelihood	Consequence	NPS-NH Risk Level	NPS-NH Policy	Approach / Action
	seiche event from volcanic activity is theoretically possible but extremely low probability)	limited exposure)			Standard civil defence emergency management protocols apply.
Cross-site hazard effects — stormwater and erosion	Possible during construction and post-development	Minor (localised erosion and sediment discharge risk to downstream ephemeral waterways)	Low	Policy 4	Stormwater management designed to maintain pre-development discharge rates and locations. Erosion and sediment control plans to be prepared per WRC guidance (TR 2009/02). Culvert outlets to include energy dissipation and scour protection. Pumice soil vulnerability managed through construction-phase erosion controls and re-vegetation. No significant increase in natural hazard risk on other sites anticipated.

Conclusion on NPS-NH

No natural hazard affecting the subject site presents a very high risk level under the NPS-NH risk matrix that would require avoidance of the entire development.

The primary active fault risk is managed through systematic avoidance — relocating building platforms outside confirmed FAZs and committing to further GNS investigation — which is consistent with Policy 3 and represents best practice under Policy 5. Liquefaction and flood risk are assessed as low. Slope stability setbacks are applied consistently.

The proposed plan change is consistent with the NPS-NH's requirement for a proportionate, risk-based approach. It is, again, superior to the permitted baseline of 10 ha grid subdivision in this regard: the plan change enables a coordinated, site-wide natural hazard response with systematic building platform avoidance of FAZs and geotechnical constraints, whereas the permitted baseline would produce piecemeal, lot-by-lot assessment at building consent stage without the same level of coordination or scrutiny.

National Policy Statement for Freshwater Management 2020 (NPS-FM)

The NPS-FM requires that development does not result in a deterioration of freshwater quality or flows. The subject site is within the Lake Taupō catchment and contains ephemeral waterways and gully systems that ultimately discharge toward the lake via surrounding rural and conservation land. Any earthworks, stormwater management, wastewater disposal and land use change associated with future residential development will therefore need to ensure freshwater values are protected, including through compliance with the Low Density Residential Environment provisions, the Waikato Regional Plan, and the site-specific stormwater and nitrogen management measures outlined in this report.

New Zealand Coastal Policy Statement 2010 (NZCPS)

The NZCPS applies to the coastal environment. The subject site is an inland rural property overlooking Lake Taupō and is not within the coastal environment as defined under the RMA. Accordingly, the NZCPS is not applicable to this proposal.

National Policy Statements — Summary Assessment

The following table summarises the relevance and consistency of each operative National Policy Statement (NPS) to the proposed plan change from Rural Environment to Low Density Residential Environment at 287, 351 and 387 Whakaroa Road, Kinloch, Taupō.

NPS Instrument	Relevant?	Consistent	Key Matters / Action Required
New Zealand Coastal Policy Statement 2010 (NZCPS)	No — subject site is not in the coastal environment as defined under the RMA. Lake Taupō is an inland lake and does not trigger NZCPS provisions	N/A	—
NPS for Freshwater Management 2020 (NPS-FM)	Yes — site is within the Lake Taupō catchment, a highly valued freshwater body; nitrogen discharge, stormwater, and land use change are all relevant	Yes	Development designed to be nitrogen neutral through targeted pastoral retirement offsetting and advanced residential wastewater discharge. Advanced wastewater treatment will reduce the nitrogen loading from the proposed residential dwellings. Gully/riparian retirement expected to produce further net reduction. Detailed nitrogen management plan to be prepared at resource consent stage. Stormwater managed per BTW SMP giving effect to Te Mana o te Wai. Lake Taupō classified Contact Recreation Zone under Waikato Regional Plan
NPS for Urban Development 2020 (NPS-UD) — as amended 2021	Yes — Taupō is a Tier 3 territorial authority; NPS-UD requires responsiveness to capacity-adding plan changes and provision of diverse housing types	Yes	Plan change adds low density residential capacity in a high-amenity rural setting consistent with identified district demand. Does not conflict with any NPS-UD objective or policy. Provides certainty for landowners and community compared to consent-by-consent 10 ha baseline. Assessed in detail at Section 2.3
NPS on Renewable Electricity Generation 2011 (NPS-REG)	No — no renewable electricity generation activities are proposed or affected by this plan change	N/A	—
NPS on Electricity Transmission 2008 (NPS-ET)	Yes — National Grid transmission line traverses the subject site	Yes	National Grid Yard and Subdivision Corridor setbacks to be maintained for all lots and elsewhere near the transmission line. Unison to be consulted on future subdivision consent applications.
NPS for Highly Productive Land 2022 (NPS-HPL)	Marginally — NPS-HPL protects Land Use Capability (LUC) Class 1–3 soils from inappropriate subdivision and development	Yes	Subject site soils are pumice-derived (Orthic Pumice), which are not classified as LUC Class 1–3 highly productive soils. The site is not highly productive land under the NPS-HPL definition. The proposed development does not conflict with the NPS-HPL. Balance land remains in active pastoral farming,

NPS Instrument	Relevant?	Consistent	Key Matters / Action Required
			further supporting retention of productive rural land use
NPS for Indigenous Biodiversity 2023 (NPS-IB)	Yes — SNAs (SNA277 and SNA309) adjoin but do not overlap the subject parcels; proposed development must avoid adverse effects on indigenous biodiversity values	Yes	Development concentrated in defined residential pockets away from SNA boundaries. Proposed gully and riparian planting will enhance indigenous biodiversity over time. No development proposed within SNAs. Biodiversity assessment to be undertaken at resource consent stage to confirm no significant adverse effects on SNA values. The clustered pocket approach is demonstrably superior to 10 ha grid subdivision for SNA protection
NPS for Greenhouse Gas Emissions from Industrial Process 2023 (NPS-GHG)	No — no industrial process emissions proposed; applies to industrial greenhouse gas emitters, not residential development	N/A	—
NPS for Natural Hazards 2025 (NPS-NH) — in force 15 January 2026	Yes — active faults (Ngangiho and Ngangautu), liquefaction, flooding, and landslip are all relevant to the subject site	Yes	Risk-based assessment confirms: active fault risk managed through building platform avoidance of FAZs and further GNS investigation; liquefaction risk low (TC1 Like, LPI=0, LSN=0 at all CPT locations); flood risk low (ridgeline location, no mapped hazard, NZBC E1 floor levels); slope stability addressed through Building Setback Lines. No very high risk (Policy 3) requiring avoidance of the development as a whole. Climate change assessed to 100 years per Policy 6. Assessed in detail at Section 2.4

2.4 Waikato Regional Policy Statement

The Waikato Regional Policy Statement (RPS) is a statutory document prepared under the RMA by the Waikato Regional Council. A district plan must give effect to the RPS, and must not be contrary to any Regional Plan for any matter specified in section 30(1) of the RMA. The subject site falls entirely within the Waikato Region, and the Waikato Regional Plan is a consolidated document containing both the RPS and the Regional Plan.

The following sections assess the proposed plan change against the relevant objectives and policies of the RPS, organised by topic. A summary assessment table is provided at the end of this section.

Integrated Management

The RPS Integrated Management (IM) chapter establishes overarching objectives and policies for the sustainable and integrated management of the Waikato Region's natural and physical resources. IM-O1 directs that natural and physical resources be managed in a way that recognises the interrelationships between environmental, social, economic and cultural wellbeing, and the interrelationship of natural resources with the built environment.

The proposed plan change is consistent with IM-O1. The proposed rezoning and development model has been designed to respond holistically to the physical characteristics of the site — including its location within the Lake Taupō catchment, its outstanding landscape values, the

proximity of Significant Natural Areas, the presence of active faults, and the absence of reticulated wastewater infrastructure. The integrated approach to infrastructure provision (communal or advanced wastewater treatment, shared water supply from the existing TDC rural main and onsite private bore, private road network managed under a legal maintenance instrument) reflects the kind of coordinated, resource-efficient response that IM-O1 requires.

IM-O8 directs that the use and development of natural and physical resources occur in a way that is sustainable and efficient, and that minimises waste. Directing residential development into defined, serviced pockets on a site that is already subject to pastoral land use — rather than dispersing development across the full landscape under the permitted 10 ha baseline — is a more efficient and sustainable use of the land resource. The use of advanced wastewater systems and communal systems where appropriate, is more resource-efficient than the alternative of 33 separate individual on-site systems and reduces the risk of cumulative discharges in the Lake Taupō catchment.

Urban Form and Development

The RPS Urban Form and Development (UFD) chapter contains key objectives and policies directing how growth and development should occur across the region, including in rural and peri-urban locations. UFD-O1 seeks development of the built environment to occur in an integrated, sustainable and planned manner that enables positive environmental, social, cultural and economic outcomes, while maintaining a strong urban/rural boundary and protecting the productive capacity of rural land.

UFD-P1 requires that subdivision, use and development of the built environment occur in a planned and co-ordinated manner having regard to the development principles in APP11 of the RPS. The APP11 principles most relevant to this proposal are:

- *Growth within existing urban areas in preference to new ones* — the proposed development delivers the same yield as the permitted baseline but in a more cohesive, planned manner, concentrating residential development in defined pockets rather than spreading across 33 separate rural lots. The balance of the 344 ha site remains in active pastoral farming;
- *Reinforcement of a strong urban/rural boundary* — the proposed rezoning is limited to approximately 44 ha of the 344 ha site, clearly delineated pockets within an otherwise continuing rural landscape. The plan change does not represent an extension of the Kinloch urban area but rather a rural residential outcome entirely consistent with the site's existing GRUZ context and permitted development potential;
- *Efficient and effective servicing* — the development is serviced by the existing TDC rural supply main (confirmed at 66,800 L/day), advanced wastewater treatment system, on-site stormwater management via pumice soakage, and a private road network managed under a legal maintenance instrument. No new public infrastructure is required and no cost is imposed on Taupō District Council; and
- *Relationship of tangata whenua with their land* — the proposed development has been positioned to avoid identified archaeological sites which is a significant improvement over a scattering of 33 10ha lots across the site.

UFD-P2 requires that the nature, timing and sequencing of new development be co-ordinated with the development, funding, implementation and operation of infrastructure, and that new development does not occur until appropriate infrastructure is in place.

The Infrastructure Report confirms that all necessary infrastructure — water supply, wastewater treatment, and road access — is feasible and can be in place prior to any residential development occurring. Because all infrastructure is privately funded, constructed and maintained, there is no dependency on public capital expenditure or sequencing constraints arising from Council infrastructure programmes.

Freshwater Quality and Lake Taupō

The Waikato Regional Plan contains specific provisions for the management of the Lake Taupō catchment, recognising the national and regional significance of Lake Taupō as a Contact Recreation Zone and the exceptional sensitivity of its water quality. The central obligation for land use and development within the catchment is that there be no net increase in nitrogen discharge to the lake.

The proposed plan change has been designed to achieve nitrogen neutrality in accordance with these catchment obligations. The residential nitrogen contribution — estimated at approximately 3.5 kgN/yr per dwelling through the advanced wastewater treatment system will be further offset by the retirement of some of the pastoral land within the farm. The site's current total nitrogen discharge allowance (TAND) from pastoral use is 4,337 kgN/yr. Pastoral retirement on a targeted area of the farm will offset the residential nitrogen contribution, achieving a net-neutral outcome as a minimum. In addition, the retirement and replanting of steeper gullies and riparian areas adjacent to the residential development is expected to produce a further reduction in nitrogen discharge, though the specific quantum will be confirmed through Overseer modelling at resource consent stage.

Wastewater generated by residential activities will be treated by way of individual advanced wastewater systems as well as shared communal systems for some of the proposed lots, well within WRC secondary treatment standards. These systems are more effective in terms of nitrogen management than the alternative of 33 separate individual on-site wastewater tanks that don't required nitrogen reducing systems under the permitted baseline, where treatment quality and effluent field locations could not be co-ordinated at a catchment scale.

Stormwater is managed in accordance with the BTW Stormwater Management Plan (Appendix E), giving effect to Te Mana o te Wai by prioritising the health and wellbeing of receiving waters. Soakage via the site's highly permeable pumice soils is the primary disposal mechanism, with green infrastructure (grassed swales, filter strips, rock check dams) provided for road runoff. No direct discharge to permanent waterbodies is proposed.

The proposed plan change is consistent with the Waikato Regional Plan's freshwater provisions and the specific Lake Taupō catchment obligations. It achieves a nitrogen outcome that is neutral to positive compared with continued pastoral farming across the full site.

Water Supply

The subject site benefits from an existing connection to the TDC public rural supply main, which traverses the site and provides a trickle supply of 66,800 L/day — sufficient for up to 39 properties at the TDC Code of Practice rate of 1,600 L/day.

An existing on-site bore has been tested at 14,000 L/hr (3.89 L/s) over 12 hours without significant drawdown, providing an independent supplementary supply. The combined capacity of these two sources comfortably exceeds the total daily demand for 66 dwellings (105,600 L/day at 1,600 L/day per dwelling). No new regional infrastructure is required, and the proposal is consistent with the RPS direction to use existing infrastructure efficiently and avoid unnecessary extensions of public supply networks.

Transportation and Private Roads

The proposed development will be served entirely by a private road network, commencing from the western end of Whakaroa Road (the existing public road end) and gated for private access. The approximately 5 km private road network will be managed under a legal maintenance instrument — such as an incorporated society or body corporate — ensuring that ongoing maintenance and renewal obligations are borne by future residents and not by Taupō District Council or the Waikato Regional Council. The private road approach does not burden regional or district roading infrastructure and is consistent with the RPS direction for development to be efficiently and effectively serviced without compromising existing public infrastructure systems.

The Transport Impact Assessment (Urban Connection Limited, August 2023, Appendix H) confirms that the Whakaroa Road/Mapara Road public road network can accommodate traffic from the proposed development within existing capacity parameters, with modest upgrades (road widening on Whakaroa Road to 6.7 m and intersection improvements at Mapara Road). These upgrades will be addressed as conditions of subdivision consent.

Natural Hazards

The RPS natural hazards chapter requires that subdivision, use and development not increase natural hazard risk, and that risks be managed to an acceptable level using the best available information. The proposed plan change is consistent with these requirements, as assessed in detail against the NPS-NH 2025 at Section 2.4 of this report. The Preliminary Geotechnical Report by CORE50 Engineers (Appendix F) confirms the site is TC1 Like for liquefaction, with no flood hazard mapped and slope stability risks managed through Building Setback Lines. Active fault risks are addressed through deliberate avoidance — building platforms have been positioned outside confirmed Fault Avoidance Zones, with further GNS Science investigation required before any subdivision consent is granted.

Natural Character and Outstanding Landscapes

The RPS Natural Character (NATC) chapter requires that natural character values of the coastal environment, wetlands, and lakes and rivers and their margins be protected from inappropriate subdivision, use and development. NATC-P1 directs that activities within or adjacent to these environments avoid significant adverse effects where natural elements are dominant, and that enhancement and restoration be promoted.

The subject site is subject to the OLA 65 (Whakaroa Peninsula Outstanding Landscape Area) overlay and overlooks Lake Taupō (ONFL 9). The Landscape and Visual Effects Assessment (LA4, May 2026, Appendix I) concludes that the proposed rezoning would have low adverse effects on the natural character, landscape character and visual amenity values of OLA 65 and the wider Taupō lake environment, from all nine assessed viewpoints. The clustered pocket development approach — concentrating built form in defined areas while retaining the majority of the 344 ha site in pastoral character — is demonstrably superior to the permitted baseline of dispersed 10 ha grid subdivision across the full OLA 65 landscape.

Indigenous Biodiversity

The RPS Biodiversity (BIO) chapter directs that significant natural areas be identified and that the values of those areas be maintained. The two Significant Natural Areas adjacent to the subject site — SNA277 and SNA309 — adjoin but do not overlap the subject parcels. Development has been concentrated in defined pockets away from the site boundaries adjoining these SNAs, maintaining appropriate buffers. The proposed pastoral retirement and riparian/gully planting will enhance indigenous biodiversity over time. A biodiversity assessment will be prepared at resource consent stage to confirm no significant adverse effects on SNA values.

Cultural Values and Tangata Whenua

The RPS recognises the relationship of tangata whenua with the natural environment and the requirement for their active participation in resource management processes. The subject site is within the rohe of Ngāti Tūwharetoa, who hold mana whenua interests over the Lake Taupō region. The permitted baseline of 33 lots has significantly more impact on any potential cultural values for the site in comparison to a carefully orchestrated cluster of residential development that avoids more sensitive landscape areas as confirmed through the LVA. The archaeological sites identified on the NZAA database have been avoided by the proposed development layout which further reinforces the sensitivity to the proposed development to mitigate any adverse effects on cultural values.

Summary Assessment

The following table summarises the consistency of the proposed plan change with the key relevant provisions of the Waikato Regional Policy Statement.

RPS Provision	Subject Matter	Consistent	Key Basis
IM-O1	Integrated management of natural and physical resources	Yes	Development model responds holistically to site constraints. Infrastructure (wastewater, water supply, roads) is integrated with land use and Lake Taupō catchment obligations. The coordinated, site-wide approach is superior to the piecemeal 10 ha permitted baseline.
IM-O8	Sustainable and efficient use of resources	Yes	Communal wastewater system and shared water supply are more resource-efficient than 33 separate individual on-site systems. Concentrating development in defined pockets is a more efficient use of land than dispersed 10 ha grid subdivision across the full 344 ha site.
UFD-O1	Built environment — integrated, planned and sustainable	Yes	Development concentrated in three defined pockets totalling ~44 ha. Balance land (~300 ha) retained as working pastoral farm. No new public infrastructure required. Residential and farming activities are co-located in a complementary relationship.
UFD-P1 (APP11)	Planned and co-ordinated subdivision	Yes	Consistent with APP11 principles: strong urban/rural boundary maintained; development yield consistent with permitted baseline; privately serviced with no Council cost; development positioned to avoid archaeological sites; tangata whenua engagement planned.
UFD-P2	Co-ordinating growth and infrastructure	Yes	All infrastructure confirmed feasible prior to development (Infrastructure Report, Simpli Consulting). Privately funded and maintained under legal instrument. No dependency on public capital expenditure or Council infrastructure sequencing.
Freshwater / Lake Taupō Catchment	Nitrogen neutrality and water quality	Yes	Development designed to be nitrogen-neutral: residential nitrogen (~3.5 kgN/yr/dwelling via 12 mg/L communal treatment) offset by targeted pastoral retirement within the farm. Gully/riparian retirement expected to produce additional net reduction. Stormwater managed via on-site soakage giving effect to Te Mana o te Wai (BTW SMP, Apr 2026, Appendix E).
NATC-O1 NATC-P1	Natural character — Lake Taupō and OLA 65 (Whakaroa Peninsula)	Yes	LVA (LA4, May 2026, Appendix I) confirms low adverse effects (less than minor) from all nine assessed viewpoints. Clustered pocket approach is demonstrably superior to dispersed 10 ha permitted baseline in landscape terms. Majority of site retained in pastoral character.
Biodiversity / BIO	Significant Natural Areas (SNA277, SNA309)	Yes	Development positioned away from boundaries of SNA277 and SNA309, which adjoin but do not overlap subject parcels. Riparian and gully retirement will enhance indigenous biodiversity over time. Full biodiversity assessment to be prepared at resource consent stage.
Natural Hazards	Risk-based approach to subdivision and development	Yes	Active faults, liquefaction, flooding and slope stability all assessed (CORE50, Apr 2026, Appendix F). Liquefaction: TC1 Like, LPI=0/LSN=0 — low risk. Flooding: no mapped hazard — low risk. Active faults: building platforms positioned outside FAZs; further GNS investigation required. All risks manageable —

RPS Provision	Subject Matter	Consistent	Key Basis
			no very high risk level requiring avoidance of development.
Cultural Values	Tangata whenua relationship with land and water	Yes	Subject site within rohe of Ngāti Tūwharetoa (mana whenua). Archaeological sites (NZAA database) avoided by development layout. Lake Taupō catchment obligations upheld.
<i>The proposed plan change is consistent with the Waikato Regional Policy Statement and is not contrary to the relevant provisions of the Waikato Regional Plan. No aspect of the proposal conflicts with regional objectives or policies.</i>			

2.5 National Environmental Standards

National Environmental Standards (NES) are regulations made under sections 43 and 44 of the Resource Management Act 1991. They set out technical standards, methods and requirements for environmental matters that apply nationally, and override any district plan rule that duplicates or is less stringent than their provisions. This section identifies each operative NES, assesses its relevance to the proposed plan change, and confirms the plan change's consistency with each.

Overview of Operative NES Instruments

As at the date of this report, the following NES instruments are operative under the RMA:

- National Environmental Standards for Air Quality 2004 (NES-AQ)
- National Environmental Standards for Sources of Human Drinking Water 2007 (NES-DW)
- National Environmental Standards for Electricity Transmission Activities 2009 (NES-ETA)
- National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011 (NES-CS)
- National Environmental Standards for Telecommunications Facilities 2016 (NES-TF)
- National Environmental Standards for Freshwater 2020 (NES-F)
- National Environmental Standard for Marine Aquaculture 2020 (NES-MA)
- National Environmental Standard for Storing Tyres Outdoors 2021 (NES-ST)
- National Environmental Standards for Commercial Forestry 2023 (NES-CF, formerly NES-PF)
- National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat 2023 (NES-IPGH)
- National Environmental Standards for Detached Minor Residential Units 2025 (NES-DMRU) — in force 15 January 2026

Each is assessed below in the context of this plan change.

2.5.1 NES for Air Quality 2004 (NES-AQ)

The NES-AQ sets national ambient air quality standards for outdoor air quality in New Zealand, including standards for particulate matter, carbon monoxide, nitrogen dioxide, sulphur dioxide, and ozone. It applies primarily to activities that discharge contaminants to air and to regional councils' management of those discharges.

Relevance: The NES-AQ is not directly triggered by a plan change to rezone land from Rural Environment to Low Density Residential Environment. Residential activities on the subject site

will not involve industrial discharges to air. Dust effects from earthworks during construction are managed under Waikato Regional Council regional plan rules and the NES-AQ's conditions for permitted activities. The proposed plan change does not conflict with and is consistent with the NES-AQ.

2.5.2 NES for Sources of Human Drinking Water 2007 (NES-DW)

The NES-DW requires regional councils to protect drinking water supply sources from contamination. It restricts activities within the catchment of a registered drinking water supply that may result in contamination of that supply. The subject site is within the Lake Taupō catchment, and the Whakaroa area is served by an existing TDC rural supply scheme.

Relevance: The subject site is in the catchment of the Lake Taupō water supply and the Whakaroa rural water scheme. The NES-DW applies to activities that may discharge contaminants near water supply abstractions. The proposed residential development, with its advanced wastewater treatment system and on-site stormwater management, has been specifically designed to protect the quality of the Lake Taupō receiving environment. The wastewater systems will comply with Waikato Regional Council secondary treatment standards. Stormwater is managed in accordance with the BTW Stormwater Management Plan. The plan change is consistent with the NES-DW and with the broader objective of protecting drinking water sources in the Lake Taupō catchment.

2.5.3 NES for Electricity Transmission Activities 2009 (NES-ETA)

The NES-ETA provides nationally consistent rules for the operation, maintenance, and upgrading of the National Grid. It also establishes the National Grid Yard — a 12 m setback from the centreline of a National Grid line (reduced to 10 m for single pole lines) — and the National Grid Subdivision Corridor, within which sensitive land uses including residential buildings must not be established or must comply with specified setback requirements.

Relevance: A transmission line traverses the subject site. The low density residential sits below the transmission tower line — as a defined development area. The NES-ETA is directly relevant to the layout of these lots. Building platforms and lot configurations in Area A must comply with the National Grid Yard setback requirements and avoid the location of habitable buildings within the National Grid Subdivision Corridor.

The proposed plan change is consistent with the NES-ETA, provided that the final lot layout, building platforms, and any earthworks in proximity to the transmission line comply with the NES-ETA requirements. This will be confirmed at engineering approval and subdivision consent stage. The utility provider will be notified of, and consulted on, the proposed plan change and any resource consent applications affecting the vicinity of the transmission line.

2.5.4 NES for Assessing and Managing Contaminants in Soil 2011 (NES-CS)

The NES-CS establishes requirements for identifying and assessing potentially contaminated land before it is subdivided, or its use changed to a more sensitive activity. Where a site is on the Hazardous Activities and Industries List (HAIL), a Preliminary Site Investigation (PSI) or Detailed Site Investigation (DSI) may be required before a more sensitive use (including residential) can be established.

Relevance: The subject site is currently and historically used for pastoral (sheep and beef) farming. Neither fuel nor pesticides have been stored on the site as a standalone farming operation, as it has been operated as part of a larger enterprise. The site does not have any of the activities listed on the HAIL that would indicate a high likelihood of contamination — no intensive horticultural spraying, no fuel storage, no industrial activity, no former dry cleaning or automotive activities.

It is noted that two electricity transmission sites are located within, or in the vicinity of, the subject parcels on their own separate, clearly defined titles. These sites are associated with the National Grid transmission infrastructure traversing the property and are known HAIL sites

due to the storage of fuel and hazardous materials associated with transmission operations. However, these sites are on discrete titles that are separate from the residential development parcels, the HAIL activity and contamination risk is well understood and clearly bounded by the title boundaries, and the transmission sites are well away from any area proposed for change of use to residential activity. Accordingly, the transmission sites do not affect the NES-CS assessment for the proposed residential lots and are not relevant to this plan change.

Notwithstanding the low contamination risk from the pastoral farming use on the residential parcels, a Preliminary Site Investigation (PSI) could be prepared by a suitably qualified practitioner as part of the resource consent process. The PSI will confirm the contamination status of the residential development areas and identify whether any further investigation or remediation is required before dwellings are established. The PSI scope should confirm that the transmission site HAIL areas are appropriately excluded from the residential development areas and that no migration pathway exists between those areas and any proposed residential lots. The plan change is consistent with the NES-CS, subject to the completion of a PSI at resource consent stage.

2.5.5 NES for Telecommunications Facilities 2016 (NES-TF)

The NES-TF provides permitted activity rules for the installation, operation, and maintenance of certain telecommunications facilities, including cabinets, antennas, and associated equipment, without the need for resource consent in most circumstances.

Relevance: The NES-TF is not directly triggered by this plan change. The proposed development will be served by way of offgrid network connections such as Starlink and normal mobile services. Any telecommunications infrastructure installed on or adjacent to the subject site will be assessed against the NES-TF at the time of installation. The plan change does not conflict with the NES-TF.

2.5.6 NES for Freshwater 2020 (NES-F)

The NES-F, made under the RMA as part of the Government's Essential Freshwater Package, establishes national standards for activities affecting natural wetlands, lake and river beds, the beds and margins of streams, culvert construction, and certain farming activities. Key provisions relevant to development include:

- *Natural wetlands:* Vegetation clearance, earthworks, and drainage of natural wetlands are controlled activities. Earthworks and vegetation clearance within 100 m of a natural inland wetland that do not affect the wetland's hydrology may be permitted subject to conditions.
- *Culverts:* The construction, placement and use of culverts in streams must comply with NES-F fish passage requirements.
- *Stock exclusion:* Cattle, deer and pigs must be excluded from wetlands, lakes and rivers with a bed width over 1 m, with minimum 3 m setbacks from the bed.
- *Farming activities:* Restrictions apply to certain intensification activities including conversion to dairy and the use of synthetic nitrogen fertiliser.

Relevance: The subject site's waterways are predominantly ephemeral, as confirmed by the BTW Stormwater Management Plan. The site is within the Lake Taupō catchment, and the NES-F provisions are of direct relevance to earthworks and construction associated with the proposed development.

Culverts proposed as part of the private road drainage network must comply with NES-F fish passage requirements. This will be addressed in detailed engineering design and any regional consent applications for works in or near waterways. The BTW Stormwater Management Plan has been designed consistent with the NES-F, maintaining existing overland flow paths,

avoiding concentration of stormwater into new channels, and providing erosion protection at all culvert outlets.

No natural inland wetlands have been identified on the subject site in the available mapping.

The balance land will remain as a working pastoral farm, and the stock exclusion requirements of the NES-F will continue to apply to the farming operations. The proposed pastoral retirement of gullies and riparian areas adjacent to the development will assist in achieving NES-F outcomes by reducing stock access to watercourses and improving water quality. The plan change is consistent with the NES-F, subject to confirmation of the wetland position and NES-F-compliant culvert design at resource consent stage.

2.5.7 NES for Marine Aquaculture 2020 (NES-MA)

The NES-MA provides consistent regulations for the management of existing marine farms around New Zealand.

Relevance: Not applicable. The subject site is an inland rural property and no marine aquaculture activity is proposed. The NES-MA has no relevance to this plan change.

2.5.8 NES for Storing Tyres Outdoors 2021 (NES-ST)

The NES-ST manages the outdoor storage of tyres to prevent fire risk and manage amenity effects.

Relevance: Not applicable. No tyre storage is proposed in connection with the proposed development. The NES-ST has no relevance to this plan change.

2.5.9 NES for Commercial Forestry 2023 (NES-CF)

The NES-CF (formerly the NES for Plantation Forestry) provides nationally consistent rules for commercial forestry operations including afforestation, harvesting, earthworks, and related activities.

Relevance: No commercial forestry is proposed on the subject site. The proposed pastoral retirement and replanting of gullies and riparian areas involves native and amenity vegetation, not commercial forestry. The NES-CF has no direct relevance to this plan change. However, if any forestry is established on the balance farm in the future, the NES-CF would apply to those operations.

2.5.10 NES for Greenhouse Gas Emissions from Industrial Process Heat 2023 (NES-IPGH)

The NES-IPGH applies to the installation, replacement or continued use of coal- and gas-fired industrial process heat equipment above specified thresholds.

Relevance: Not applicable. The proposed development is residential in nature and does not involve industrial process heat. The NES-IPGH has no relevance to this plan change.

2.5.11 NES for Detached Minor Residential Units 2025 (NES-DMRU) — in force 15 January 2026

The NES-DMRU came into force on 15 January 2026 as part of the Government's January 2026 national direction package. It establishes a nationally consistent permitted activity pathway for the construction of one detached minor residential unit (DMRU) per site in rural zones, residential zones, Māori purpose zones, and mixed use zones, without the need for a resource consent, provided the DMRU complies with specified standards.

The key permitted activity standards in a rural zone are:

- Maximum floor area of 70 m² (internal dimensions);
- Maximum building coverage consistent with the district plan rules for the zone;

- Setback of no less than 10 m from the front boundary and 5 m from side and rear boundaries;
- Setback of no less than 2 m from the principal residential unit;
- The DMRU must remain on the same site as and in common ownership with the principal dwelling;
- The DMRU must not be used for commercial activity, intensive indoor primary production, or industrial activity.

Where the district plan is more lenient than the NES-DMRU standards, those more lenient standards apply. Natural hazard constraints identified through a Project Information Memorandum (PIM) may trigger a resource consent requirement even where the DMRU otherwise meets the NES-DMRU standards.

Relevance: The NES-DMRU is of limited direct relevance to this plan change. The proposed development comprises 66 standalone low density residential lots — each a discrete, independently serviced residential section. The proposal does not rely on the minor dwelling mechanism to achieve its yield: the 66 dwellings are 66 primary lots, not 33 primary lots each with one minor dwelling attached. The NES-DMRU is therefore not a structural component of the development model. However, the NES-DMRU is relevant to the question of yield management: once the LDR zone applies, any of the 66 lots could in future accommodate a detached minor residential unit as a permitted activity under the NES-DMRU (subject to complying with the 70 m² floor area limit and other NES-DMRU standards), creating a theoretical maximum of 132 dwellings on the site over time. Whether that theoretical additional yield is appropriate in this location — and whether it should be restricted through consent notices or other mechanisms — is addressed below.

The practical implications of the NES-DMRU for this plan change are as follows:

First, the NES-DMRU confirms that any future minor dwelling on a lot within the proposed Low Density Residential Zone would be a permitted activity by national direction, provided it complies with the NES-DMRU standards. This is consistent with the LDR zone's character as a low density residential environment. As noted above, this creates a theoretical maximum of up to 132 dwellings on the site — 66 primary lots plus 66 potential minor dwellings. Whether this additional density is appropriate will depend on infrastructure capacity, landscape effects, and the intended character of the three residential pockets. The applicant is open to the Council imposing specific consent notices under section 221 of the RMA as a condition of subdivision consent, registered against the title of each lot, restricting or prohibiting minor dwellings where the cumulative effects of an additional dwelling on any given lot would be inconsistent with the development's infrastructure design, natural hazard avoidance constraints, or the LVA's landscape mitigation framework. This is a standard and well-established planning tool that provides the Council with a practical mechanism to manage the NES-DMRU's permitted activity status at a site-specific level, without requiring a district plan rule change and without conflicting with the NES-DMRU's national direction (which does not preclude consent notice restrictions arising from resource consent processes).

The proposed plan change is consistent with the NES-DMRU. The applicant acknowledges the Council's interest in managing the cumulative yield implications of the NES-DMRU on the subject site, and confirms that the imposition of specific consent notices under section 221 of the RMA at subdivision consent stage — restricting minor dwellings on individual lots where warranted — is a practical and appropriate mechanism to achieve this. The appropriate scope and coverage of such consent notices will be determined through the subdivision consent process, informed by the infrastructure capacity assessment, the LVA's landscape mitigation requirements, and the detailed lot layout.

2.5.12 NES Summary

The following table summarises the relevance and consistency of each NES to the proposed plan change.

NES Instrument	Relevance	Consistent	Action Required
NES for Air Quality 2004 (NES-AQ)	Marginally — construction dust only	Yes	Standard earthworks dust conditions at subdivision/building consent stage
NES for Sources of Human Drinking Water 2007 (NES-DW)	Yes — site is within Lake Taupō catchment and Whakaroa rural water scheme catchment	Yes	Advanced wastewater treatment; stormwater management per BTW SMP (Appendix E)
NES for Electricity Transmission Activities 2009 (NES-ETA)	Yes — Transmission line traverses site; Area A lots located below transmission corridor	Yes	Building platforms and lot layout in Area A to comply with transmission line setbacks.
NES for Assessing and Managing Contaminants in Soil 2011 (NES-CS)	Yes — proposed change to more sensitive (residential) use; two transmission HAIL sites on separate titles nearby	Yes	Preliminary Site Investigation (PSI) to be prepared at resource consent stage; PSI to confirm transmission HAIL sites are excluded from residential areas with no migration pathway to proposed lots
NES for Telecommunications Facilities 2016 (NES-TF)	No — no telecommunications infrastructure proposed as part of plan change	N/A	—
NES for Freshwater 2020 (NES-F)	Yes — culverts proposed in road drainage network; ephemeral waterways on site; wetland status to be confirmed	Yes	NES-F fish passage compliant culvert design at engineering approval stage; wetland assessment at resource consent stage to confirm no natural inland wetlands affected; pastoral retirement of gullies and riparian areas supports NES-F outcomes
NES for Marine Aquaculture 2020 (NES-MA)	No — inland rural site; no marine aquaculture proposed	N/A	—
NES for Storing Tyres Outdoors 2021 (NES-ST)	No — no tyre storage proposed	N/A	—
NES for Commercial Forestry 2023 (NES-CF)	No — no commercial forestry proposed; pastoral retirement and native/amenity replanting only	N/A	Note: if commercial forestry is established on balance farm in future, NES-CF will apply to those operations

NES Instrument	Relevance	Consistent	Action Required
NES for Greenhouse Gas Emissions from Industrial Process Heat 2023 (NES-IPGH)	No — no industrial process heat proposed	N/A	—
NES for Detached Minor Residential Units 2025 (NES-DMRU) — in force 15 January 2026	Yes — marginally relevant. Future minor dwellings on LDR lots would be permitted by the NES-DMRU. Consent notices under s221 RMA available at subdivision consent to restrict minor dwellings where warranted by infrastructure, landscape, or hazard constraints.	Yes — consistent	Consent notices under s221 RMA to be considered at subdivision consent stage to restrict minor dwellings on individual lots, LVA landscape mitigation requirements make additional dwellings inappropriate. Scope to be determined through subdivision consent process.

The proposed plan change is consistent with all operative NES instruments.

No NES instrument creates a barrier to, or inconsistency with, the proposed rezoning.

2.6 Taupō District Plan – Relevant Provisions

This section identifies the district plan provisions most relevant to the relief sought in response to notified Plan Change 44. It distinguishes between: (a) the operative Taupō District Plan provisions that currently apply to the subject site; and (b) the notified Plan Change 44 provisions that would apply if the site were rezoned to Low Density Residential Environment through the submission relief sought. The assessment is therefore directed not only to general consistency with the district plan framework, but also to whether the requested planning map amendment and consequential application of the notified Plan Change 44 residential provisions are appropriate in this case.

- the Strategic Directions chapter and other operative district-wide objectives and policies that guide urban form, growth management, infrastructure, climate resilience, freshwater, tangata whenua outcomes, and significant infrastructure;
- the operative Rural Environment / General Rural Zone provisions, which currently apply to the subject site and establish the permitted baseline against which the requested relief is assessed;
- the notified Plan Change 44 Residential Environment provisions, in particular the Low Density Residential Environment objectives, policies, rules and associated residential framework that the submitter seeks to have applied to the subject site;
- the notified Plan Change 44 planning maps, to the extent the submission seeks amendment to include the subject site within the Low Density Residential Environment; and
- the district-wide overlay and topic-based provisions that would continue to apply to the site irrespective of zoning, including provisions relating to outstanding landscapes, natural hazards, biodiversity, heritage, infrastructure and network utilities.

2.6.1 Assessment Against Taupō District Plan Provisions

The following table evaluates the proposed rezoning of 287, 351 and 387 Whakaroa Road, Kinloch from General Rural Zone to Low Density Residential Zone against the key provisions of the Taupō District Plan that are relevant to notified Plan Change 44 and to the specific submission relief sought. It is structured to assess: the Strategic Directions and district-wide policy framework; the outstanding landscape and other operative constraint provisions that would continue to apply to the site; the operative General Rural Zone provisions that establish the current baseline; and the notified Plan Change 44 Low Density Residential provisions that would apply if the planning maps were amended as sought. In this way, the table addresses both the notified residential framework and the appropriateness of extending that framework to the subject site through a site-specific planning map amendment.

Provision Reference	Objective / Policy	How the Proposed Rezoning Gives Effect
PART A – TAUPŌ DISTRICT PLAN: STRATEGIC DIRECTIONS		
CC-O1	Subdivision, use and development of land in the Taupō District will result in positive climate change outcomes.	The proposed rezoning concentrates development in defined pockets within a continuing working farm, reducing transport reliance and enabling infrastructure-efficient residential growth. Proposed renewable energy (solar) exemptions and rainwater harvesting within the LDR zone support emissions reduction consistent with PC44 direction.
CC-O2	Subdivision, use and development will be resilient to the current and future effects of climate change.	The subject site is assessed as low flood hazard risk under NPS-NH 2025. Building platforms are located outside active fault avoidance zones and identified overland flow paths. Stormwater is managed on-site via pumice soakage with climate-adjusted design rainfall (HIRDS V4 RCP 6.0, 2081–2100). No development is proposed in areas of mapped natural hazard.
CC-O3	The Taupō District is well prepared to adapt to the risks and effects from climate change, such as natural hazards.	The plan change approach enables a coordinated, site-wide natural hazard response — positioning building platforms away from fault avoidance zones, slope instability areas, and flood paths — that is demonstrably superior to the alternative of piecemeal 10 ha grid subdivision assessed on a lot-by-lot consent basis.
FWQ-O1	Subdivision and land use is managed in a way that promotes positive effects, while avoiding, remedying, or mitigating adverse effects on the mauri, health and wellbeing of water bodies, to benefit freshwater ecosystems, the wider environment, and the community.	The development is designed to achieve nitrogen neutrality through targeted pastoral retirement offsetting residential wastewater nitrogen. Advanced wastewater treatment to reduce nitrogen from the residential site is proposed. Stormwater managed via on-site soakage using permeable pumice soils, with green infrastructure (swales, filter strips, rock check dams) for road drainage quality treatment. No permanent watercourses are affected.

Provision Reference	Objective / Policy	How the Proposed Rezoning Gives Effect
FWQ-P5	Manage subdivision, use and development of land, in a manner consistent with Te Mana o te Wai, that restores, protects and enhances the mana, mauri, health and wellbeing of the District's waterbodies, freshwater ecosystems and receiving environments.	The Stormwater Management Plan (BTW, April 2026) is explicitly designed to give effect to Te Mana o te Wai, prioritising the health and wellbeing of receiving waters within the Lake Taupō catchment. Gully and riparian retirement and replanting are proposed, expected to produce a net reduction in nitrogen discharge beyond the residential offset.
LD-O1	Provide for and manage urban growth so as to achieve the sustainable management of the District's natural and physical resources.	The proposed rezoning provides planned residential capacity in a location suited to low density rural residential demand identified in the FDS and PC44 s32 report. The pocket-based approach manages growth in a coordinated, sustainable manner consistent with the zone's objectives.
LD-O4	Avoid the degradation of Taupō District's lakes, waterways and aquifers from effluent and wastewater resulting from land development.	Wastewater managed communal or advanced secondary treatment system achieving nitrogen reduction with land disposal, meeting WRC secondary treatment standards. The system avoids direct discharge to water. Nitrogen from residential use is offset through pastoral retirement, achieving neutrality as a minimum.
LD-O5	Ensure land development does not detract from the amenity value or qualities of the local environment.	The Landscape and Visual Effects Assessment (LA4, May 2026) concludes adverse effects on natural character, landscape character and visual amenity would be low (less than minor) from all assessed viewpoints. Development is concentrated in defined pockets, retaining pastoral and natural character across the majority of the 344 ha site.
LD-P2	Ensure patterns of future urban development are consistent with the identified Urban Growth Areas.	The proposal is located within the Kinloch growth area context, and its scale (33 primary lots) is consistent with the low density residential demand identified in the FDS. The plan change supports, rather than contradicts, the planned pattern of district growth.
LD-P11	Allow new activities and development to connect to existing water and wastewater infrastructure where there is adequate capacity to meet the needs of the development.	The Infrastructure Report (Simpli Consulting, May 2026) confirms feasibility of two independent water sources (TDC rural supply main at 66,800 L/day; private bore at 3.89 L/s). A communal and separate wastewater treatment system with land disposal is proposed. All infrastructure is privately funded and maintained with no cost burden to TDC.
UFD-O1	The district develops in a cohesive, compact and structured way that: (a) contributes to well-functioning communities; (b) ensures	The proposal provides planned, structured low density residential development within an identifiable area, integrating private road, water and wastewater

Provision Reference	Objective / Policy	How the Proposed Rezoning Gives Effect
	infrastructure is efficiently integrated with land use; (c) supports emissions reduction; and (d) meets short, medium and long-term housing and business needs.	infrastructure. The pocket-based approach avoids dispersed development across the landscape and supports a coherent community outcome.
UFD-02	Subdivision, use and development will protect the effective functioning of the Rural Zones, maximise efficient use of zoned and serviced urban land and is co-ordinated with the provision of cost effective infrastructure.	The balance land (approximately 300 ha) is proposed to remain in active pastoral farming as a working farm. Residential development is concentrated in three defined pockets totalling approximately 44 ha. This is demonstrably superior to the 10 ha grid subdivision permitted baseline, which would fragment the full 344 ha site.
UFD-07	Subdivision, use and development is designed to avoid, remedy or mitigate adverse effects on the environment and occurs in a sequenced and coherent manner that protects or enhances important natural, cultural and historic values.	Development has been deliberately positioned away from active fault traces, NZAA archaeological sites, slope instability areas, and the boundaries of adjacent SNAs (SNA277 and SNA309). Further GNS fault trace investigation is committed as a condition before subdivision consent.
TW-01 / TW-02	The values, rights and interests of Taupō District mana whenua are recognised and protected. Mana whenua are a partner in District Plan planning and decision making.	The subject site is within the rohe of Ngāti Tūwharetoa. Archaeological sites on the NZAA database have been avoided by the proposed development layout.
TW-04	Support development on Māori land that meets the needs of those landowners and respects kaitiakitanga, self-determination and the relationship of tangata whenua with their land.	Not directly applicable to the subject site (freehold title). However, the plan change framework supports broader provision of residential development options consistent with LDR zone objectives for the wider district.
SI-03 / SI-04	Land use will not adversely affect the capacity and safe and effective functioning of Nationally and Regionally Significant Infrastructure. National transport infrastructure operates in a safe and effective manner.	A transmission line traverses Area A of the site. The lot layout and building platforms in Area A maintain required setbacks The TIA confirms the Whakaroa/Mapara Road intersection operates at well under 30% of capacity with the proposed development.
PART B – TAUPŌ DISTRICT PLAN: OUTSTANDING NATURAL FEATURES, LANDSCAPES & AMENITY AREAS		
OLA/ONFL Objective	Outstanding Natural Landscape Areas (OLAs) and Outstanding Natural Features and	The subject site is subject to OLA 65 (Whakaroa Peninsula) in its entirety and a small area of ALA 66 (Whakaroa Hills). Lake Taupō is identified as ONFL 9 / OLA

Provision Reference	Objective / Policy	How the Proposed Rezoning Gives Effect
	Landscapes (ONFLs) are protected from the adverse effects of inappropriate subdivision, use and development. Activities within or visible from these areas must avoid, remedy or mitigate adverse effects on the landscape values that give rise to the designation.	60. The LVA (LA4, May 2026) concludes adverse effects on all three designations would be low (less than minor). Development is concentrated in three defined pockets on modified pastoral land, screened by existing landform and vegetation from lake-level viewpoints.
OLA Policy – Character Retention	Development within or adjacent to OLAs must be compatible with the character, scale and visual qualities of the landscape. Built form must be designed and located to minimise visual dominance and avoid detracting from the integrity of outstanding landscape values.	The LVA confirms the visual catchment is highly constrained by the Whakaroa Peninsula's landform and the DoC reserve vegetation. Building Design Guidelines are proposed to control materials, colours, scale and form. Indigenous mitigation planting will screen and soften built structures. The clustered pocket approach retains the majority of the site in pastoral character rather than scattering 66 dwellings across the OLA landscape under the permitted baseline.
OLA Policy – Subdivision Effects	Subdivision that would result in the fragmentation of outstanding landscape areas, create visual clutter or introduce incompatible patterns of development is to be avoided.	The proposed plan change concentrates residential development in three defined areas, avoiding the fragmentation of the OLA 65 landscape that 10 ha grid subdivision (33 separate lots each with dwelling, driveway, and infrastructure) would produce. This is a core planning advantage of the plan change approach over the permitted baseline.
ALA 66 – Whakaroa Hills	Amenity Landscape Areas are to be maintained and enhanced. Activities within ALAs are to avoid adverse effects on the landscape character and visual amenity values that contribute to the area's designation.	Only a small northern part of the site is within ALA 66. No development is proposed in this area. The LVA confirms no adverse effects on ALA 66 values.
Foreshore Protection Area	Development within the Foreshore Protection Area around Lake Taupō is to protect and maintain the visual, ecological and amenity values of the lake foreshore and its margins.	The subject site does not adjoin the Lake Taupō foreshore. The site is located on the elevated upper escarpment of the Whakaroa Peninsula, separated from the lake by DOC scenic reserve land and conservation areas. The Foreshore Protection Area overlay does not apply to the subject parcels.
PART C – TAUPŌ DISTRICT PLAN: GENERAL RURAL ZONE (GRUZ) – CURRENT ZONE (as amended by Plan Change 42)		
GRUZ-01	To maintain and protect the productive capacity of the district's rural land for primary production	The proposed plan change retains the balance of the 344 ha site (approximately 300 ha) as an active pastoral working farm integrated with the residential development. Residential pockets of approximately 44 ha are concentrated in areas

Provision Reference	Objective / Policy	How the Proposed Rezoning Gives Effect
	activities and other rural activities that are compatible with the rural environment.	least suited to productive farming. This outcome is superior to the permitted baseline, which would fragment 33 separate 10 ha lots across the full site and end the integrated farming operation.
GRUZ-02	To protect outstanding natural features, landscapes and areas of significant natural value from the adverse effects of inappropriate subdivision, use and development.	The clustered pocket approach concentrates development away from ridgelines and areas most visible from Lake Taupō, maintaining the pastoral character of the OLA 65 landscape across the majority of the site. The LVA confirms adverse effects on OLA 65 and ONFL 9 values are low. The permitted baseline of dispersed 10 ha lots would have greater adverse landscape effects.
GRUZ-03	To enable the sustainable use and development of rural land for a range of activities that support the social, economic and cultural wellbeing of the community while avoiding significant adverse effects on the rural environment.	The plan change enables residential development at a scale and yield consistent with the permitted baseline (66 dwellings), while achieving a demonstrably superior planning outcome through coordinated infrastructure, hazard management, and landscape protection. The balance land remains productive rural land, maintaining both uses in a complementary relationship.
GRUZ-P (Avoid Fragmentation)	Avoid the inappropriate fragmentation of rural land through subdivision, use or development that would result in incompatible land use patterns, reduction of productive land area, or cumulative adverse effects on rural character.	The plan change does not fragment the rural land beyond the permitted baseline. The 344 ha site is treated as a single entity, with residential pockets in defined areas and the balance retained as a working farm. No additional lots are created beyond the 33 primary lots already enabled by GRUZ permitted subdivision.
GRUZ-P (Hazard Management)	Subdivision and development of rural land must identify and appropriately manage natural hazard risks, including active faults, slope instability, flooding and volcanic hazard.	The plan change enables a systematic, site-wide hazard assessment and management approach. Building platforms are positioned outside active FAZs, slope instability areas and flood paths. Further GNS fault trace investigation is committed. This coordinated approach is superior to the lot-by-lot geotechnical assessment that would apply under the 10 ha grid subdivision permitted baseline.
GRUZ-P (Infrastructure Self-Sufficiency)	Lots in the Rural Zone must be of sufficient size to accommodate on-site services including wastewater disposal, water supply and stormwater management without adverse effects on neighbouring properties or the receiving environment.	The proposed LDR lots are designed to be self-servicing. Water supply is confirmed via two independent sources. Wastewater is managed via communal and separate advanced secondary treatment with land disposal meeting WRC standards. Stormwater is disposed via on-site soakage using the site's permeable pumice soils. All services are privately funded and maintained.
PART D – TAUPŌ DISTRICT PLAN: LOW DENSITY RESIDENTIAL ZONE (LDRZ) – PROPOSED ZONE (as proposed through Plan Change 44)		

Provision Reference	Objective / Policy	How the Proposed Rezoning Gives Effect
LDRZ Objective	To provide for low density residential development on the outskirts of urban areas, in locations where the low density pattern of development is consistent with the surrounding character and environmental constraints, and where infrastructure can be provided in an efficient and appropriate manner.	The subject site is located on the rural fringe of Kinloch, approximately 11 km west of Taupō township. The proposed development pattern of 66 lots across 44 ha is consistent with the LDR zone's intended density and character. The development is self-servicing with private infrastructure, consistent with the LDR zone's expectation of on-site services.
LDRZ – Character and Density	Development in the Low Density Residential Zone must be compatible with the low density character of the zone and surrounding environment. Minimum lot sizes, building setbacks, site coverage and height limits apply to maintain open space character and limit visual bulk.	Proposed lots are anticipated to be consistent with typical LDR lot sizes with an average lot size across 44ha of land to be rezoned at 6,667m ² . There will be a variety of lot sizes and building typologies to provide variation and visual interest. Building Design Guidelines will govern scale, form, and materials. The LVA confirms built form can be appropriately integrated into the landscape. The clustered pocket approach maintains open pastoral character across the majority of the site.
LDRZ – Natural Hazard Avoidance	Development within the Low Density Residential Zone must be located and designed to avoid or adequately mitigate natural hazard risk, including from active faults, flooding, slope instability and volcanic hazard consistent with the NPS-NH 2025.	Building platforms are positioned outside active FAZs with further GNS investigation committed. The site is assessed as TC1 Like for liquefaction (LPI=0, LSN=0). No flood hazard is mapped. Building Setback Lines of 5–15 m from slope crests apply. All risk levels under the NPS-NH risk matrix are low, except where active fault avoidance has been applied to bring very high risk to low.
LDRZ – Infrastructure	Lots in the Low Density Residential Zone must be adequately serviced. Connection to reticulated networks is required where available. Where reticulation is not available, on-site systems must be of sufficient standard to manage wastewater, water supply and stormwater without adverse effects.	The Infrastructure Report confirms water supply via TDC rural supply main (66,800 L/day) and private bore (3.89 L/s), together providing capacity for 66 dwellings. Communal wastewater treatment to 12 mg/L N with land disposal. Stormwater via on-site soakage confirmed by SMP. All infrastructure private, managed by a legal maintenance instrument.
LDRZ – Renewable Energy	Small-scale renewable electricity generation and rainwater harvesting systems are provided for in the Low Density Residential Zone, with exemptions from bulk and location standards to facilitate uptake.	PC44 specifically introduces exemptions to bulk and location standards for solar panels, small wind turbines, and rainwater harvesting tanks in the LDR zone. These provisions are consistent with the FDS and Climate Change Strategy and directly relevant to the rural residential character of the proposed development.

Provision Reference	Objective / Policy	How the Proposed Rezoning Gives Effect
LDRZ – Comprehensive Housing Development	Comprehensive Housing Developments (four or more residential units designed and planned in an integrated manner, with all resource and subdivision consents submitted together) may apply MRZ performance standards to enable greater development potential.	The proposed development of 66 lots is an integrated, comprehensively planned development with coordinated infrastructure, lot layout, and hazard management. While the LDR zone is the appropriate zone given the site context, the comprehensive development approach aligns with the PC44 framework for integrated residential development.

On the basis of the assessment above, the proposed rezoning is consistent with all relevant objectives and policies of the Taupō District Plan. It gives effect to the Strategic Directions, manages effects on outstanding landscape values in accordance with OLA 65 and ONFL 9 provisions, is consistent with the objectives of the General Rural Zone for the protection of productive rural land and outstanding landscapes, and is appropriate to the Low Density Residential Zone in terms of density, character, natural hazard management, and infrastructure provision. A dedicated assessment against the PC44 section 8.2 LDR rezoning criteria is provided at Section 2.7 below.

2.7 Assessment Against Plan Change 44 Section 8.2 Criteria

Section 8.2 of the Taupō District Council Section 32 Evaluation Report for Plan Change 44 (the PC44 s32 Report) establishes eight criteria against which a submission seeking to include land in the Low Density Residential Zone (LDRZ) will be assessed. The PC44 s32 Report expressly provides that any person may seek LDR rezoning by way of a submission to Plan Change 44, provided they demonstrate that their landholding meets the requirements of section 32 of the RMA and satisfies all eight criteria.

This section provides a dedicated, structured assessment of the subject site at 287, 351 and 387 Whakaroa Road, Kinloch against each of those eight criteria. It draws together the technical evidence in the supporting appendices — the Landscape and Visual Effects Assessment (LA4, May 2026), the Preliminary Geotechnical Report (CORE50 Engineers, April 2026), the Infrastructure Report (Simpli Consulting Limited, May 2026), the Stormwater Management Plan (BTW Company, April 2026), and the Transport Impact Assessment (Urban Connection Limited, August 2023) — and demonstrates that the proposed LDR rezoning satisfies all eight criteria.

Two criteria — Criterion 4 (Outstanding Natural Landscape and SNA) and Criterion 8 (natural hazard risk) — require evidential support rather than a simple factual answer. In both cases the relevant technical report provides that support, and in both cases the answer is that the criterion is met, not that it creates an obstacle to rezoning. The structure and purpose of the criteria framework is discussed at section 2.7.7 below.

Summary Assessment Table

The table below summarises the assessment of each criterion. Detailed analysis of each criterion follows in sections 2.7.1 to 2.7.6.

Criterion	Met?	Basis of Assessment	Key Reference
C1 — Adjacent to existing LDR or GRZ, or existing development pattern consistent with LDR density and character	✓ Met	The site adjoins the Kinloch settlement, which includes GRZ-zoned land and an established rural residential fringe. The Whakaroa Road area exhibits a development pattern consistent in density and character with the LDR zone. The proposed 66 lots across 44 ha equates to approximately 1.5 lots/ha — consistent with low density residential density.	<i>Section 2.7.1 below; s1.4</i>
C2 — Efficiently serviced by Council-supplied water infrastructure	✓ Met	Existing TDC public rural supply main traverses the site: 66,800 L/day confirmed. Private bore provides independent supplementary supply at 3.89 L/s. Combined capacity (105,600+ L/day) exceeds demand for 66 lots. No extension of public network required.	<i>Section 2.7.2 below; s2.4; Infrastructure Report (App E)</i>
C3 — Development would not result in more than minor adverse effects on the supporting land transport network	✓ Met	TIA (Urban Connection, August 2023) confirms 66 lots generate ~297 vpd and 30 vph peak. Whakaroa/Mapara Road intersection operates at <29% capacity even under a 115-lot scenario. Minor road upgrades (Whakaroa Road widening; intersection improvements at Mapara Road) as subdivision conditions.	<i>Section 2.7.3 below; TIA (App H)</i>
C4 — Area is not identified as an Outstanding	ⓘ Qualified Response	The site lies within OLA 65 (Whakaroa Peninsula) and overlooks ONFL 9 (Lake Taupō). This criterion is not a hard prohibition	<i>Section 2.7.4 below; LVA (App I)</i>

Criterion	Met?	Basis of Assessment	Key Reference
Natural Landscape or Significant Natural Area		on development within landscape overlays — it requires that adverse effects be avoided, remedied, or mitigated. The LVA (LA4, May 2026) confirms effects are less than minor from all 9 viewpoints. The clustered pocket approach is demonstrably superior to the permitted 10 ha baseline in landscape terms. SNA277 and SNA309 adjoin but do not overlap the site.	
C5 — Proximate to the Taupō township and/or existing LDR	✓ Met	Site is 11 km from Taupō township (15–20 min). Proximate to Kinloch township (GRZ, school, commercial services, medical). PC44 s32 report acknowledges LDR demand arises across the district including rural townships. Kinloch is an established TDC urban township — proximity is to both the township itself and to existing residential zoning within it.	<i>Section 2.7.5 below; s1.4</i>
C6 — Site does not take access from a State Highway	✓ Met	Site access via Whakaroa Road (Low Volume Road) connecting to Mapara Road (Secondary Collector). Neither is a State Highway. No SH access is proposed.	<i>s1.4; TIA (App H)</i>
C7 — Area is not located within the Wairakei-Tauhara or Ohaaki Geothermal Systems (Map D1)	✓ Met	Site is located on the Whakaroa Peninsula, western shores of Lake Taupō at Kinloch. It is not within either the Wairakei-Tauhara or Ohaaki Geothermal Systems as shown on Map D1 of the Taupō District Plan.	<i>s1.4; TDP Map D1</i>
C8 — Area is demonstrated to be free of significant natural hazard risk	ⓘ Qualified Response	Two active faults traverse the site. Liquefaction: TC1 Like (LPI=0, LSN=0). Flood: low risk. Slope: managed by BSLs. Active faults are addressed by systematic FAZ avoidance — building platforms positioned outside confirmed FAZs with further GNS investigation required before subdivision consent. All residual risks are manageable to low under NPS-NH 2025 risk matrix. No very high risk level requiring avoidance of development.	<i>Section 2.7.6 below; Geotech Report (App F); SMP (App E)</i>
✓ = criterion met unconditionally ⓘ = criterion met with evidential support (LVA / Geotechnical Report) All eight criteria are met. No criterion operates as a prohibition on the proposed rezoning.			

2.7.1 Criterion 1 — Proximity to Existing LDR or GRZ / Consistent Development Pattern

Criterion: The area is located immediately adjacent to an existing LDR or GRZ, or has an existing development pattern that is consistent with LDR density and character.

The subject site is located on the Whakaroa Peninsula approximately 11 km west of the Taupō township via Mapara Road and Poihipi Road, adjacent to the Kinloch settlement. Kinloch is an established Taupō District township with General Residential Zone (GRZ) zoned land, a primary school, medical facilities, commercial services, and a marina. The Whakaroa Road corridor and wider Kinloch fringe exhibit an established pattern of rural residential development — larger lots used for residential purposes on the rural boundary of an urban settlement — that is consistent in density, character, and lot size with the Low Density Residential Zone.

The proposed 66 lots across the three residential pockets (totalling approximately 44 ha which provides an average lot size of 6,667m²) that allow for a mixture of lot sizes and building typology determined by natural topography and building design guidelines. This is consistent with the LDR zone's intended character as a low density residential environment for larger sections on urban fringes. The site does not abut an existing LDR zone boundary directly; however, Kinloch is geographically proximate to the site, occupying the same catchment basin and clearly visible from the elevated Whakaroa Peninsula. That geographic and visual relationship — rather than a direct road corridor connection — is what makes LDR zoning on this site a natural extension of the upper catchment area served by the Kinloch GRZ, consistent in density and character with the rural residential fringe pattern of the wider Kinloch settlement.

This criterion is met.

2.7.2 Criterion 2 — Efficient Servicing by Council-Supplied Water Infrastructure

Criterion: The area is able to be efficiently serviced by Council-supplied water infrastructure.

The subject site benefits from an existing connection to the Taupō District Council public rural supply main, which traverses the site. This main provides a confirmed trickle supply of 66,800 L/day — sufficient, at the TDC Code of Practice rate of 1,600 L/day per lot, for up to 39 lots from this source alone.

An existing private bore on the site has been independently tested at 14,000 L/hr (3.89 L/s) over a 12-hour period without significant drawdown, providing a reliable supplementary supply. The Infrastructure Report confirms that the combined supply capacity of the TDC main and the private bore substantially exceeds total daily demand for 66 lots (105,600 L/day at 1,600 L/day per lot).

No extension of the public water supply network is required. All infrastructure will be privately funded, constructed, and maintained under a legal maintenance instrument (incorporated society or body corporate), with no cost burden to Taupō District Council. The Infrastructure Report concludes that there are no water servicing constraints that would affect the development's viability.

This criterion is met.

2.7.3 Criterion 3 — No More Than Minor Adverse Effects on the Land Transport Network

Criterion: The development of allotments would not result in more than minor adverse effects on the supporting land transport network.

A Transport Impact Assessment (TIA) was prepared by Urban Connection Limited (August 2023, Appendix H). The TIA was prepared for the current proposal of 66 standalone low density residential lots and confirms the following:

- The proposed development is estimated to generate approximately 297 vehicle movements per day (vpd) and 30 vehicle movements in the peak hour (vph), based on the TIA's surveyed rural residential trip rate of 4.5 vpd and 0.45 vph per lot.
- The Whakaroa Road/Mapara Road intersection was assessed under a significantly larger scenario (115 lots plus a tourism lodge complex) and found to operate at a maximum of 29% of available capacity — well within functional limits. The 66-lot proposal generates approximately one quarter of those traffic volumes.

- Sight distances at the Whakaroa Road/Mapara Road intersection already comply with TDC requirements (270 m north, 160 m south against a 160 m requirement). No sight distance improvements are required.
- Road upgrades recommended as conditions of subdivision consent: widening of Whakaroa Road to a minimum 6.7 m carriageway width along its 2.9 km length; right turn lane, give way markings, flag lighting, and improved signage at the Mapara Road intersection. These are minor, proportionate upgrades that are standard conditions for rural residential developments of this scale.
- The internal road network will be entirely private, approximately 5 km in length, commencing from the western end of Whakaroa Road and gated for private access. It will be managed under a legal maintenance instrument with no cost burden to TDC.

The TIA confirms that adverse traffic effects on the supporting land transport network would be no more than minor. This criterion is met.

2.7.4 Criterion 4 — Not an Outstanding Natural Landscape or Significant Natural Area

Criterion: The area is not identified as an Outstanding Natural Landscape or Significant Natural Area.

Engagement with the Criterion

This is the criterion that requires the most careful analysis. The subject site lies entirely within OLA 65 (Whakaroa Peninsula Outstanding Landscape Area) under the operative Taupō District Plan, and it overlooks Lake Taupō, which is identified as ONFL 9 / OLA 60 (an Outstanding Natural Feature and Landscape). SNA277 and SNA309 are located adjacent to but do not overlap the subject parcels.

Read literally and absolutely, this criterion might appear to preclude rezoning. That reading is incorrect for two reasons.

First, the criterion's purpose is to ensure that outstanding landscape values are given appropriate weight, not to operate as a blanket prohibition on any activity in any area subject to an OLA overlay. The OLA 65 overlay in the TDP does not prohibit residential development — it requires that development avoid, remedy, or mitigate adverse effects on the outstanding landscape values that give rise to the designation. The PC44 s32 Report itself adopts an effects-based approach throughout: it does not say that land with OLA overlays can never be rezoned, but that the effects on landscape values must be addressed.

Second, and more fundamentally, an absolute reading would produce an absurd result: it would mean that no development of any kind can be proposed in OLA-overlaid land through a submission, regardless of how minor the effects are. This cannot have been the intent of the criterion, which is directed at the appropriate level of scrutiny — not at creating a prohibition.

The Landscape and Visual Effects Assessment

The Landscape and Visual Effects Assessment was prepared by Rob Pryor, NZILA Registered Landscape Architect, of LA4 Landscape Architects (Final, 28 May 2026, Appendix I). The LVA was prepared in accordance with the Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines 2022 — the nationally recognised methodology for landscape assessment in New Zealand planning processes.

The LVA assessed nine viewpoints across the visual catchment of the subject site, selected to represent the range of observers who might experience the development, from the most sensitive (lake-level views from Whakaipo Bay and Whangamata Bay) to rural elevated viewpoints (Lochridge Estate, Piro Place, Taumata Rise). The LVA findings are as follows:

- Natural character effects: Low from all viewpoints. The clustered pocket approach, with indigenous mitigation planting and Building Design Guidelines, maintains the prevailing natural and pastoral character of the Whakaroa Peninsula across the majority of the OLA 65 landscape.
- Landscape character effects: Low from all viewpoints. The three development pockets are concentrated in areas of existing pastoral modification and are set back from ridgelines and lake-facing slopes. The pastoral and bush character of the wider OLA 65 landscape is retained.
- Visual amenity effects: Low or very low from all nine viewpoints. From the most sensitive lake-level viewpoints (Whakaipo Bay, Whangamata Bay), the development would be largely screened by the landform of the Whakaroa Peninsula and the existing vegetation of the DoC scenic reserve. From the two closest viewpoints (Lochridge Estate and Piro Place), effects are assessed as low.
- Cumulative effects: The clustered pocket approach produces lower cumulative effects than the permitted 10 ha baseline. Under the baseline, 66 dwellings would be dispersed across the full 344 ha of the OLA 65 landscape with no design coordination, no unified landscape mitigation strategy, and no ability to avoid the most sensitive terrain. The plan change produces a superior cumulative landscape outcome.

The overall LVA conclusion is that adverse effects on OLA 65 and ONFL 9 landscape values would be less than minor, and that the proposed development is compatible with the outstanding landscape values that give rise to the OLA 65 and ONFL 9 designations.

SNAs

SNA277 and SNA309 are located adjacent to the subject site but do not overlap the subject parcels. The development pockets have been deliberately positioned away from the site boundaries that adjoin these SNAs. The proposed pastoral retirement and riparian/gully planting is expected to enhance indigenous biodiversity values adjacent to these areas. A biodiversity assessment will be prepared at resource consent stage confirming no significant adverse effects on SNA values.

Conclusion on Criterion 4

Criterion 4 is met. The OLA 65 overlay does not prohibit rezoning — it requires that adverse effects on outstanding landscape values be avoided, remedied, or mitigated. The LVA demonstrates that the proposed development achieves effects that are less than minor on OLA 65 and ONFL 9 values, and that the clustered pocket approach produces a materially better landscape outcome than the permitted baseline. The SNA criterion is met unconditionally as neither SNA overlaps the subject site.

2.7.5 Criterion 5 — Proximate to the Taupō Township and/or Existing LDR

Criterion: The area is proximate to the Taupō township and/or existing LRZ.

The subject site is located approximately 11 km from the Taupō township via Mapara Road and Poihipi Road — a travel time of approximately 15 to 20 minutes by private vehicle. The site is adjacent to the Kinloch settlement, which is an established Taupō District urban township with its own GRZ zoning, primary school, medical facilities, commercial and retail services, and marina.

The criterion is satisfied in two respects. First, the site is proximate to the Kinloch township and existing GRZ zoning — the most immediate and relevant urban community for this location. The PC44 s32 Report acknowledges throughout that LDR demand in the district arises not only in the Taupō urban area but across the district's townships, and that the purpose of the LDR zone is to provide for this demand in appropriate locations. Kinloch is an

established TDC urban community that anchors the northern Lake Taupō area. Second, while 11 km from central Taupō is at the outer range of 'proximate', this distance is a function of the geography of the district — major settlements in the Taupō District are spread across a large area and road distances of this order are consistent with rural residential living patterns throughout the district.

The proposed development is specifically designed to serve the rural residential market segment — households seeking a larger section in a natural rural setting within reasonable commuting distance of Taupō township and local services at Kinloch. The PC44 s32 Report's own economic analysis (Taupō Low Density Residential Demand Forecast Economic Update, May 2025) identifies a continuing demand for this typology. The subject site addresses that demand in a location that is as proximate to both Kinloch and Taupō township as any comparable rural residential area in the district.

This criterion is met.

2.7.6 Criteria 6 and 7 — State Highway Access and Geothermal Systems

Criterion 6: The site does not take access from a State Highway.

Site access is via Whakaroa Road, a Low Volume Road, which connects to Mapara Road, a Secondary Collector Road. Neither Whakaroa Road nor Mapara Road is a State Highway. The internal development road is entirely private, gated from the western end of Whakaroa Road. There is no access to or from any State Highway. This criterion is met.

Criterion 7: The area is not located within land being part of the Wairakei-Tauhara or Ohaaki Geothermal Systems shown on Map D1.

The subject site is located on the Whakaroa Peninsula on the western shores of Lake Taupō at Kinloch. It is not located within the Wairakei-Tauhara Geothermal System or the Ohaaki Geothermal System as shown on Map D1 of the Taupō District Plan. The geothermal systems are located to the north and east of the Taupō urban area and are geographically remote from the Kinloch/Whakaroa Peninsula location of the subject site. This criterion is met.

2.7.7 Criterion 8 — Freedom from Significant Natural Hazard Risk

Criterion: The area is demonstrated to be free of significant natural hazard risk.

Approach

This criterion requires demonstration — not an assertion. The Preliminary Geotechnical Report by CORE50 Engineers Limited (April 2026, Appendix F) and the Stormwater Management Plan by BTW Company (Rev WD, April 2026, Appendix E) together provide the technical basis for this demonstration. The criterion does not require the complete absence of natural hazards — all land carries some level of natural hazard. It requires that the level of risk be demonstrated to be manageable, consistent with the proportionate, risk-based approach required by the NPS-NH 2025.

Liquefaction

The site is classified as TC1 Like for liquefaction based on CORE50 CPTu testing at four locations across the site. The site consists of dense ignimbrite and pumice soils with very low liquefaction probability. Liquefaction Potential Index (LPI) and Liquefaction Severity Number (LSN) were both calculated at zero across all test locations. Liquefaction presents a low risk level under the NPS-NH 2025 matrix and requires no site-specific mitigation beyond standard building code provisions.

Flooding

No flood hazard from rivers, streams, or overland flow paths is mapped for the subject site in the Taupō District Plan or Waikato Regional Council flood hazard databases. The site's elevated position on the Whakaroa Peninsula above Lake Taupō and its well-draining pumice soils mean that flood risk from rainfall events is low. The BTW Stormwater Management Plan confirms the site is assessed as low flood hazard risk under the NPS-NH 2025. On-site soakage is confirmed as the primary stormwater disposal method. Flooding presents a low risk level requiring no special mitigation.

Slope Instability

The site contains areas of steeper terrain, particularly towards the eastern portions of the parcels. CORE50 has identified slope instability risk in these areas and recommends Building Setback Lines (BSLs) of 5–15 m from slope crests, applied consistently across the development pockets. Building platforms have been positioned to respect these setbacks. Slope instability presents a low to medium risk level, managed through the BSL framework. No building platforms are proposed within areas of identified slope instability.

Active Faults

The Ngangaiho Fault and Ngangautu Fault traverse the subject site, as identified in the CORE50 geotechnical report. Active fault rupture presents a very high risk level under the NPS-NH 2025 risk matrix if a building platform falls within a confirmed Fault Avoidance Zone (FAZ). This is the most significant natural hazard facing the site.

The plan change addresses active fault risk through systematic, site-wide Fault Avoidance Zone mapping and coordinated building platform avoidance — an approach that is only possible through a plan change process and is demonstrably superior to the lot-by-lot geotechnical assessment that would occur under the permitted 10 ha baseline. Specifically:

- CORE50 has identified the approximate centrelines and indicative FAZ extents for both fault traces. Building platforms for lots adjacent to the fault traces have been positioned outside these FAZ extents in the development layout.
- Lots where FAZ refinement may be required at engineering approval stage will have building platforms confirmed outside FAZs through further GNS Science investigation. This investigation is a committed condition prior to any subdivision consent being granted.
- Once building platforms are confirmed outside FAZs, the residual active fault risk for those platforms is reduced from very high (within FAZ) to low (outside FAZ) under the NPS-NH 2025 risk matrix. No further mitigation is required beyond FAZ avoidance.
- The further GNS Science investigation required as a condition of subdivision consent will provide a higher level of certainty regarding FAZ extents than was available at plan change stage. This staged approach — plan change based on preliminary FAZ mapping, subdivision consent requiring confirmed FAZ extents — is the standard risk-based approach recommended by NPS-NH 2025 for active fault hazard management in plan change processes.

The proposed plan change is, in natural hazard management terms, superior to the permitted baseline. Under the permitted 10 ha subdivision baseline, 33 individual lots would each undergo separate geotechnical assessment at building consent stage, with no coordinated oversight, no GNS investigation commitment, and no ability to systematically redesign lot layouts to avoid FAZs across the full site. The plan change enables all of this.

Conclusion on Criterion 8

The site is not free of natural hazards — active faults in particular present a hazard that requires careful management. However, the criterion requires demonstration that the site is free of significant natural hazard risk, not that it is free of hazards entirely. The distinction

between hazard (a physical phenomenon) and risk (the product of hazard, likelihood, and consequence) is fundamental to the NPS-NH 2025 framework. The CORE50 report and the BTW SMP together demonstrate that:

- Liquefaction risk is low — no mitigation required beyond standard building provisions.
- Flood risk is low — on-site soakage confirmed as appropriate disposal method.
- Slope instability risk is low to medium — managed through Building Setback Lines.
- Active fault risk is very high within confirmed FAZs and low outside them — managed through systematic FAZ avoidance with GNS investigation required as a condition of subdivision consent.

No natural hazard presents a risk level under the NPS-NH 2025 matrix that requires avoidance of the development in its entirety. All risks are manageable to an acceptable level through conditions applied at plan change, engineering approval, and subdivision consent stages. Criterion 8 is met.

2.7.8 The Purpose and Structure of the Section 8.2 Criteria Framework

The eight criteria in PC44 section 8.2 are thresholds for when LDR rezoning through a submission is appropriate — not a list of physical characteristics that must be entirely absent from a site. This distinction is important for Criteria 4 and 8, which engage overlays and hazards that are present on the subject site but do not, on proper analysis, prevent rezoning.

The PC44 s32 Report's own policy framework acknowledges throughout that amenity, landscape, and hazard effects are to be avoided, remedied, or mitigated — not that they require absolute avoidance of all development. The RMA's effects-based approach, the NPS-NH's risk-based approach, and the NPS-UD's direction to enable development capacity that meets demand all point in the same direction: the question is whether effects are acceptable with appropriate mitigation, not whether any constraint exists at all.

Read in this way, all eight criteria support the conclusion that the proposed LDR rezoning is appropriate. The subject site:

- Is located adjacent to an established GRZ-zoned township (Kinloch) with a consistent rural residential development pattern;
- Is efficiently served by the existing TDC rural supply main and a tested private bore, with no public infrastructure cost;
- Generates traffic effects that are minor and manageable through standard road upgrade conditions;
- Is within OLA 65 and overlooks ONFL 9 — but the LVA demonstrates effects are less than minor and the clustered pocket approach is superior to the permitted baseline in landscape terms;
- Is proximate to Kinloch township (adjacent) and Taupō township (11 km, 15–20 min);
- Does not access a State Highway;
- Is not within either geothermal system; and
- Is subject to active faults that are managed through systematic FAZ avoidance with GNS investigation as a condition of subdivision consent.

The proposed plan change satisfies all eight criteria. It represents precisely the kind of LDR rezoning submission that the PC44 s32 Report's section 8.2 framework was designed to enable: a well-evidenced, site-specific proposal that achieves the same dwelling yield as the permitted baseline in a manner that is demonstrably superior for the landscape, the environment, and the productive rural land resource.

2.7.9 Comparative Advantage Over the Permitted Baseline

The PC44 s32 Report notes at section 8.2 that LDR development 'did not contribute significantly to overall growth and is inherently an inefficient use of land proximate to urban amenities.' This observation is directed at the general question of whether to extend LDR zoning on greenfield land through the plan change itself — not at whether a site-specific submission supported by technical evidence is appropriate. The report expressly provides for submissions seeking LDR inclusion.

On the specific facts of this proposal, the 'inefficient use of land' concern is addressed directly by the clustered pocket approach. The proposal does not bring forward additional development capacity beyond what the permitted baseline already provides — it rearranges 66 permitted dwellings from a dispersed pattern across 344 ha into three coordinated residential pockets across 44 ha, retaining 300 ha as productive farmland. This is a more efficient use of the rural land resource, not a less efficient one. The 300 ha of retained farmland represents active, integrated pastoral farming that would be eliminated under the permitted baseline. The plan change protects that land resource while delivering the permitted yield in a superior spatial form.

The following table summarises the comparative outcome across the key planning metrics:

Planning Metric	Permitted Baseline (10 ha grid)	Proposed Plan Change (clustered pockets)
Total dwellings	Up to 66 (33 primary + 33 minor on 10 ha lots)	Up to 66 (66 standalone LDR lots)
Residential land area	344 ha fragmented into 33 separate lots	~44 ha across three defined pockets
Productive farmland retained	Nil — farming enterprise eliminated by fragmentation	~300 ha retained as integrated working farm
Landscape effects on OLA 65	66 dwellings dispersed across full OLA 65 landscape — no coordinated mitigation	Clustered pockets on modified pastoral land — LVA confirms less than minor effects
Natural hazard management	Lot-by-lot assessment at building consent stage — no FAZ coordination	Systematic FAZ avoidance; GNS investigation required before subdivision consent
Infrastructure coordination	33 independent driveways, water tanks, effluent fields	Shared private road, communal wastewater system, single water supply reticulation
Nitrogen management	33 independent on-site systems — nitrogen neutrality not guaranteed	Communal treatment to 12 mg/L N; pastoral retirement offset — nitrogen neutrality achieved
Planning certainty	No design coordination; lot-by-lot consenting	Coordinated layout, Building Design Guidelines, legal maintenance instrument

Conclusion on Section 8.2 Assessment

The proposed LDR rezoning of 287, 351 and 387 Whakaroa Road, Kinloch satisfies all eight criteria established in section 8.2 of the PC44 Section 32 Evaluation Report. Six criteria are met unconditionally on the basis of the site's physical characteristics and location. Two criteria — the OLA 65 landscape overlay (Criterion 4) and active fault risk (Criterion 8) — are met with the support of technical evidence (the LVA and the CORE50 geotechnical report respectively). Neither criterion operates as a prohibition on rezoning; both require an effects-based

assessment that has been carried out through the technical reports in the supporting appendices.

The proposal is also consistent with the broader intent of the section 8.2 framework: it achieves the same dwelling yield as the permitted baseline in a manner that is demonstrably superior for the landscape, the environment, the productive rural land resource, and infrastructure management. It is the kind of LDR rezoning submission the PC44 framework was designed to enable.

3. Objectives of the Proposed Plan Change

3.1 Proposed Objectives

The objectives of the proposed rezoning from Rural Environment to Low Density Residential Environment are:

#	Objective
O1	To enable low density residential development on land that is appropriately located in relation to existing urban areas, infrastructure, and community facilities within the Taupō District.
O2	To provide additional housing land supply to meet the identified residential growth needs of the Taupō District, consistent with the Council's Future Development Strategy and population projections to 2060.
O3	To ensure that the character, scale, and form of residential development on the subject site is appropriate to its location and consistent with the Low Density Residential Environment provisions of the Taupō District Plan.
O4	To facilitate efficient use of existing infrastructure, including roading, water supply, and wastewater networks, to service new residential development.
O5	To protect and maintain the natural values, ecological features, and amenity of the subject site and surrounding environment through the application of appropriate rules and standards.
O6	To retain the productive rural character and ongoing pastoral farming use of the balance land (approximately 300 ha), confining residential development to three discrete, defined pockets that minimise fragmentation of the landscape and the agricultural land resource, and that coexist with and complement — rather than displace — the existing pastoral farming enterprise.
O7	To demonstrate through a robust and independent landscape and visual effects assessment, prepared in accordance with the Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines 2022 and addressing all relevant viewpoints in the OLA 65 / ONFL 9 visual catchment, that the proposed clustered pocket development approach produces effects on outstanding landscape values that are less than minor and materially superior to the effects of the permitted 10 ha grid subdivision baseline.

3.2 Assessment of Objectives

The objectives above are consistent with and give effect to the purpose of the RMA (section 5), the relevant national policy statements, and the Waikato Regional Policy Statement. They align with the objectives and policies of the Low Density Residential Zone as proposed by Plan Change 44, and with the Strategic Directions provisions of the operative Taupō District Plan. The PC44 section 8.2 criteria are addressed in detail at Section 2.7.

The objectives are considered to be the most appropriate way to achieve the purpose of the RMA in the context of this site and the surrounding landscape, taking into account the productive land retention objective (O6) and the landscape effects demonstration objective (O7) that together define the planning rationale for the clustered pocket approach.

4. Principal Alternatives Considered

4.1 Overview

Section 32(1)(b) requires that the principal alternative ways of achieving the objectives have been identified and assessed. Three principal alternatives have been considered:

4.2 Alternative 1: Status Quo (Retain Rural Environment Zoning)

Under this alternative, the subject site would remain zoned Rural Environment. Residential development would continue to be assessed on a case-by-case resource consent basis.

Advantages	Disadvantages
Maintains existing rural character. No immediate infrastructure demand.	Fails to provide planned residential capacity. Inconsistent with NPS-UD growth requirements and the PC44 FDS housing supply objectives. Allows continued ad hoc development through individual resource consent applications. Critically, the permitted 10 ha grid subdivision baseline — which is the realistic 'do nothing' outcome — would scatter 66 dwellings across the full 344 ha OLA 65 landscape with no coordinated landscape strategy, no Building Design Guidelines, and no ability to protect the productive farming enterprise. This outcome is demonstrably worse for the Whakaroa Peninsula landscape and productive land than the proposed plan change.

This alternative is not preferred. It does not achieve the stated objectives and is inconsistent with the NPS-UD and the Council's Future Development Strategy.

4.3 Alternative 2: Medium or High Density Residential Rezoning

This alternative would rezone the subject site to a Medium Density or High Density Residential Environment, enabling more intensive residential development.

Advantages	Disadvantages
Greater housing supply per hectare. Potentially better infrastructure efficiency.	Inconsistent with site characteristics, surrounding rural context, and OLA 65 / ONFL 9 landscape designations. Would require significant infrastructure investment well beyond the capacity of existing water supply and private road networks. Would not retain the productive farming operation. Cannot satisfy the PC44 s8.2 LDR criteria. A higher-density development outcome cannot be reconciled with the LVA analysis — clustered low-density development is the minimum intervention compatible with less-than-minor effects on the outstanding landscape values of the Whakaroa Peninsula.

This alternative is not preferred. Given the site's location on the urban fringe and its physical characteristics, a higher density zoning would be inappropriate and inconsistent with the surrounding environment.

4.4 Alternative 3: Proposed Low Density Residential Rezoning (Preferred)

The proposed rezoning to Low Density Residential Environment is the preferred alternative. It appropriately balances the need for residential growth with the site's characteristics and context, provides certainty for landowners and the community, and gives effect to relevant national and regional planning documents.

This alternative is considered the most appropriate way to achieve the stated objectives and is assessed in detail in the following sections.

The proposed alternative is specifically consistent with the criteria established in section 8.2 of the PC44 Section 32 Evaluation Report for submissions seeking LDR rezoning. Of the eight criteria, six are met unconditionally by the site's characteristics: the site is adjacent to the Kinloch settlement (consistent LDR character); serviced by the existing TDC rural supply main; traffic effects are minor per the TIA; access is via Whakaroa Road, not a State Highway; the site is not within the Wairakei-Tauhara or Ohaaki Geothermal Systems; and natural hazard risk is demonstrably manageable. Two criteria — the OLA 65 landscape overlay and the presence of active faults — require evidential support, provided by the LVA and the CORE50 geotechnical report respectively. Neither precludes rezoning. The LVA confirms effects on OLA 65 are less than minor using the clustered pocket approach. The CORE50 report confirms building platforms can be positioned outside all Fault Avoidance Zones with further GNS investigation prior to subdivision consent. This preferred alternative is the only one of the three considered that can satisfy all eight criteria.

This alternative also preserves the greatest quantum of productive rural land. Concentrating development in ~44 ha of defined pockets retains ~300 ha as an active, integrated pastoral farm — an outcome directly aligned with the GRUZ objectives of the TDP and the RPS direction to protect productive rural land from inappropriate fragmentation. The status quo alternative provides no such assurance, and the higher density alternative would require a scale of development fundamentally incompatible with retaining a viable farming operation on the balance land.

The LDR clustered pocket approach is the only alternative that simultaneously meets the PC44 criteria, satisfies the OLA 65 and ONFL 9 overlay requirements as confirmed by the LVA, retains the productive farming enterprise, and achieves the stated objectives.

5. Assessment of Benefits and Costs

5.1 Overview

Section 32(1)(a) requires identification and assessment of the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposed plan change. This section addresses each category of effect. In each case, the assessment takes into account the comparative position relative to the permitted baseline of 33 dispersed 10 ha lots across the full 344 ha site, which is the relevant comparator for a section 32 evaluation of this type.

5.2 Environmental Effects

5.2.1 Benefits

- The Low Density Residential Environment and Natural Values provisions include rules for building setbacks, height limits, landscaping, and site coverage that will maintain an appropriate level of amenity and limit the visual and physical dominance of buildings.
- The proposed zoning will enable planned, orderly development with appropriate environmental controls, avoiding the ad hoc development patterns that can arise from case-by-case rural consenting.
- Low density residential development, through appropriate stormwater, earthworks, and landscaping rules, can avoid, remedy, or mitigate adverse effects on natural values, waterways, and ecological features.
- A Stormwater Management Plan (SMP) has been prepared for the site by BTW Company (Rev WD, April 2026) and is attached as Appendix E. The SMP demonstrates that stormwater effects are manageable. Key findings include: (a) the site is assessed as 'low' flood hazard risk under the National Policy Statement for Natural Hazards 2025; (b) the highly permeable pumice soils support on-site soakage disposal for all lots and rights of way, avoiding discharge to sensitive receiving environments; (c) the stormwater management system gives effect to Te Mana o te Wai by prioritising the health and well-being of receiving water bodies within the Lake Taupō catchment; and (d) green infrastructure – grassed swales, filter strips, and rock check dams – is proposed to provide water quality treatment to road runoff prior to discharge, in accordance with the Waikato Regional Council Stormwater Management Guideline (TR20-07). The SMP has been prepared in accordance with Taupō District Council and Waikato Regional Council standards.
- The balance land is proposed to remain in active pastoral farming as a working farm integrated with the residential development. The development has been designed to be nitrogen neutral: an appropriate area of pastoral land within the farm will be retired from active grazing to offset the nitrogen contribution from the residential dwellings, such that there is no net increase in nitrogen discharge from the property as a whole. In addition, steeper gullies and areas adjacent to the development are proposed to be retired from pastoral use and replanted in native or amenity vegetation – providing a further likely reduction in nitrogen discharge. The specific areas for retirement and replanting have not yet been fully assessed, and a detailed nitrogen management plan will be prepared at resource consent stage to confirm compliance with Waikato Regional Council rules for the Lake Taupō catchment. The overall nitrogen outcome is expected to be a reduction from the current pastoral baseline, consistent with the values of Lake Taupō as a Contact Recreation Zone under the Waikato Regional Plan. The retention of active pastoral farming alongside residential development is a positive planning outcome, maintaining productive agricultural land use and rural character consistent with the General Rural Zone context of the site.

- Potable water supply for the development is confirmed as feasible through two independent sources: an existing TDC public rural supply main (66,800 L/day, sufficient for a trickle supply to 39 properties at 1,600 L/day) and an existing private bore tested at 14,000 L/hr (3.89 L/s) over 12 hours. The total water demand for 66 dwellings at the TDC code of practice rate of 1,600 L/day is 105,600 L/day – well within the combined supply capacity. The Infrastructure Report concludes that there are no infrastructure servicing issues that should affect the development.
- The proposed internal road network will be fully private, commencing from the end of Whakaroa Road and gated for private access. The entire road network of approximately 5 km will be subject to a legal instrument – such as an incorporated society or body corporate agreement – to ensure long-term maintenance and funding obligations are shared equitably among future residents, with no burden falling on Taupō District Council. A main spine road will run through the site, with a secondary road branching off to serve the low density residential sites in Area A below the transmission tower line. The alignment broadly follows existing formed farm tracks to limit earthworks and maintain the working farm character of the balance land. One section through a heavily planted area with steeper, narrow ground will require detailed design and cut and fill to achieve the required access road width and legal formation; this will be addressed at engineering approval stage. The private road approach is consistent with the rural residential environment and comparable developments in the region, and the legal management structure provides certainty for future residents and the Council over the long-term maintenance of the network.
- The proposed plan change avoids adverse effects on Significant Natural Areas SNA277 and SNA309, which adjoin (but do not overlap) the subject site. By concentrating development in defined pockets, the plan change maintains appropriate buffers from these SNA boundaries. Similarly, identified archaeological sites on the NZAA database are avoided by the proposed development layout – an outcome that is more reliably achieved through a co-ordinated plan change approach than through the alternative of piecemeal 10 ha grid subdivision assessed on a lot-by-lot consent basis.
- The LVA specifically concludes that the clustered pocket development approach produces materially lower adverse cumulative landscape effects than the permitted baseline of 66 dwellings (33 primary plus 33 minor units) dispersed across the full OLA 65 landscape. Under the permitted baseline, dwellings, driveways, earthworks, domestic infrastructure, and vehicle movements would be scattered across 344 ha of the Whakaroa Peninsula with no coordinated landscape strategy, no unified design guidelines, and no ability to systematically concentrate development away from the most sensitive ridgeline, lake-facing and bush-edge terrain. The plan change, by contrast, enables Building Design Guidelines, coordinated indigenous mitigation and restoration planting, and building platform positioning informed by both the LVA and geotechnical assessment. The LVA explicitly identifies this comparative advantage: the plan change's cumulative landscape effects are assessed as lower than those of the permitted baseline.

5.2.2 Costs and Mitigation

- There will be some localised change in character within the three residential development pockets as the site transitions from rural to residential land use. This change is limited to approximately 44 ha — approximately 13% of the subject site — and does not affect the character of the remaining 300 ha, which continues as active pastoral farmland. Critically, this localised character change is substantially less than would result from the permitted baseline of 33 dispersed 10 ha lots across the full 344 ha site. The LVA confirms that adverse effects on landscape character within OLA 65 are low and less than minor, and that the clustered pocket approach retains the

prevailing rural character of the Whakaroa Peninsula. This cost is therefore both minor in absolute terms and demonstrably better than the permitted alternative.

- Earthworks associated with site development may result in temporary sediment discharge. Erosion and sediment control plans will be prepared in accordance with WRC guidance (TR 2009/02), and pumice soil compaction during construction will be managed to preserve pre-development infiltration rates. These effects are managed through regional plan requirements.
- Any effects on indigenous biodiversity will be addressed through the District Plan's indigenous biodiversity provisions and, if applicable, through conditions of subdivision consent.

5.2.3 Landscape and Visual Effects

Overview

A Landscape and Visual Effects Assessment ("LVA") has been prepared by LA4 Landscape Architects (Rob Pryor, NZILA Registered Landscape Architect) and is now Final (28 May 2026), attached as Appendix I to this report. The LVA was prepared in accordance with the Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines 2022 ("TTatM") and addresses the effects of the proposed rezoning on landscape character, natural character, and visual amenity values of the site and surrounding environment.

The proposal involves the rezoning of approximately 44 hectares of the 344.2165 hectare site from General Rural Zone to Low Density Residential Zone within three discrete areas. The site is located on the elevated upper escarpment of the Whakaroa Peninsula and is subject to Outstanding Landscape Area overlay OLA 65 (Whakaroa Peninsula) in its entirety, and a small area of Amenity Landscape Area (ALA 66 Whakaroa Hills) in the northern part. Lake Taupō is identified as an Outstanding Natural Feature and Landscape (ONFL 9) in the Waikato Regional Policy Statement, coinciding with TDP OLA 60.

Natural Character Effects

The LVA concludes that the proposed rezoning would have low adverse effects on the natural character values of the site and surrounding area. The site has historically been utilised for rural production and pastoral farming and consists predominantly of open pasture with low natural character values. The natural characteristics and qualities that contribute to the natural character of the surrounding environment – including Lake Taupō's ONFL and OLA, the Whakaroa Peninsula OLA, Whakaroa Hills ALA, and surrounding SNAs – would not be adversely affected by the proposal.

The physical and visual integrity of the area would be retained and the biophysical and hydrological natural processes of the location would not be adversely affected. The proposal would have no adverse effects on the ecological values of the lake environment or the macrofaunal communities within and around the lake margin. The site is physically separated from the lake and does not contain any permanent streams or wetlands. The characteristics and values of Lake Taupō's OLA – including the expansive area of water and its memorable and vivid attributes – would not be adversely affected, and the physical, aesthetic and associative attributes would be retained.

Landscape Character Effects

The LVA concludes that the proposal will have low adverse landscape character effects. The site and surrounding environment to the north have been subjected to high degrees of modification as a result of the removal of natural cover, pastoral farming activities, and rural residential and urban settlement patterns, and are not high in landscape character values. The proposal is assessed as an appropriate development and use of this part of the rural environment.

The landscape attributes of the Outstanding Landscape Areas would not be adversely affected. The Whakaroa Peninsula would retain its high physical prominence when viewed from within the lake and from Kinloch. The bush-clad areas on the headland with grazed pasture on the plateau would be retained, albeit interspersed with a limited level of built development. The site is well buffered from Lake Taupō's OLA and ONFL through the extensively vegetated SNAs surrounding the site. Any potential landscape effects would be localised due to the type and scale of change and the existing on-site and surrounding landform and vegetation patterns.

The proposal would result in a change in landscape character by introducing a level of built form into the landscape and reducing the existing rural character. However, it sits within a landscape that has been modified extensively for productive farming and is well buffered from the surrounding area by the vegetated SNAs on the Whakaroa Peninsula. The characteristics and qualities that contribute to the landscape character of the rural environment will not be adversely affected. The location, scale, and design of the proposal is appropriate in this modified rural environment.

Visual Amenity Effects

The LVA assessed visual effects from nine viewpoints across the visual catchment, including from Whakaipo Bay Recreation Reserve, from the water in Whakaipo Bay and Whangamata Bay, from Kinloch Marina, Lochridge Estate, Piro Place, and Taumata Rise. The visual catchment is restricted due to the steep terrain and densely vegetated characteristics of the Whakaroa Peninsula and DoC reserve flanking the site to the east, south, and west. The LVA further confirms that views will not be gained from the W2K (Whakaipo to Kinloch) Great Lake Trail — a segment of the Great Lake Pathway that traverses the adjoining Whakaroa Point Recreation Reserve — due to the densely vegetated nature of the reserve, meaning users of this nationally significant recreational asset will not experience visual effects from the proposed development.

The LVA concludes that adverse visual amenity effects from all assessed viewpoints would be low or very low (less than minor). Key findings include:

- From Whakaipo Bay Recreation Reserve (Viewpoints 1 and 2), the majority of the site is screened by the intervening landform and densely vegetated slopes of the Whakaroa Peninsula. Future development enabled by the rezoning is unlikely to be visible, and visual amenity effects would be very low to nil.
- From Whakaipo Bay (Viewpoint 3), the steep landform of the rocky bluffs, cliffs, and escarpments of the Whakaroa Peninsula largely screens future development, being located largely on the western side of the ridgeline. The visual amenity attributes of the OLA would not be adversely affected, and effects are assessed as low.
- From Whangamata Bay (Viewpoints 4 and 5), the densely vegetated peninsula entirely screens the majority of the site. The northern rezoning area would be visible to varying degrees but would be viewed within the context of the existing Kinloch settlement pattern. The landscape has the capacity to absorb the development, and effects are assessed as low.
- From Kinloch Marina (Viewpoint 6), parts of the northern rezoning area would be visible above the Loch eagles Rise settlement, viewed within the context of the Kinloch urban settlement pattern and separated by the indigenous bush stand. Effects are assessed as low.
- From elevated rural viewpoints at Lochridge Estate (Viewpoint 7), Piro Place (Viewpoint 8), and Taumata Rise (Viewpoint 9), built form associated with the proposal will be visible to varying degrees but would be subservient within the context of the wider viewshed. The scale and expanse of the wider landscape setting, combined with the small scale nature of the proposal and proposed mitigation measures, results in effects assessed as low.

Cumulative Effects

The LVA concludes there would be no adverse cumulative effects resulting from the proposed rezoning. The rezoning of 44 hectares will not exceed the capacity of the landscape to absorb the changes or compromise its existing landscape values. Clustering future development into three defined areas allows for an extensive area of the site to remain in primary production, retaining the rural character values. Building Design Guidelines and comprehensive mitigation and restoration planting will ensure that future development integrates well into the rural landscape.

Critically, the LVA notes that the alternative permitted baseline of sixty-six dwellings dispersed across the site with minimal design integration could potentially result in greater adverse cumulative effects through the resulting scattering of dwellings and structures of varying architectural designs with no coordinated landscape strategy. The proposed plan change approach is therefore demonstrably superior in landscape and visual amenity terms compared to the permitted baseline.

Mitigation Measures

The LVA identifies the following mitigation measures to address any adverse landscape and visual effects arising from future development enabled by the rezoning:

- Building Design Guidelines to assist in integrating built development into the landscape setting, addressing matters including building materials, colours, scale, and form.
- Indigenous mitigation and restoration planting requirements to screen or soften built structures and contribute to the ecological restoration of the site margins and gully systems.
- Clustering of development into three defined areas to concentrate built form and retain the majority of the site in pastoral production and natural character.

LVA Conclusion

The LVA concludes that within the context of the established rural environment, the proposal could be effectively integrated and assimilated into the site and surrounding landscape. Overall, the adverse effects on the natural character, landscape character, and visual amenity values of the surrounding Taupō environment would be low (less than minor). The proposal meets the overall intent of the relevant landscape and amenity objectives, policies and rules of the relevant statutory provisions and is acceptable in landscape character and visual amenity terms. The LVA is attached as Appendix I.

5.3 Economic Effects

5.3.1 Benefits

- The rezoning will increase the supply of residential land, contributing to housing affordability and market choice in the Taupō District.
- It will enable the efficient utilisation of existing infrastructure networks, reducing per-household infrastructure costs compared with more distant greenfield development.
- Residential development will generate economic activity through construction, local spending, and rates income for the Council.
- Providing planned residential capacity reduces developer uncertainty and enables timely housing delivery in response to population growth.
- Creating 66 new lots will provide significant Rates revenue for TDC with minimal infrastructure, maintenance, or operating costs due to the private road, private septic systems and no increased water supply, e.g. 66 Lots average of \$7000 rates contribution will net TDC \$462,000 pa in Rates for minimal expenditure

5.3.2 Costs and Mitigation

- Infrastructure upgrades may be required to service new residential lots. These costs are typically borne by the developer through development contributions and subdivision requirements, rather than the community at large.
- There may be some reduction in the total area of productive rural land. However, this cost is materially less than under the permitted baseline: the proposed plan change confines residential development to approximately 44 ha across three discrete pockets, retaining approximately 300 ha as an active pastoral farming enterprise. Under the permitted 10 ha subdivision baseline, the full 344 ha would be fragmented into 33 separately-owned lots, eliminating the integrated farming operation entirely. The proposed approach is therefore clearly superior in productive land terms. The pumice-derived pastoral soils of the subject site are not classified as highly productive land, and their continued use as productive land is contingent on being managed as a unified farming enterprise — which the plan change specifically enables.

5.4 Social Effects

5.4.1 Benefits

- The rezoning supports the provision of additional housing to meet Taupō's identified growth needs, contributing to community wellbeing and housing affordability.
- Low density residential development at an appropriate location will provide access to open space, community facilities, schools, and services consistent with a high quality of life.
- The planned nature of the rezoning provides certainty for existing and future residents regarding the future character of the area.

5.4.2 Costs and Mitigation

- There may be some amenity effects on adjoining rural properties during and after transition. These are manageable through appropriate yard, landscaping, and fencing rules within the Low Density Residential Environment.
- Traffic generation will increase with residential development. A Transport Impact Assessment (TIA) prepared by Urban Connection Limited (August 2023) for a previous, larger-scale iteration of the development (115 lots and a tourism lodge) provides relevant roading baseline data and is attached as Appendix H. That assessment found that even with that larger development, the Whakarua Road/Mapara Road intersection would operate at a maximum of 29% of available capacity — well within functional limits. The proposed development of up to 66 standalone low density residential lots is estimated to generate approximately 297 vpd and 30 vph in the peak hour, applying the TIA's surveyed rural residential rate of 4.5 vpd and 0.45 vph per lot. This remains significantly below the traffic volumes assessed in the TIA and well within the roading network's capacity. The TIA identified that Whakarua Road requires widening to a minimum 6.7 m along its 2.9 km length, and recommended intersection upgrades at Mapara Road (right turn lane, give way markings, flag lighting, and improved signage). These infrastructure improvements should be addressed as conditions of any subdivision consent. Sight distances at the Whakarua Road/Mapara Road intersection already comply with TDC requirements (270 m north, 160 m south against a 160 m requirement). Internally, the site will be served by a fully private road network of approximately 5 km commencing from the end of Whakarua Road, gated for private access. The road will be managed under a legal instrument ensuring ongoing maintenance and funding by future residents, with no cost burden to Taupō District Council. The alignment follows existing farm tracks where possible to minimise earthworks; one challenging section through a heavily planted,

steep and narrow area will require detailed cut and fill design to achieve the required road width and legal formation. These internal roading matters will be resolved at engineering approval and subdivision consent stage.

5.5 Cultural Effects

5.5.1 Māori Cultural Values

Taupō District is within an area of significant cultural importance to Ngāti Tūwharetoa as tangata whenua. The assessment of cultural effects should be undertaken as part of future resource consent as required by sections 6(e), 7(a), and 8 of the RMA.

- The site is located within the rohe of Ngāti Tūwharetoa, who are the principal iwi with interests in the Lake Taupō region. Engagement with Ngāti Tūwharetoa will be undertaken as part of the resource consent processes to identify any sites or areas of significance, cultural associations, and any conditions or protections required. Lake Taupō (ONFL20), which the site overlooks, has deep cultural significance to Ngāti Tūwharetoa.
- Archaeological sites identified on the NZAA database are present in parts of the subject site. The proposed development has been deliberately located to avoid these areas – a key advantage of the plan change approach over the permitted baseline of 10 ha grid subdivision, under which individual lot development would be assessed on a consent-by-consent basis without the same systematic avoidance of known archaeological features across the whole site.

5.5.2 Heritage

No scheduled heritage items or scheduled buildings are identified on the subject site in the operative Taupō District Plan. Archaeological sites recorded on the NZAA database are present in parts of the site; the proposed development avoids these areas. All works that may affect archaeological sites will require authority from Heritage New Zealand Pouhere Taonga under section 44 or 56 of the Heritage New Zealand Pouhere Taonga Act 2014.

6. Risk Assessment

6.1 Risk of Acting

The principal risk of proceeding with the rezoning relates to the possibility that future residential development may generate adverse effects that are not fully anticipated at this stage.

These risks include:

- Infrastructure capacity constraints, including water supply, wastewater, and stormwater management. An Infrastructure Report by Simpli Consulting Limited (May 2026, summarised in Appendix G) confirms that both water supply and wastewater are feasible for this development. Water supply is provided through two independent sources: an existing TDC public rural supply main (66,800 L/day) and a tested private bore (3.89 L/s). Total demand for 66 dwellings (105,600 L/day) is well within this combined capacity. Wastewater will be managed through individual advanced treatment systems and/or a communal treatment system achieving nitrogen reduction to 12 mg/L with land disposal, meeting WRC secondary treatment standards. Stormwater is addressed in the Stormwater Management Plan by BTW Company (Appendix E). The Infrastructure Report concludes that there are no infrastructure servicing constraints that would affect the development's viability.
- Traffic effects on the surrounding road network. A TIA by Urban Connection Limited (August 2023, Appendix H) demonstrates the roading network can accommodate development traffic with manageable infrastructure upgrades. Even for a much larger 115-lot proposal, the key intersection operated at well under 30% of available capacity. The proposed 66 standalone low density residential lots are estimated to generate approximately 297 vpd and 30 vph peak — less than a quarter of the traffic volumes assessed in the TIA. The main mitigations required are widening of Whakaroa Road to 6.7 m and intersection upgrades at Mapara Road. No capacity constraints were identified that would preclude residential development on this site.
- Natural hazard risk, including volcanic hazard and active fault lines given the Taupō Volcanic Zone context. A Preliminary Geotechnical Report by CORE50 Engineers (April 2026, Appendix F) has assessed these risks. The site is classified as TC1 Like for liquefaction, with 100% low probability across all four CPT test locations. No flood hazard is mapped for the site. Two active faults (Ngangiho and Ngangautu) cross the site; building platforms for affected lots must be located outside confirmed Fault Avoidance Zones, and further fault trace investigation is recommended for lots 4, 5, 7, 8, 15, 17, 19, 21, 22 and 25. Slope stability setbacks of 5–15 m from slope crests apply across the site. These risks are manageable through appropriate lot layout, building platform design, and conditions at building consent stage.
- Effects on freshwater quality and quantity. The development has been designed to achieve nitrogen neutrality: an area of pastoral land within the farm will be retired to offset residential nitrogen discharge, resulting in no net increase in nitrogen from the property. The current pre-development total nitrogen discharge allowance (TAND) is 4,337 kgN/yr from pastoral use. A detailed nitrogen management plan confirming the offset area and methodology will be prepared at resource consent stage in accordance with Waikato Regional Council rules. In addition, steeper gullies and riparian areas adjacent to the development are proposed to be retired and replanted, which is expected to produce a further net reduction in nitrogen discharge, though the specific areas and quantum have not yet been assessed. Overall, the nitrogen outcome is expected to be neutral to positive for Lake Taupō, which is classified as a Contact Recreation Zone and highly valued for water quality under the Waikato Regional Plan. Stormwater quality is managed through green infrastructure as confirmed in the SMP (Appendix E).

These risks are considered manageable through the existing provisions of the Low Density Residential Zone and Natural Values Rules of the Taupo District Plan, the requirements of relevant national environmental standards, and through conditions applied at the subdivision and development consent stages. In particular, with respect to stormwater management, a Stormwater Management Plan (SMP) has been prepared by BTW Company (Rev WD, April 2026) and is attached as Appendix E. The SMP concludes that the site is at 'low' flood hazard risk under the NPS-NH 2025, that on-site soakage via the site's permeable pumice soils is a viable primary disposal method, and that water quality treatment for road runoff can be achieved through green infrastructure in accordance with TDC and WRC standards.

With respect to water supply and wastewater, an Infrastructure Summary Report by Simpli Consulting Limited (May 2026, Appendix G) confirms that the existing TDC public rural supply main and on-site private bore together provide sufficient capacity for 66 dwellings, and that a communal advanced wastewater treatment system achieving nitrogen reduction is viable.

With respect to freshwater quality, the development has been designed to be nitrogen neutral: pastoral retirement within the farm will offset the residential nitrogen contribution, with a likely further reduction from retiring steeper gullies and riparian areas adjacent to the development. A detailed nitrogen management plan will be prepared at resource consent stage. The balance land is proposed to remain as a working pastoral farm, maintaining rural character and productive agricultural land use.

The infrastructure and freshwater risks associated with this rezoning are therefore considered well understood and manageable.

6.2 Risk of Not Acting

The risk of not rezoning the subject site includes:

- Failure to provide adequate housing land supply to meet the district's projected growth needs, contributing to housing unaffordability and supply shortfalls;
- Continued ad hoc development on rural land through individual consent applications, resulting in unplanned and potentially inefficient development patterns;
- Non-compliance with the requirements of the NPS-UD to provide sufficient residential development capacity;
- Foregone economic benefits associated with planned residential development and infrastructure investment.

On balance, the risk of not acting is considered greater than the risk of proceeding with the proposed rezoning, particularly given the alignment of the proposal with Council's Future Development Strategy and the NPS-UD.

6.3 Uncertainty

There is some residual uncertainty regarding two matters: first, the precise extents of the Fault Avoidance Zones for the Ngangiho and Ngangautu Faults, which will be resolved through further GNS Science investigation required as a condition of subdivision consent; and second, the detailed lot layout and building platform design, which will be finalised through the engineering approval and subdivision consent processes. Neither source of uncertainty is of a kind that creates material risk to the rezoning decision — both are standard matters addressed through conditions at later consent stages, and the fundamental feasibility of the development has been confirmed through the technical reports in the supporting appendices.

The evaluation has been carried out in accordance with section 32(2)(c), which requires consideration of the risk of acting or not acting where there is uncertain or insufficient information.

7. Evaluation of Proposed Methods

7.1 Proposed Methods

The proposed method to achieve the objectives is to rezone the subject site from the Rural Environment to the Low Density Residential Zone on the Taupō District Plan maps, through the Plan Change 44 process.

The Low Density Residential Environment provisions of the District Plan (as proposed through Plan Change 44) and existing Natural Values Rules and Standards will then apply to the site, providing a suite of objectives, policies, and rules to manage residential development including:

- Permitted activity standards for buildings (height, setbacks, site coverage, landscaping);
- Subdivision standards including minimum lot sizes and dimensions;
- Rules managing earthworks, vegetation removal, and stormwater;
- Provisions addressing natural hazards, including the Taupō Volcanic Zone volcanic hazard overlay.

Allowing the permitted baseline of 33 dispersed 10 ha lots to proceed through individual resource consent applications, producing a pattern of development across the full 344 ha of OLA 65 that is demonstrably more harmful to the outstanding landscape values of the Whakaroa Peninsula than the coordinated clustered pocket approach proposed here — and that would fragment the existing pastoral farming enterprise beyond viable scale, permanently removing approximately 300 ha of productive rural land from active farming use.

7.2 Evaluation Summary

Criterion	Assessment	Conclusion
Efficiency	The rezoning enables residential development at a density and scale appropriate to the site's characteristics and location. Infrastructure costs can be offset through development contributions.	Efficient
Effectiveness	The rezoning is a direct and effective means of enabling residential development and providing planning certainty. It achieves all five stated objectives.	Effective
Appropriateness	Low Density Residential is the most appropriate zone given the site's context, proximity to urban area, and surrounding land uses. Higher or lower density alternatives are not appropriate.	Appropriate
Consistency with national documents	Gives effect to NPS-UD requirements for development capacity. Consistent with RPS urban growth policies.	Consistent
Consistency with District Plan objectives	Consistent with Plan Change 38 Strategic Directions and Future Development Strategy.	Consistent

Environmental effects	Manageable and minor. Low density residential rules provide adequate controls.	Acceptable
Economic effects	Net positive. Provides housing supply, infrastructure efficiency, and economic activity.	Positive
Social effects	Net positive. Provides housing choice and planned growth.	Positive
Cultural effects	Requires consultation with Ngāti Tūwharetoa. No known significant cultural sites on the site.	Manageable
Consistency with PC44 s8.2 LDR criteria	All eight PC44 s32 section 8.2 criteria are met. The OLA 65 overlay is addressed by the LVA (effects less than minor; clustered pocket approach produces substantially lower effects than the permitted 10 ha baseline). Active faults addressed by systematic FAZ avoidance and commitment to further GNS investigation prior to subdivision consent. Water servicing confirmed via existing TDC rural main. All other criteria met unconditionally.	Consistent
Landscape and visual effects — OLA 65 / ONFL 9	LVA (LA4, May 2026) confirms low adverse effects (less than minor) from all nine viewpoints including sensitive lake-level views from Whakaipo Bay and Whangamata Bay. Clustered pocket approach produces materially lower cumulative effects than the permitted 10 ha dispersed baseline. Building Design Guidelines and indigenous mitigation planting confirmed as appropriate and sufficient mitigation.	Acceptable — less than minor
Productive rural land retention	Approximately 300 ha retained as active, integrated pastoral working farm. Residential development confined to ~44 ha in three discrete pockets. The farm remains viable as a single enterprise — a direct, measurable advantage over the permitted 10 ha grid subdivision baseline, which would fragment the full 344 ha site and eliminate the farming enterprise.	Positive

8. Conclusion

This section 32 evaluation report has assessed the proposed rezoning of the subject site from the Rural Environment to the Low Density Residential Zone through Taupō District Plan Change 44.

The evaluation has considered:

- The objectives of the proposed plan change and whether they are the most appropriate way to achieve the purpose of the RMA;
- The principal alternative methods and their advantages and disadvantages;
- The environmental, economic, social, and cultural benefits and costs of the proposal;
- The risk of acting and not acting; and
- The consistency of the proposal with relevant national policy statements, the Waikato Regional Policy Statement, and the operative Taupō District Plan.

The evaluation concludes that the proposed rezoning of 287, 351 and 387 Whakaroa Road, Kinloch from the General Rural Zone to the Low Density Residential Zone is the most appropriate method of achieving the objectives of the plan change and the sustainable management purpose of the RMA. In summary:

1. The objectives of the proposed rezoning are appropriate and consistent with the purpose of the RMA, the NPS-UD, the NPS-FM, the NPS-NH 2025, the Waikato Regional Policy Statement, and the operative Taupō District Plan (including as proposed to be amended by Plan Change 44). Each objective is the most appropriate way to achieve the sustainable management purpose of the RMA in the context of this site.
2. The proposed method – rezoning to Low Density Residential Environment – is the most appropriate way to achieve those objectives, having considered and discounted the alternatives of retaining the Rural Environment zoning and rezoning to a higher density residential environment.
3. The anticipated benefits of the proposal substantially outweigh the anticipated costs. The proposal will result in net positive environmental outcomes compared with the permitted baseline: a demonstrably superior landscape outcome within OLA 65 and ONFL 9 through the clustered pocket approach; retention of approximately 300 ha of productive pastoral farmland; achievement of nitrogen neutrality in the Lake Taupō catchment; systematic natural hazard risk management; and protection of adjacent SNAs. The net economic, social, and cultural benefits are positive.
4. The risks are manageable and can be addressed through the provisions of the Low Density Residential Zone as proposed by PC44, existing natural values rules, and through conditions to be applied at the engineering approval, subdivision, and development consent stages. The proposed rezoning satisfies all eight criteria in PC44 section 8.2 — including the criteria relating to the OLA 65 landscape overlay and active fault risk, which are addressed by the LVA and the CORE50 geotechnical report respectively.
5. The proposal is consistent with Council's Future Development Strategy and supports the planned provision of housing for the Taupō District's projected population growth.

The defining planning concept of this proposal is the retention of approximately 300 ha of the 344 ha site as a single, integrated pastoral farming enterprise while enabling residential development in three discrete, well-designed pockets totalling approximately 44 ha.

This approach is not merely a design preference — it is the mechanism by which this proposal solves every significant planning challenge the site presents.

The OLA 65 and ONFL 9 landscape overlays are addressed because concentrating development on modified pastoral land in defined pockets produces landscape and visual effects that are less than minor from all nine LVA viewpoints, and substantially less than the dispersed effects of the permitted 10 ha baseline.

The active faults are addressed because a plan change enables systematic, site-wide Fault Avoidance Zone mapping and coordinated building platform relocation, which is more rigorous and more protective than lot-by-lot geotechnical assessment at building consent stage.

The Lake Taupō nitrogen obligations are addressed because a mixture of communal and individual advanced wastewater treatment system, coordinated with targeted pastoral retirement, achieves nitrogen neutrality.

The productive rural land is retained because 300 ha of integrated pastoral farm survives the development, where under the permitted baseline it would be fragmented beyond viable farming scale.

Measured against the PC44 Section 32 Evaluation Report's own section 8.2 criteria for LDR rezoning submissions, this proposal satisfies all eight criteria. The two that require evidential support — the OLA 65 overlay and active faults — are directly answered by the LVA (LA4, May 2026) and the geotechnical report (CORE50, April 2026). The proposed LDR rezoning is the most appropriate, most efficient, and most protective planning outcome available for this site and this landscape.

On the basis of this evaluation, the proposed rezoning of the subject site from the Rural Environment to the Low Density Residential Environment is confirmed as the most appropriate way to achieve the purpose of the RMA. It is recommended that Taupō District Council accept this submission in support of Plan Change 44 and include the subject site within the Low Density Residential Zone.

9. Decision Sought

The submitter respectfully requests that Taupō District Council, in determining submissions on notified Plan Change 44, amend the notified planning maps and apply the notified Low Density Residential Environment provisions to the subject site as set out below.

Subject Site	287 Whakaroa Road (Lot 1 DP 378264), 351 Whakaroa Road (Lot 2 DP 408156) and 387 Whakaroa Road (Lot 4 DP 408156), Kinloch, Taupō
Current Zoning	Rural Environment
Decision Sought	Rezone the identified land from Rural Environment to Low Density Residential Environment through Plan Change 44.
Plan Map Amendment	Amend the notified Plan Change 44 planning maps to include 287 Whakaroa Road (Lot 1 DP 378264), 351 Whakaroa Road (Lot 2 DP 408156) and 387 Whakaroa Road (Lot 4 DP 408156), Kinloch, within the Low Density Residential Zone.
Reason	For the reasons set out in this section 32 evaluation, including that the requested planning map amendment and consequential application of the notified Low Density Residential Environment provisions are the most appropriate response to notified Plan Change 44 in respect of the subject site.

In addition to the specific relief above, the submitter seeks any consequential, alternative, or lesser relief necessary to give effect to the requested rezoning through Plan Change 44, including any amendments to notified provisions, planning maps, or related district-wide controls that are required to ensure the subject site is appropriately incorporated within the Low Density Residential Environment framework.

If the Hearing Panel determines that the full extent of the relief sought cannot be granted, the submitter seeks such lesser or modified relief as may be available and appropriate.

For further information please contact:

Scott Devonport

Simpli Consulting

2/20 Totara Street, Taupo 3330

scott@simpliconsulting.co.nz

027 605 9143

Appendices

The following appendices should be included with this report when lodged as a formal submission:

Appendix	Document
A	Certificate of Title for the subject sites
B	Site location map showing subject site, current zoning, and surrounding land uses
C	Aerial photograph of subject site
D	Proposed zoning map showing extent of rezoning sought
E	Stormwater Management Plan – Te Tuhi Subdivision <i>Prepared by BTW Company for Big Ball Holdings Limited Rev WD – 29 April 2026</i>
F	Preliminary Geotechnical Report – 387 Whakaroa Road, Taupō <i>Prepared by CORE50 Engineers for Big Ball Holdings Ltd Job Ref CR 260139-SR01 April 2026</i>
G	Infrastructure Summary Report – Roading, Wastewater, Nitrogen and Water Supply <i>Infrastructure Summary Report prepared by Simpli Consulting Limited for Te Tuhi Estate Ltd May 2026 </i>
H	Transport Impact Assessment – 287 Whakaroa Road, Taupō (Te Tuhi Point) <i>Prepared by Urban Connection Limited for Te Tuhi Estate Limited August 2023 Report 004-074</i>
I	Landscape and Visual Effects Assessment – Te Tuhi High Country Estate, Whakaroa Road, Kinloch <i>Prepared by LA4 Landscape Architects for Big Ball Holdings Limited – Rob Pryor, NZILA Registered Landscape Architect – Final, 28 May 2026</i>



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD**

**Guaranteed Search Copy issued under Section 60 of the Land
Transfer Act 2017**




R.W. Muir
Registrar-General
of Land

Identifier **313610**
Land Registration District **South Auckland**
Date Issued 11 July 2007

Prior References

283449

Estate Fee Simple
Area 102.4510 hectares more or less
Legal Description Lot 1 Deposited Plan 378264

Registered Owners

Michael John Phillips and Christine Anne Phillips

Interests

Subject to Section 11 Crown Minerals Act 1991

Subject to Part IV A Conservation Act 1987

H804440 Land Improvement Agreement pursuant to Section 30A Soil Conservation and Rivers Control Act 1941 - 27.6.1988 at 11.17 am

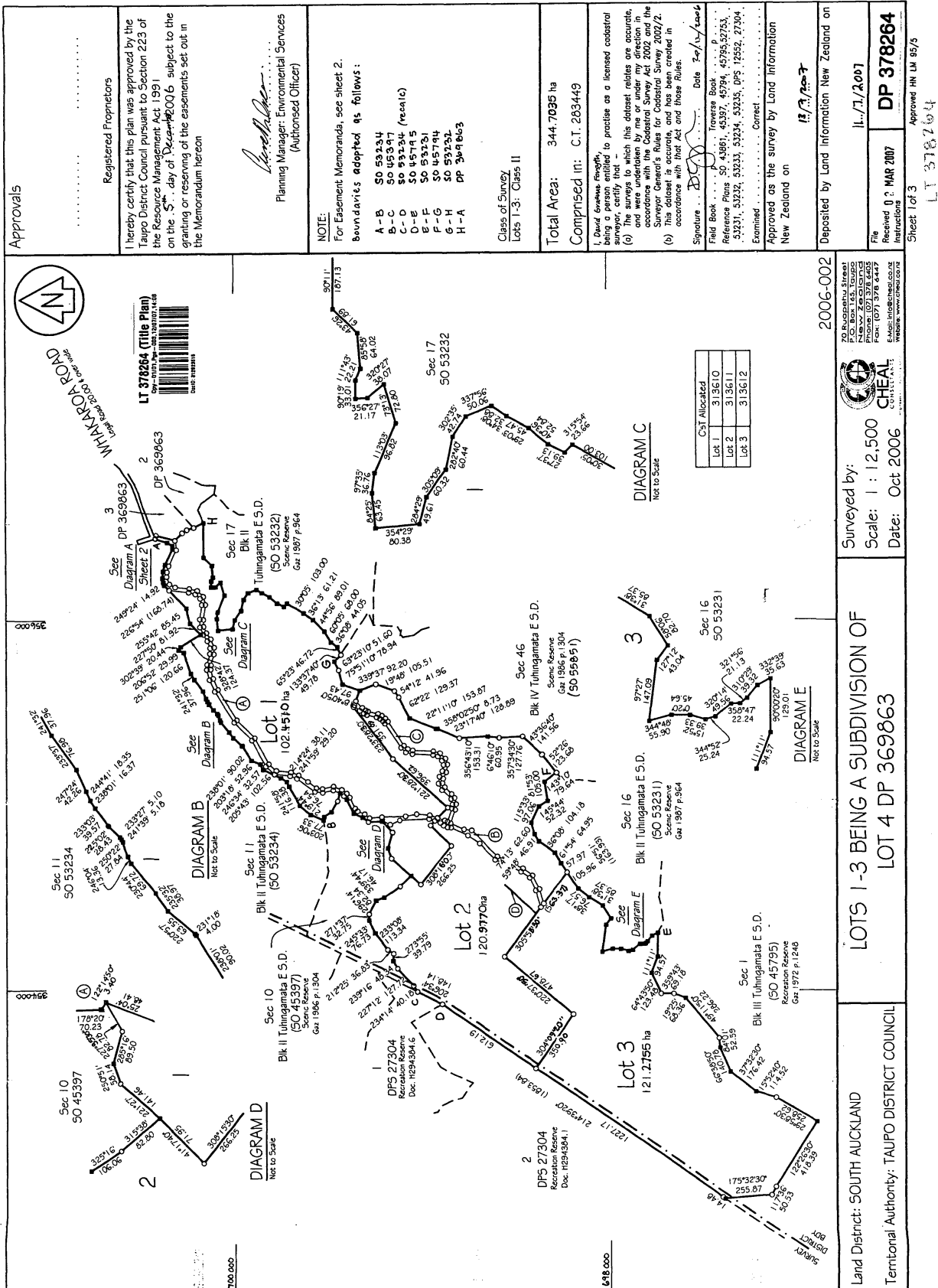
7457514.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 11.7.2007 at 9:00 am

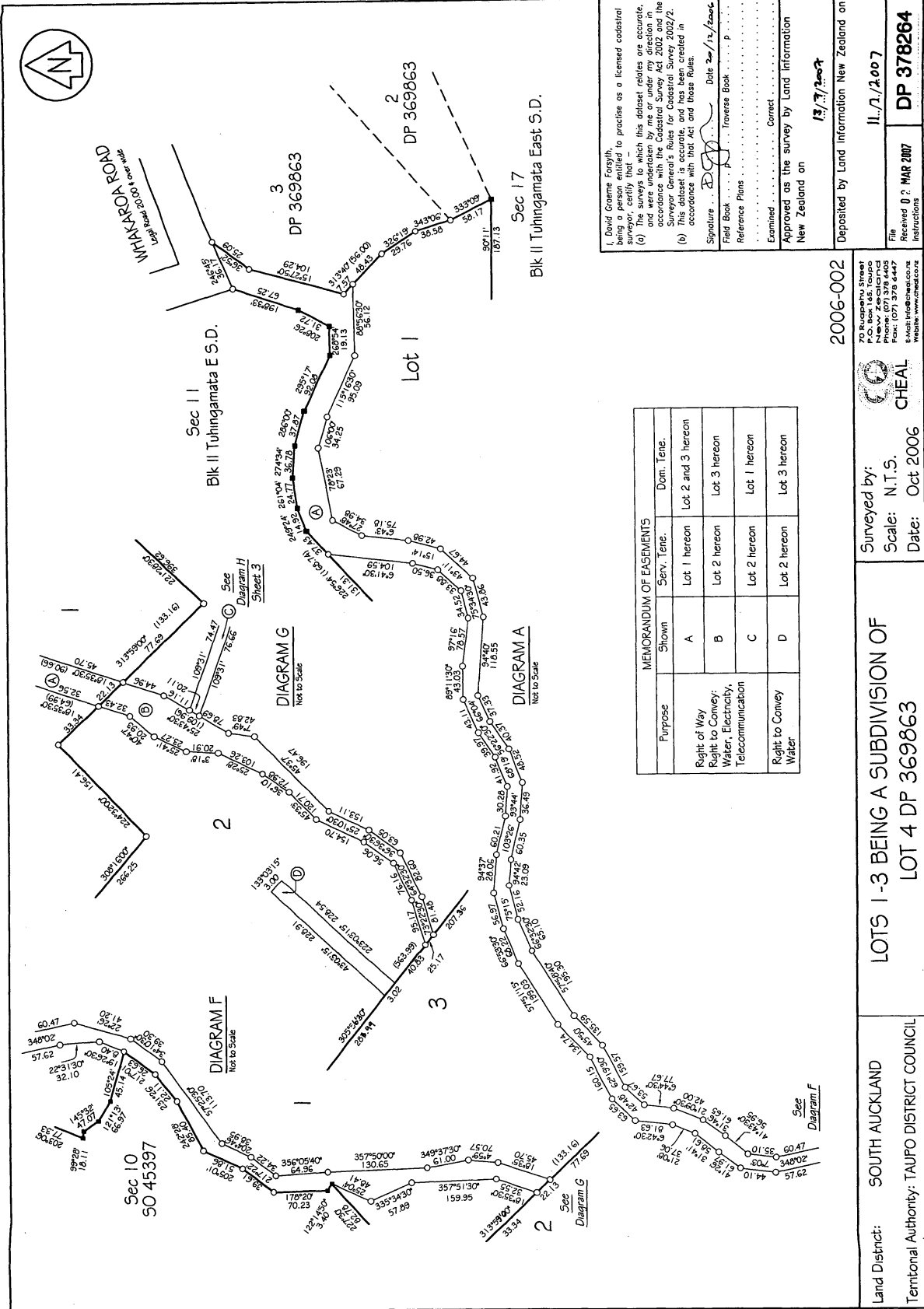
Subject to a right of way and a right to convey, water, electricity and telecommunications over part marked A on 378264 created by Easement Instrument 7457514.4 - 11.7.2007 at 9:00 am

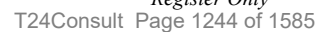
Appurtenant hereto is a right of way and a right to convey, water, electricity and telecommunications created by Easement Instrument 7457514.4 - 11.7.2007 at 9:00 am

The easements created by Easement Instrument 7457514.4 are subject to Section 243 (a) Resource Management Act 1991 Appurtenant hereto is a right of way and a right to convey water, electricity, telecommunications and electronic data and a right to transmit telecommunications and computer media created by Easement Instrument 8017715.2 - 4.12.2008 at 9:00 am

10705132.3 Mortgage to Rabobank New Zealand Limited - 28.2.2017 at 1:43 pm









**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD**

**Guaranteed Search Copy issued under Section 60 of the Land
Transfer Act 2017**



R.W. Muir
Registrar-General
of Land

Identifier **428971**
Land Registration District **South Auckland**
Date Issued 04 December 2008

Prior References

313611

Estate Fee Simple
Area 120.6110 hectares more or less
Legal Description Lot 2 Deposited Plan 408156
Registered Owners
Michael John Phillips and Christine Anne Phillips

Interests

Subject to Section 11 Crown Minerals Act 1991

Subject to Part IV A Conservation Act 1987

H804440 Land Improvement Agreement pursuant to Section 30A Soil Conservation and Rivers Control Act 1941 - 27.6.1988 at 11.17 am

7457514.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 11.7.2007 at 9:00 am

Subject to a right of way and a right to convey, water, electricity and telecommunications over parts marked B, C & P and a right to convey water over part marked D all on 408156 created by Easement Instrument 7457514.4 - 11.7.2007 at 9:00 am

Appurtenant hereto is a right of way and a right to convey, water, electricity and telecommunications created by Easement Instrument 7457514.4 - 11.7.2007 at 9:00 am

The easements created by Easement Instrument 7457514.4 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way over parts marked C, I, J, K, L, M, N & P and a right to convey water, electricity, telecommunications and electronic data and a right to transmit telecommunications and computer media over part marked P all on DP 408156 created by Easement Instrument 8017715.2 - 4.12.2008 at 9:00 am

Subject to a right of way over parts marked B, C, F, G, H, I, J, K, L, M, N & P on DP 408156 created by Easement Instrument 8017715.3 - 4.12.2008 at 9:00 am

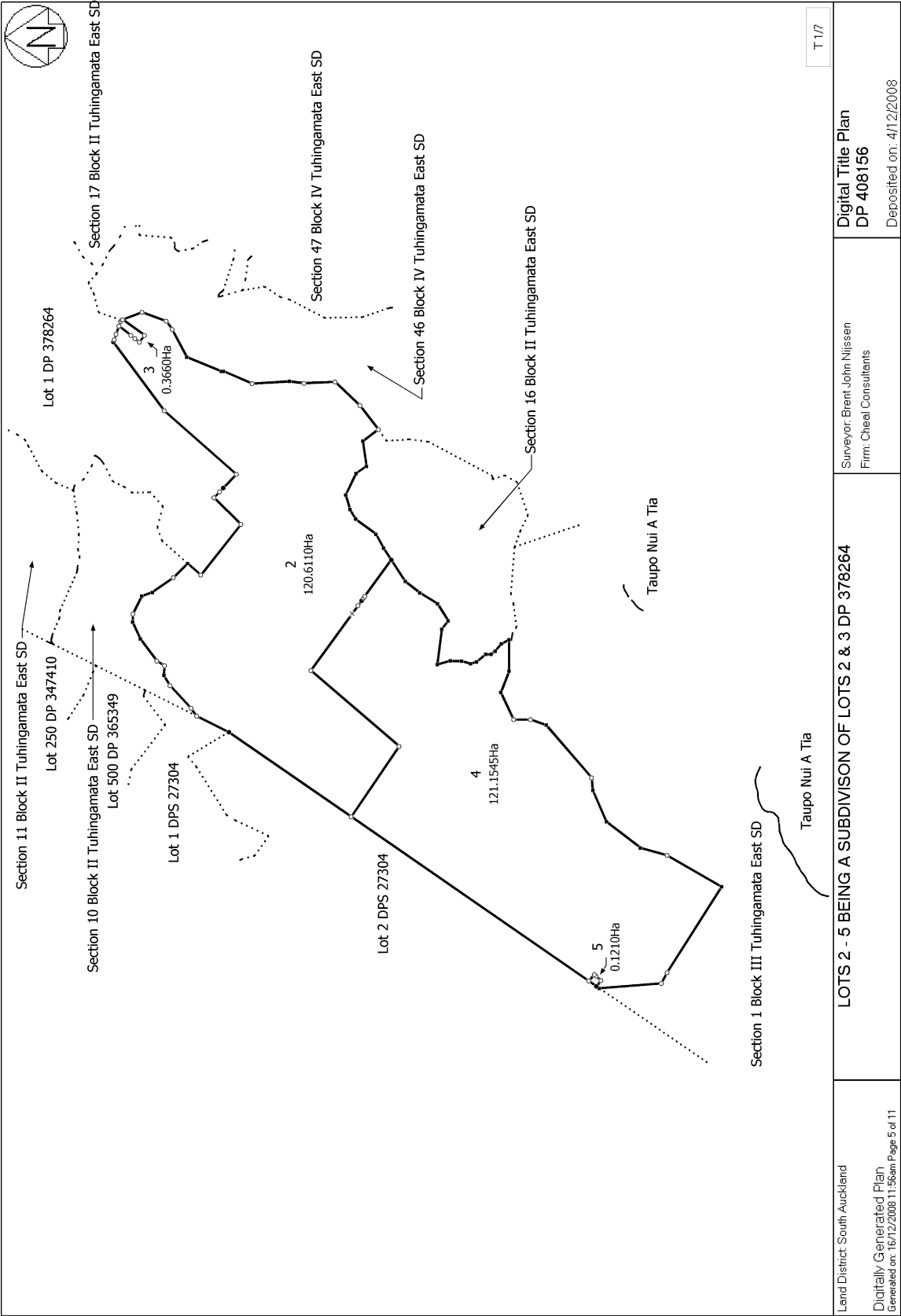
The easements created by Easement Instrument 8017715.3 are subject to Section 243 (a) Resource Management Act 1991

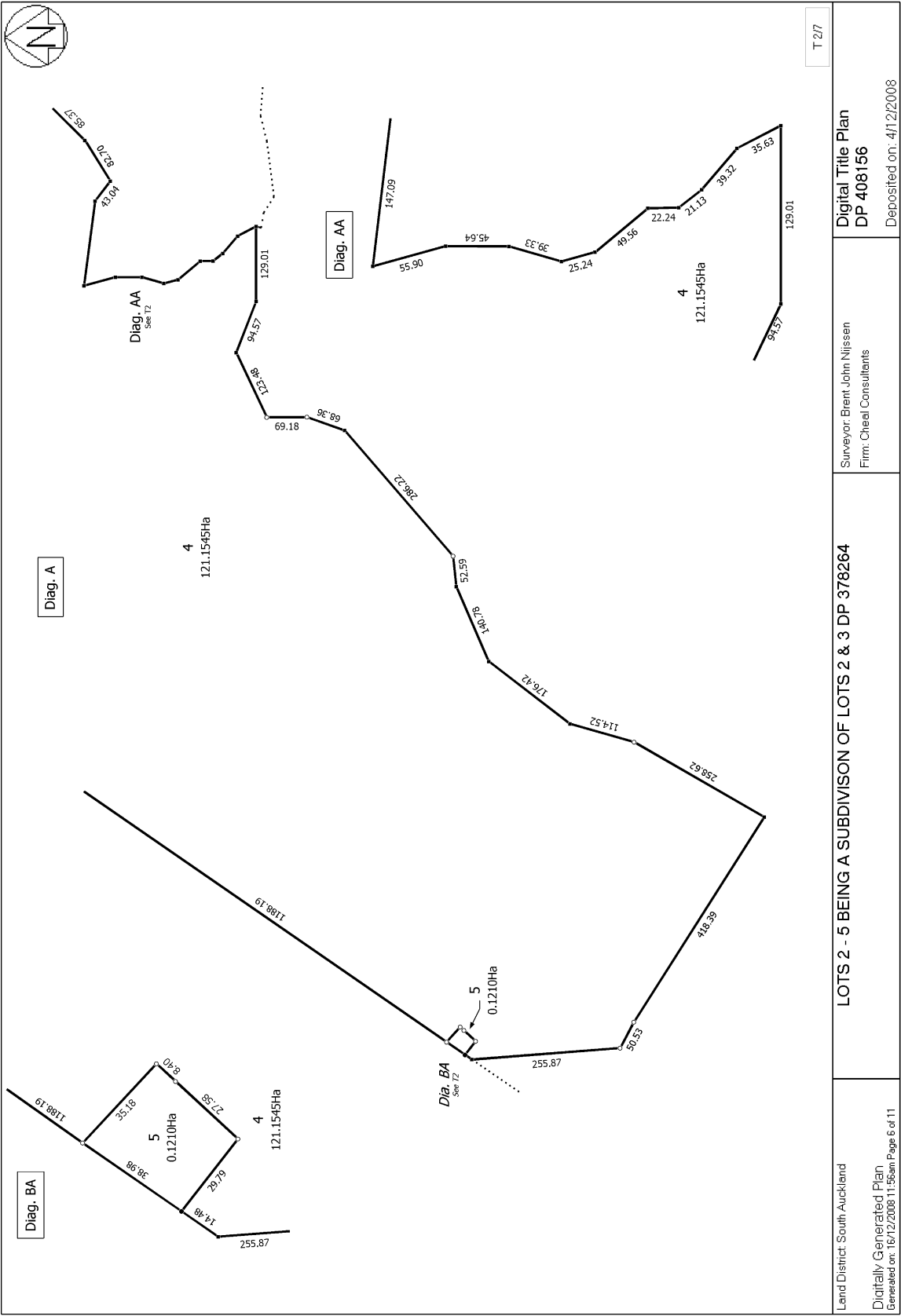
Land Covenant in Deed 8096888.4 - 13.3.2009 at 3:32 pm

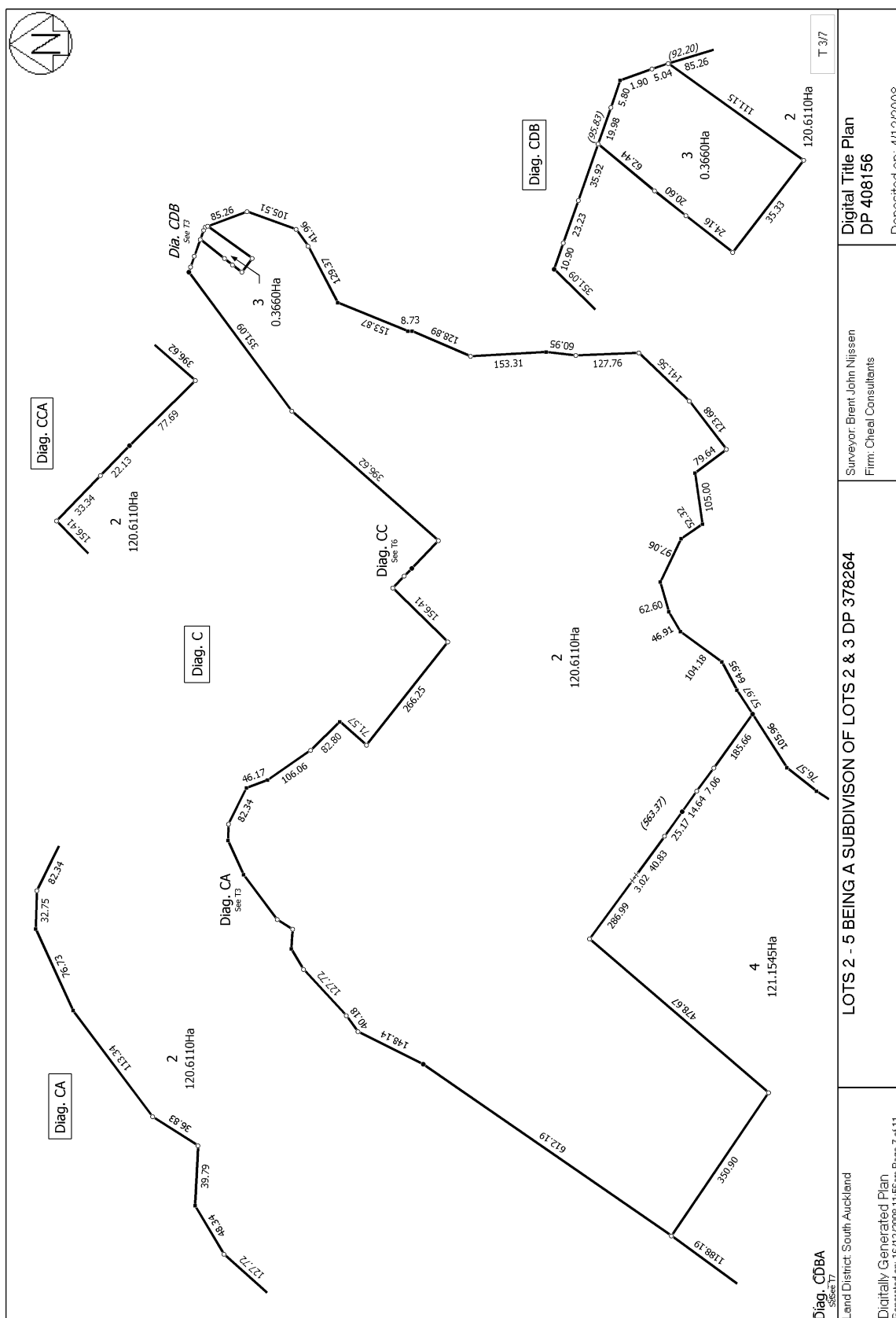
Land Covenant in Deed 8110767.4 - 21.5.2009 at 1:30 pm

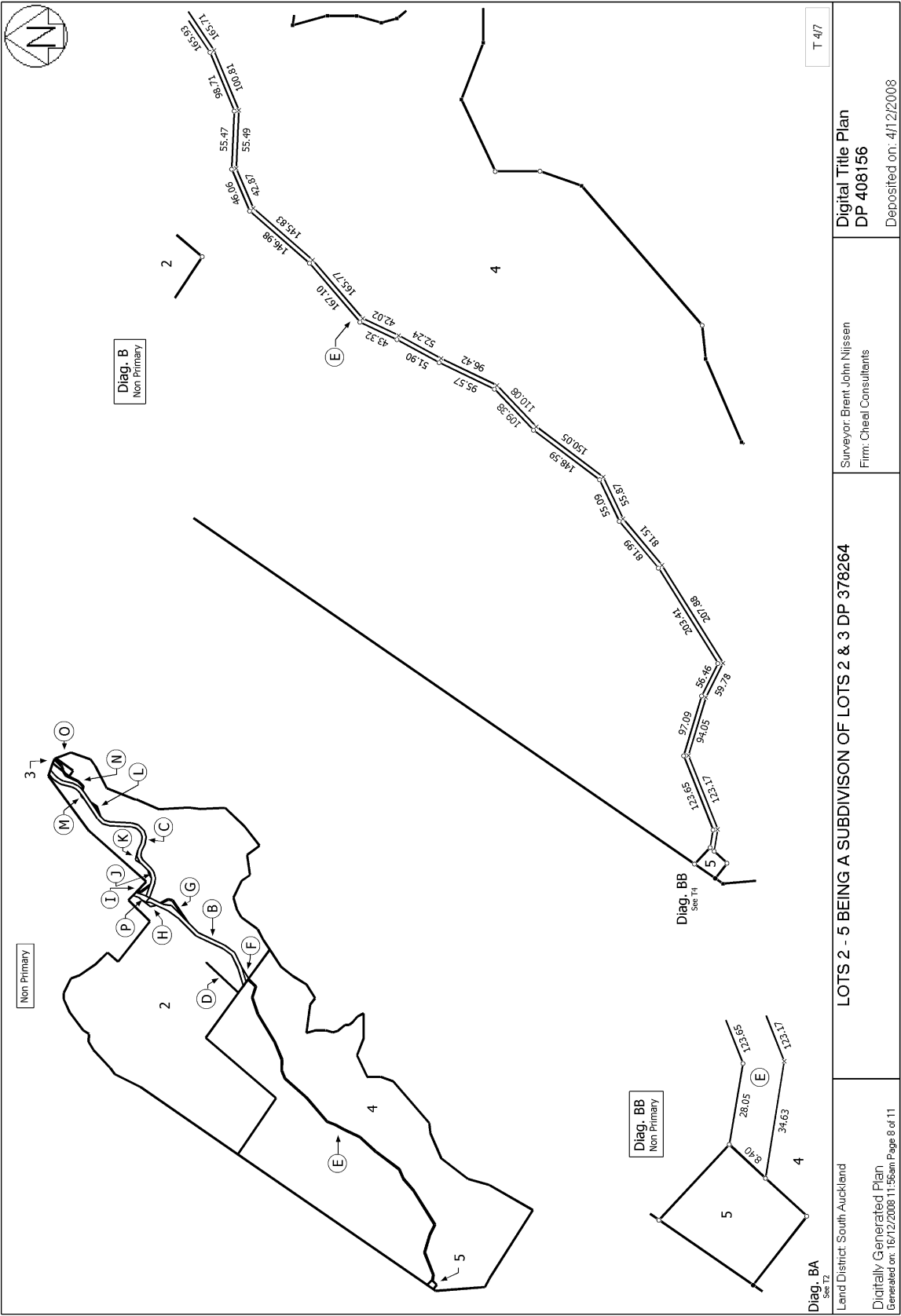
Land Covenant in Deed 8111193.4 - 21.5.2009 at 2:05 pm

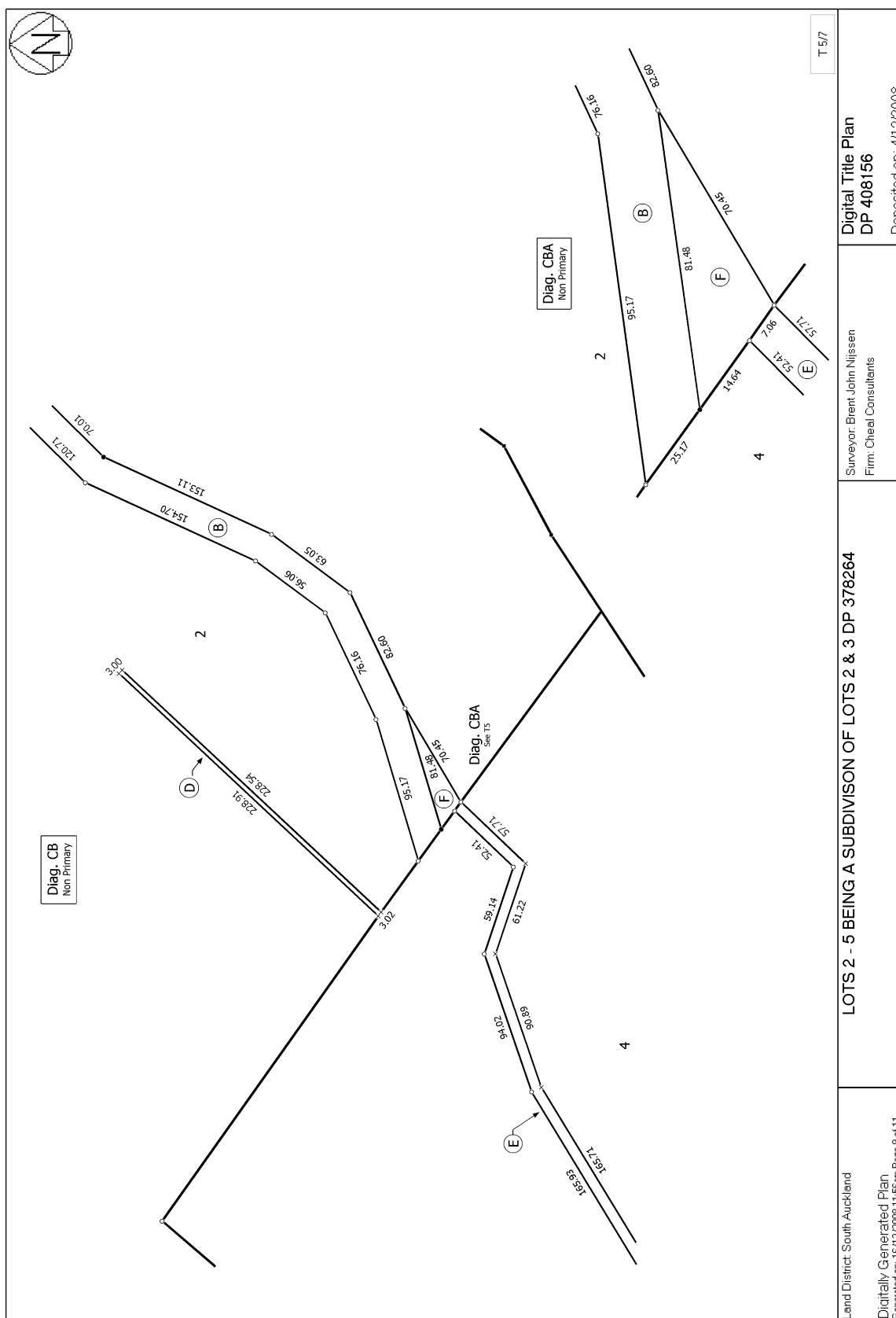
10705132.3 Mortgage to Rabobank New Zealand Limited - 28.2.2017 at 1:43 pm

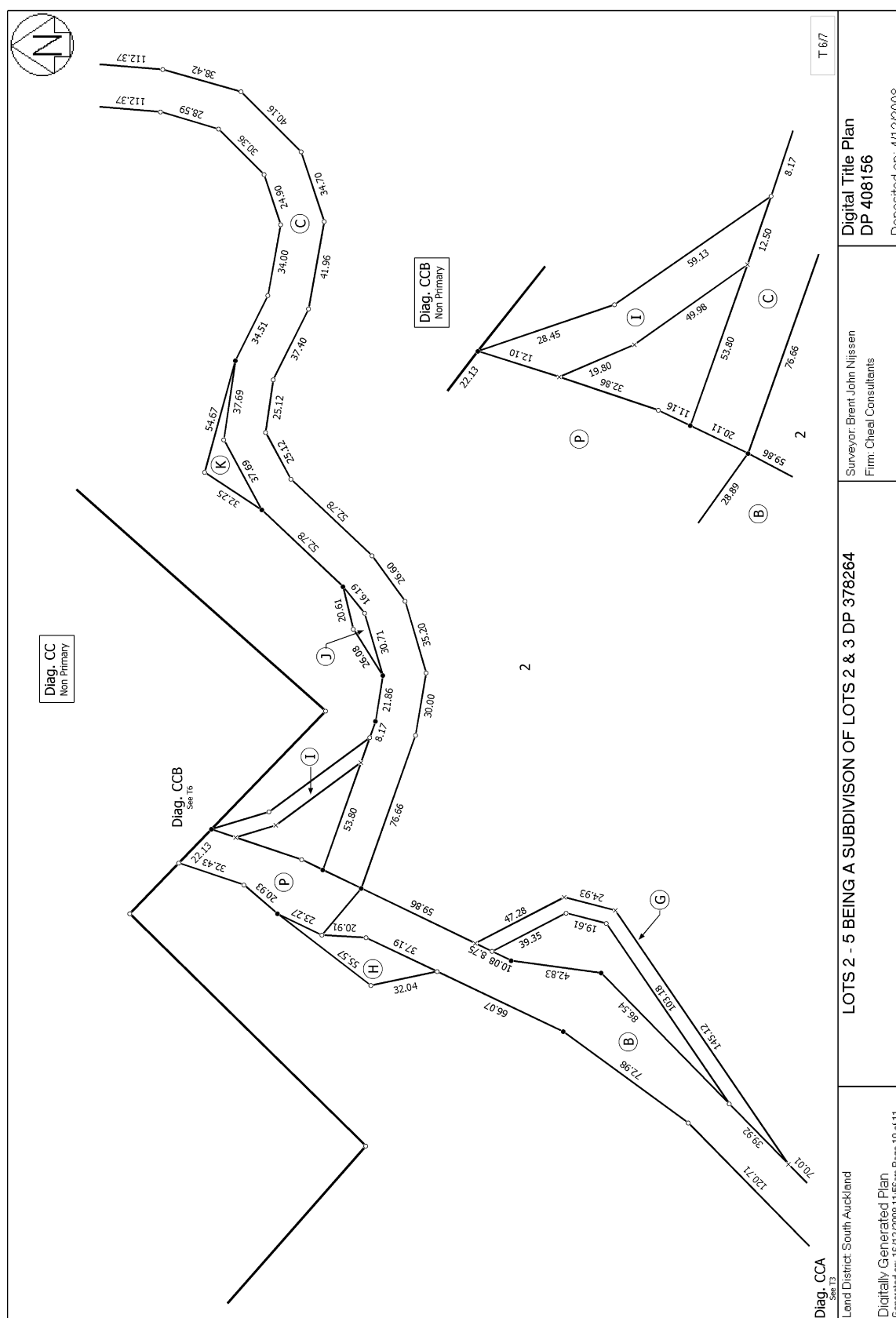


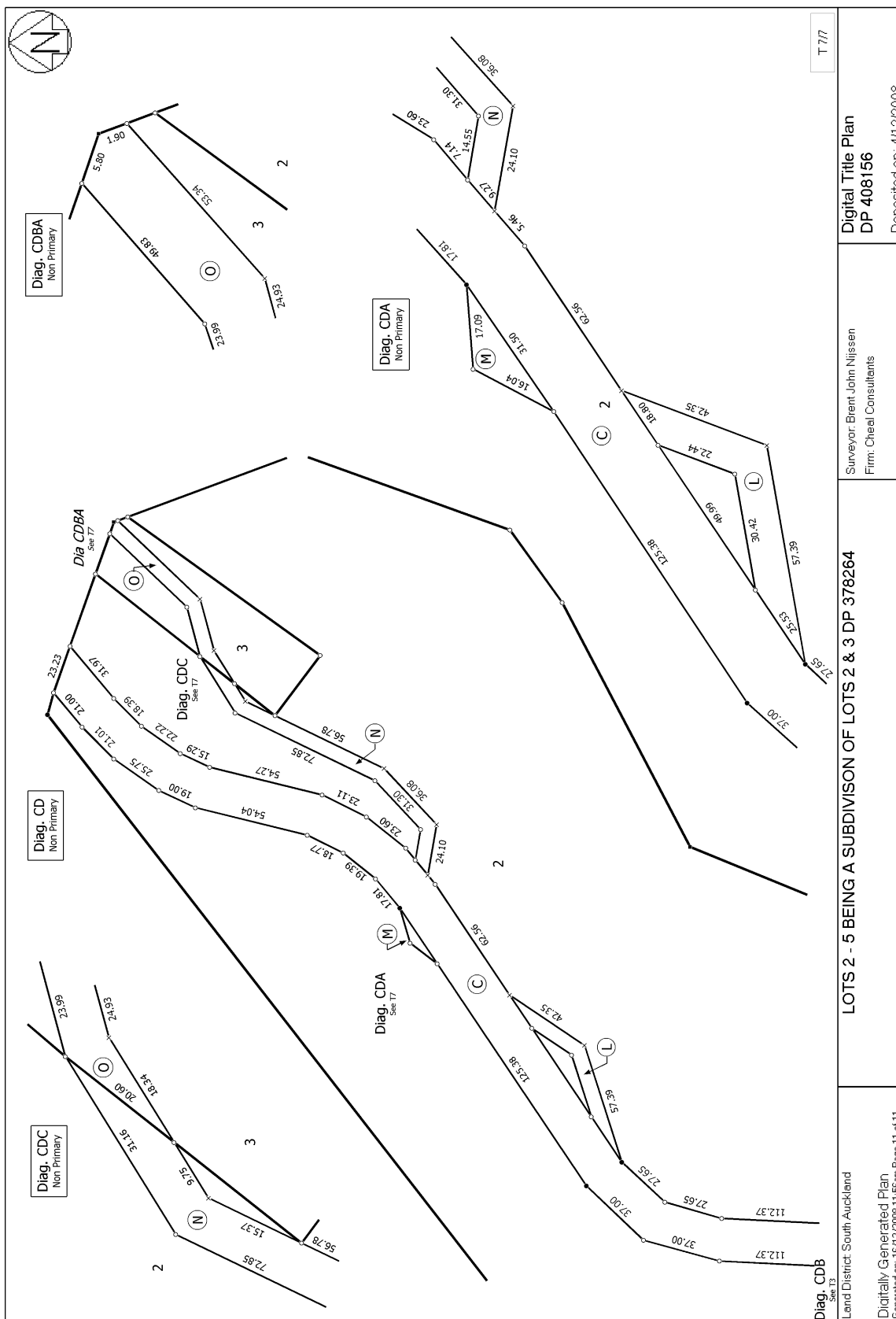














**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD**

**Guaranteed Search Copy issued under Section 60 of the Land
Transfer Act 2017**




R.W. Muir
Registrar-General
of Land

Identifier **428973**
Land Registration District **South Auckland**
Date Issued 04 December 2008

Prior References

313612

Estate Fee Simple
Area 121.1545 hectares more or less
Legal Description Lot 4 Deposited Plan 408156
Registered Owners
Michael John Phillips and Christine Anne Phillips

Interests

Subject to Section 11 Crown Minerals Act 1991

Subject to Part IV A Conservation Act 1987

H804440 Land Improvement Agreement pursuant to Section 30A Soil Conservation and Rivers Control Act 1941 - 27.6.1988 at 11.17 am

7457514.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 11.7.2007 at 9:00 am

Appurtenant hereto is a right of way, a right to convey electricity and telecommunications and rights to convey water, created by Easement Instrument 7457514.4 - 11.7.2007 at 9:00 am

The easements created by Easement Instrument 7457514.4 are subject to Section 243 (a) Resource Management Act 1991

Subject to a right of way over part marked E on DP 408156 created by Easement Instrument 8017715.3 - 4.12.2008 at 9:00 am

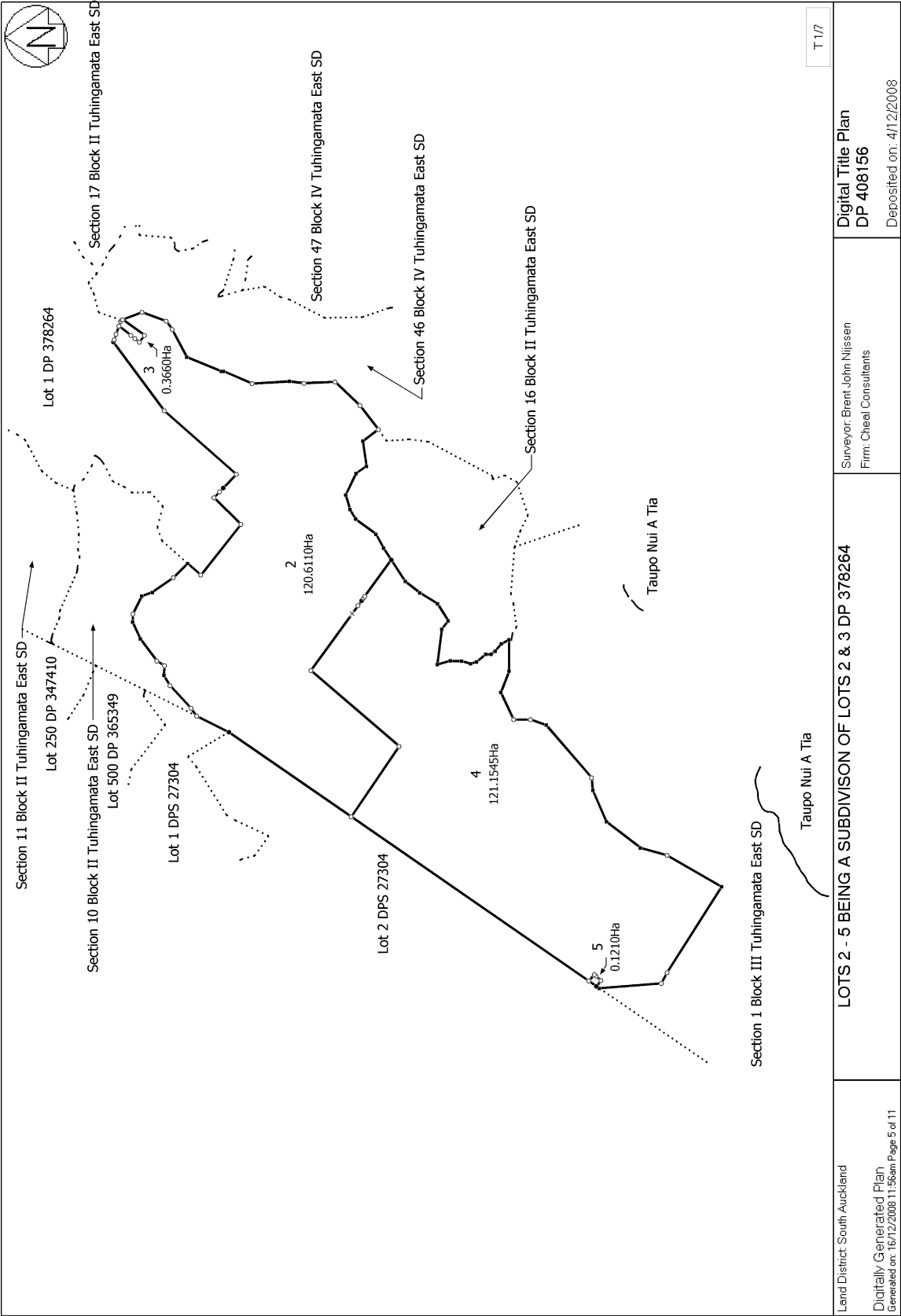
The easements created by Easement Instrument 8017715.3 are subject to Section 243 (a) Resource Management Act 1991

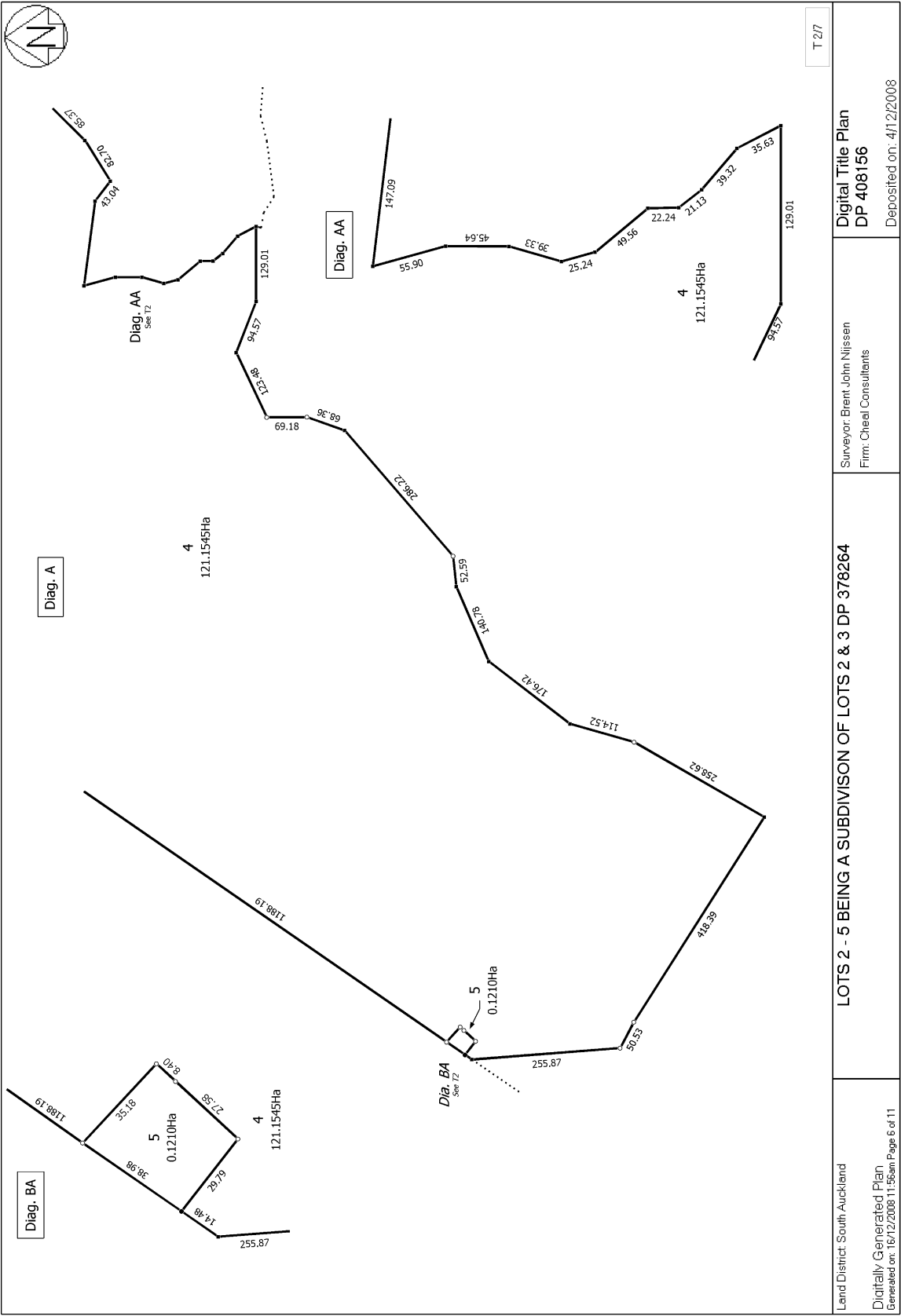
Land Covenant in Deed 8096888.4 - 13.3.2009 at 3:32 pm

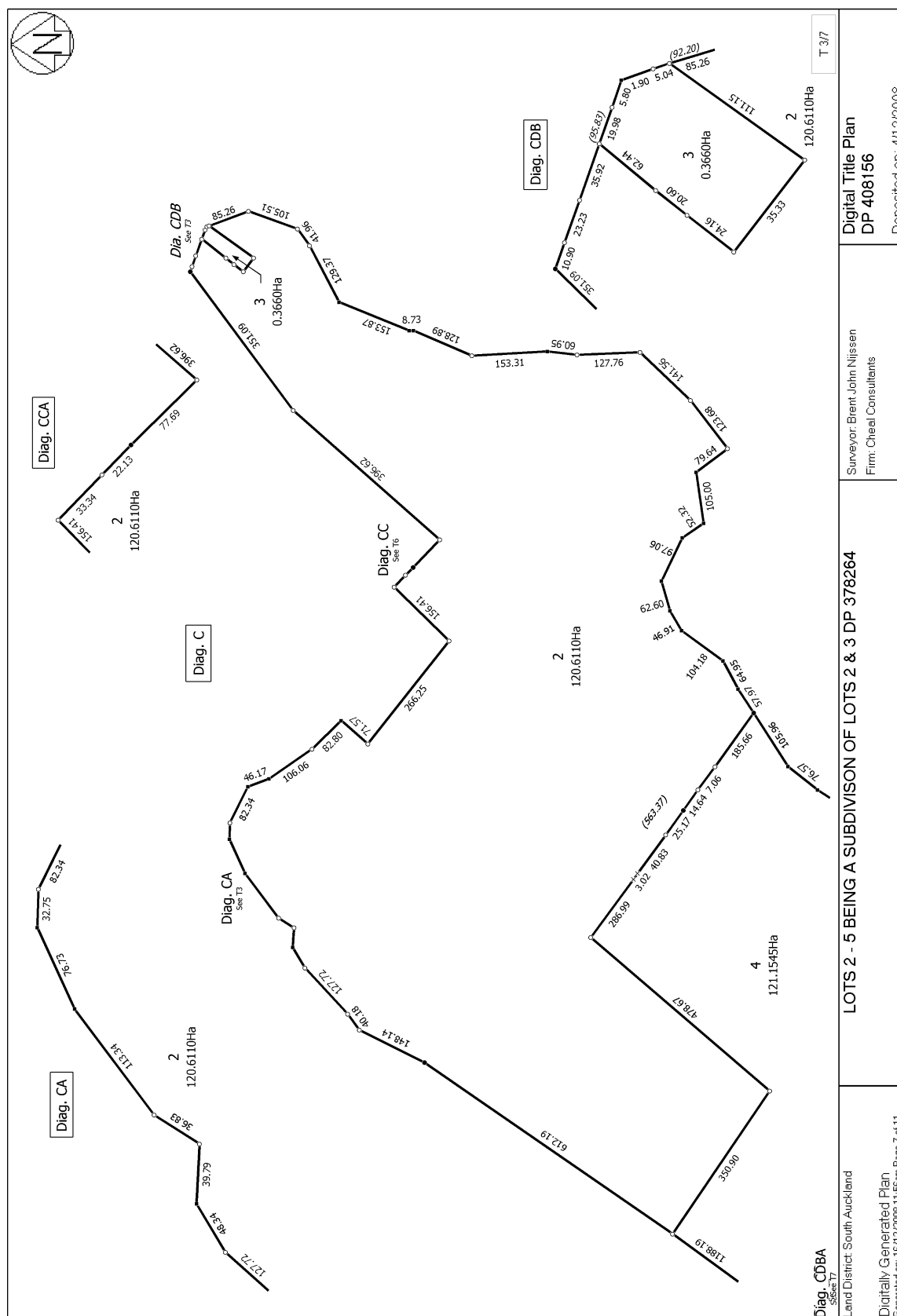
Land Covenant in Deed 8110767.4 - 21.5.2009 at 1:30 pm

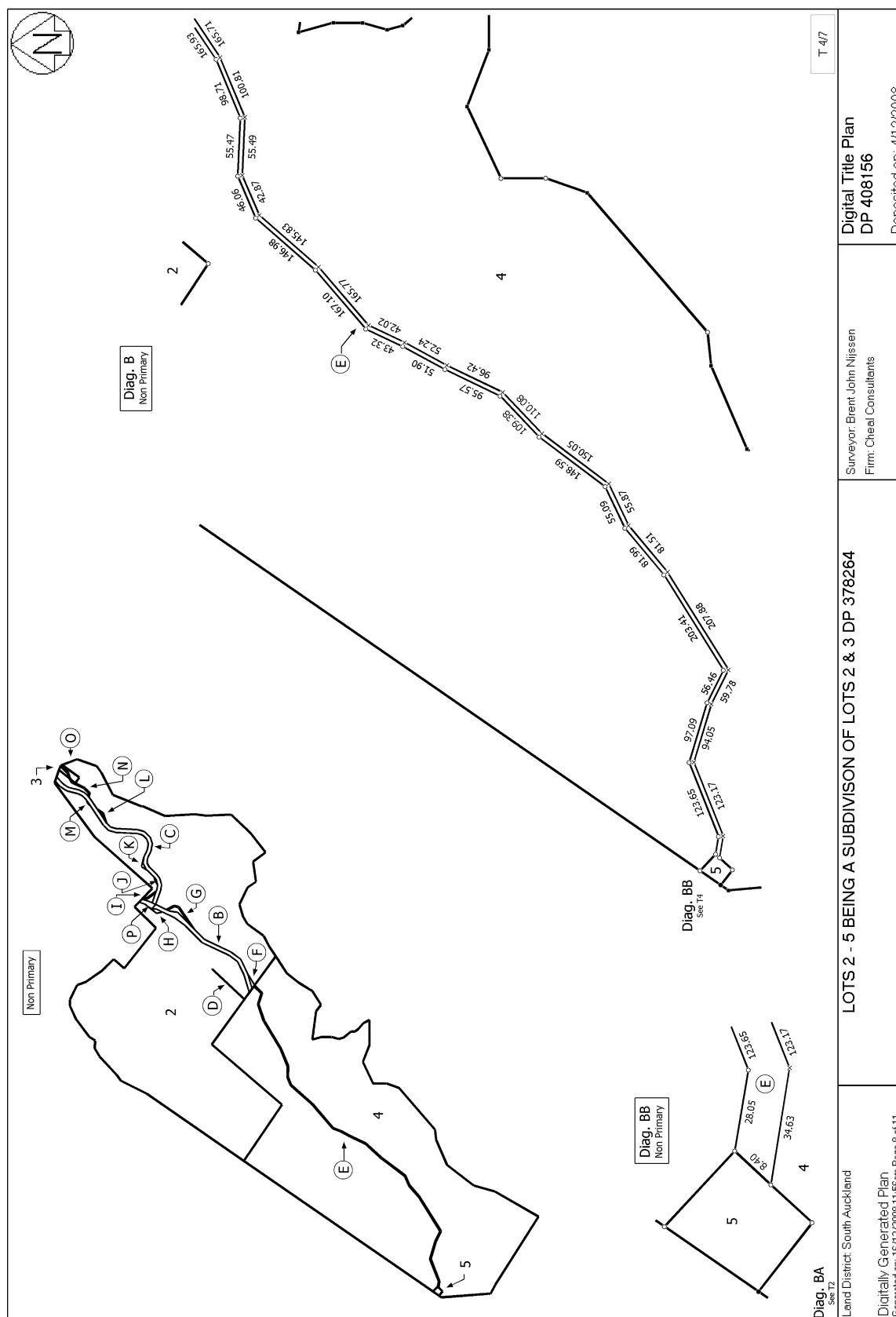
Land Covenant in Deed 8111193.4 - 21.5.2009 at 2:05 pm

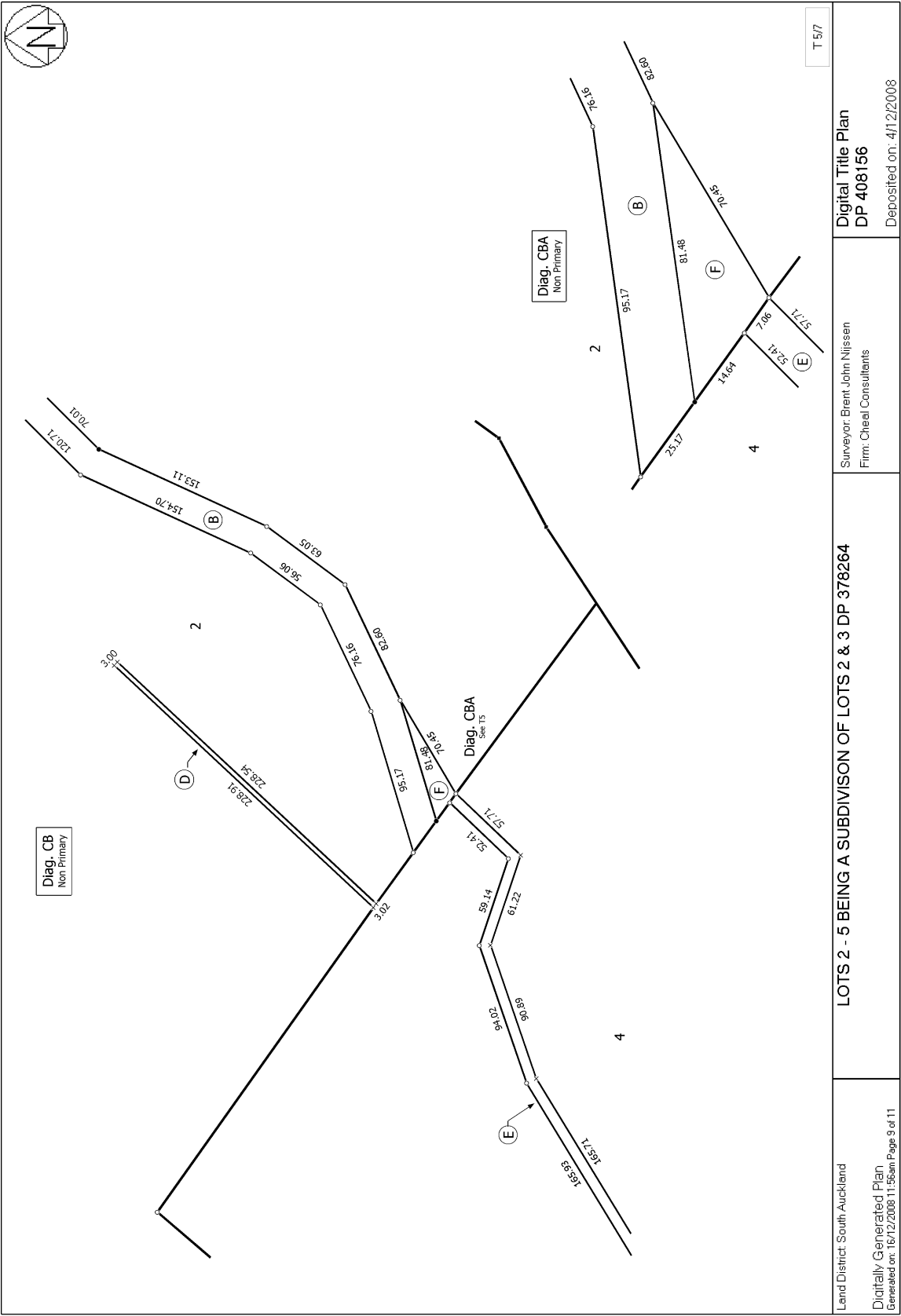
10705132.3 Mortgage to Rabobank New Zealand Limited - 28.2.2017 at 1:43 pm

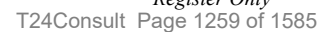




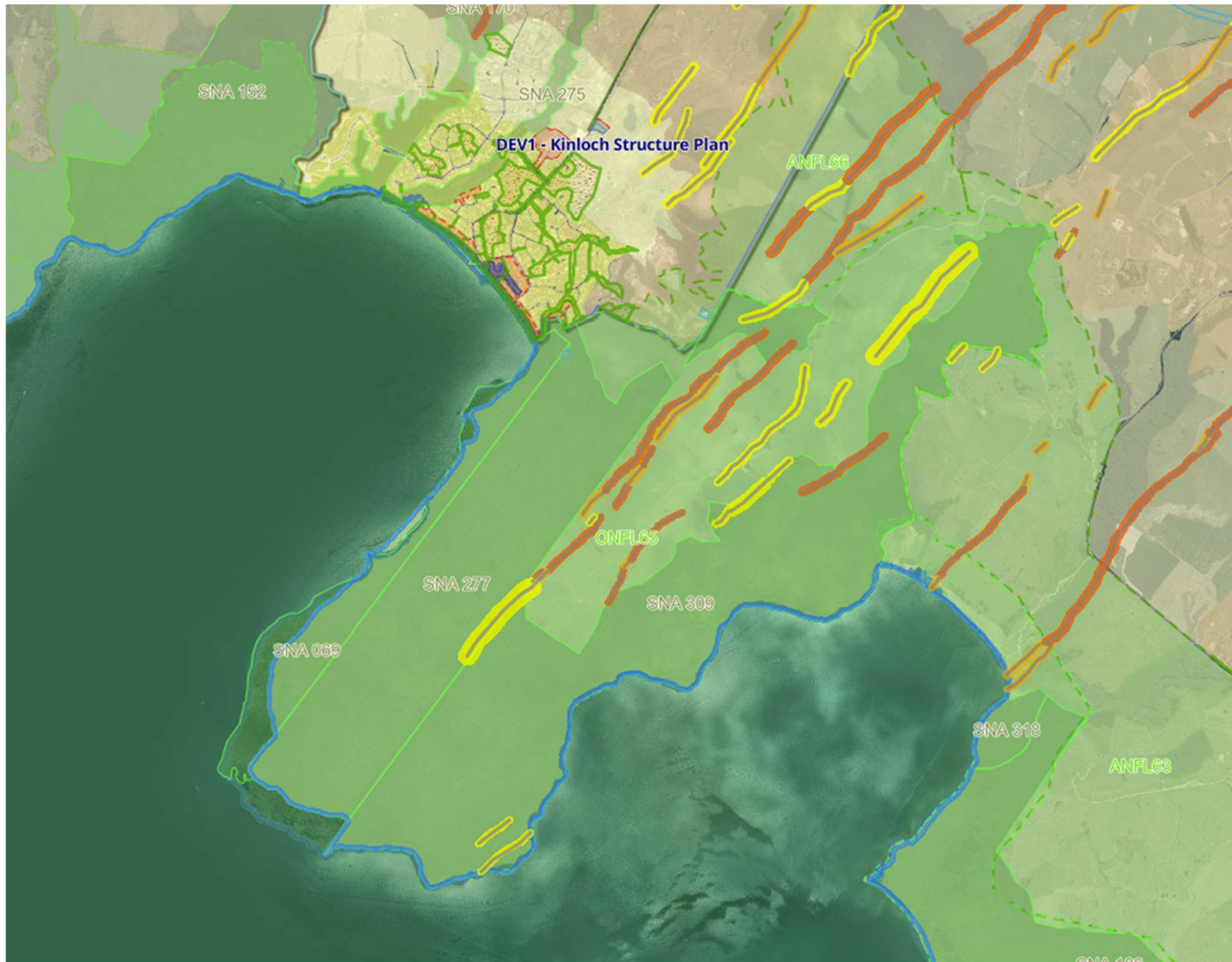


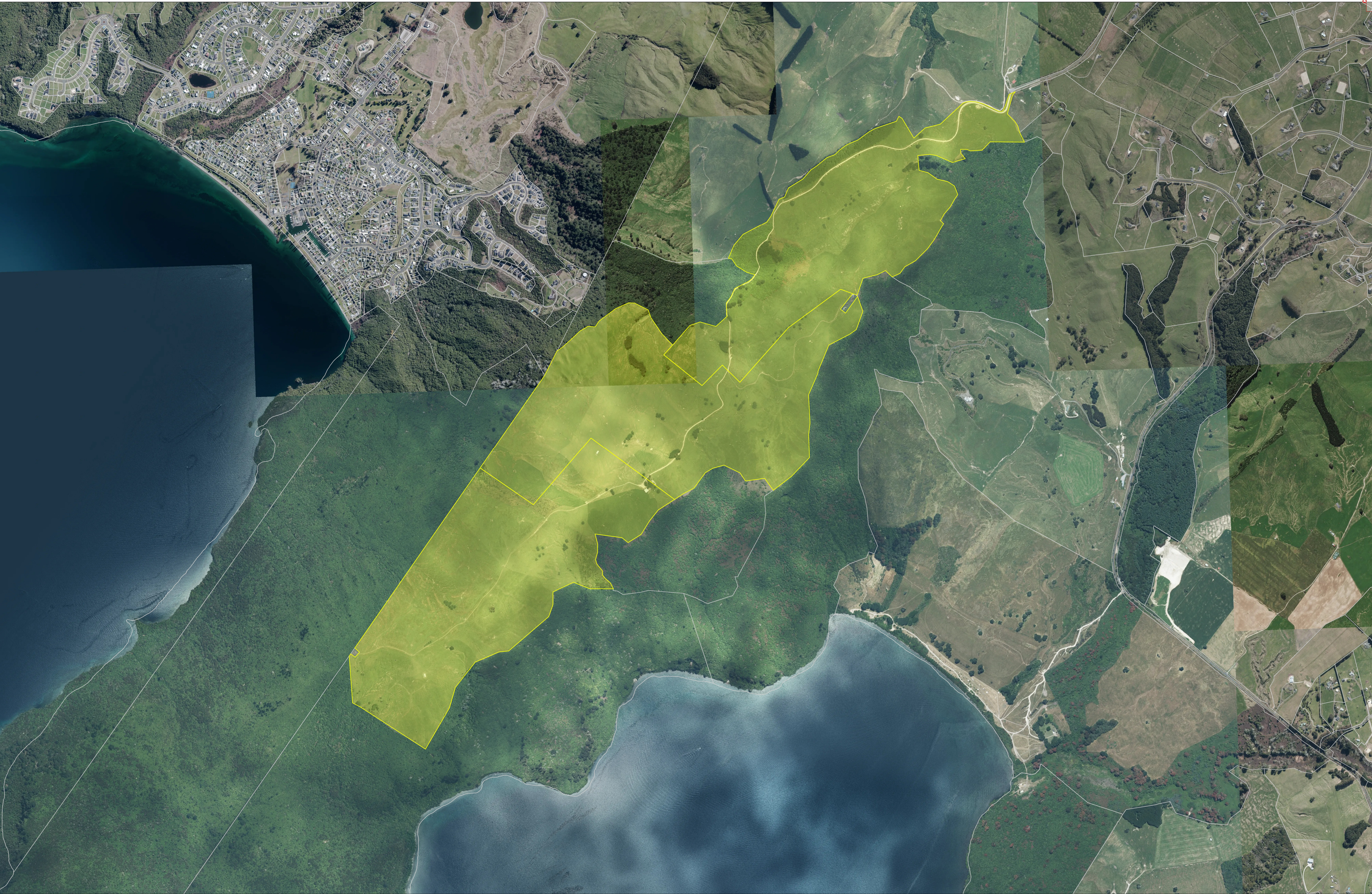












Map Prepared

Simpli Consulting Ltd



Te Tuhi Estate - Aerial Photo

1:9000 @ A1

2 June 2026

DISCLAIMER: This mapplan is illustrative only and all information should be independently verified on site before taking any action. Whilst due care has been taken, Grip gives no warranty as to the accuracy and plan completeness of any information on this mapplan and accepts no liability for any error, omission or use of the information.

SOURCES: Property & Imagery: LINZ CC BY 4.0

Copyright © Grip Limited





TE TUHI
HIGH COUNTRY ESTATE

KINLOCH

WHAKAROA ROAD

Sec 11
Block II
Tuhingamata East SD

LOT 4

LOT 4
2,257,300 m²

Sec 17
Block II
Tuhingamata East SD

Sec 10
Block II
Tuhingamata East SD

LOT 1
DPS 27304

ROAD
LOT 100
55,319 m²

LOT 3
DP 408156

LD ZONE 1
254,259.09m²

LOT 4

LD ZONE 2
84,520.69m²

LOT 4

LD ZONE 3
89,718.63m²

Sec 16
Block II
Tuhingamata East SD

Sec 46
Block IV
Tuhingamata East SD

SHEET 02

LOT 2
DPS 27304

LOT 5
DP 408156

LOT 7
540,582 m²

Sec 1
Block III
Tuhingamata East SD

LAKE TAUPŌ
(TAUPŌ NUI A TIA BLOCK)

Sec 10
Block II
Tuhingamata East SD

ROAD
LOT 100
95,979 m²

LOT 3
DP 408156

LD ZONE 1
284,259.09m²

LOT 4

LD ZONE 2
84,920.69m²

LOT 4

LD ZONE 3
69,718.83m²

Sec 16
Block II
Tuhingamata East SD

Sec 46
Block IV
Tuhingamata East SD

STORMWATER MANAGEMENT PLAN

DRAFT

Stormwater Management Plan - Te
Tuhi Subdivision

for Big Ball Holdings Limited

Rev WD - 29/04/2026

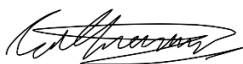


Stormwater Management Plan - Te Tuhi Subdivision

for Big Ball Holdings Limited

Reviewed

Report Author



Catherine Gu, BE (Hons), MEngNZ

29/04/2026

Date

Reviewed by



Sean Husband, BE (Hons), CPEng,
CMEngNZ

29/04/2026

Date

251116.00

Rev WD - 29/04/2026 DRAFT

CONTENTS

1	INTRODUCTION	1
1.1	Background	1
1.2	Site Description.....	1
1.3	Taupō District Plan.....	2
2	CATCHMENT ASSESSMENT	3
2.1	Hydrological Context.....	3
2.2	Site Catchments	3
2.3	Waikato Regional Plan.....	5
2.4	Historic Imagery	6
2.5	Existing Infrastructure	6
2.6	Downstream Environment.....	7
2.7	Downstream Flooding	7
2.8	Soil Description	8
2.9	Groundwater Level	9
2.10	Cross-Boundary Flows.....	9
3	FLOOD HAZARD RISK ASSESSMENT	10
4	STORMWATER MANAGEMENT	11
4.1	Design Objectives	11
4.2	Catchment Assessment Outcomes and Design Criteria Discussion.....	11
4.3	Basis of Design	12
4.4	Design Strategy	15
4.5	Design Features	15
4.5.1	<i>On-site Stormwater Disposal</i>	16
4.5.2	<i>Road Drainage</i>	16
4.5.3	<i>Secondary Overland Flow Paths</i>	18
4.5.4	<i>Cross Boundary Flow</i>	18
4.6	Finished Floor Levels.....	18
4.7	Peak Flow Control	19
5	CONCLUSION AND RECOMMENDATIONS	20
APPENDIX A	PRELIMINARY STORMWATER DRAWINGS.....	22

TABLES

Table 3.1:	Site assessment against NPS-NH risk matrix	10
Table 4.1:	Stormwater design objectives.....	12

FIGURES

Figure 1.1:	Site Location (Image source: Waikato 0.3m Rural Aerial Photos (2021-2024).....	1
Figure 1.2:	Taupō District Plan with site boundary outlined.	2
Figure 2.1:	Site Location within the Lake Taupo Catchment (Source: Waikato Regional Council Catchment Management Zones Map).....	3
Figure 2.2:	Site Catchments (proposed road shown as dashed lines)	4
Figure 2.3:	Site overland flow paths	5
Figure 2.4:	Water body classifications under Waikato Regional Plan (Data source: WRC Water Classification map).....	6
Figure 2.5:	Taupō District Plan Flood Hazard Area overlay	7
Figure 2.6:	Indicative flooding on site and surrounds in 1%AEP event with 3°C climate change (Source: NIWA)	8
Figure 2.7:	Groundwater level estimation	9

1 INTRODUCTION

This Stormwater Management Plan has been prepared for a proposed 33-lot rural residential subdivision located at 387 Whakaroa Road, Taupō, hereafter referred to as 'the site'.

This report outlines the stormwater management measures required for the proposed subdivision. The report includes a catchment assessment, identification of design criteria and preliminary design for infrastructure required to support the proposed development and mitigate the effects of the development on the receiving environment.

This stormwater management plan is intended to support resource consent applications for the site.

This assessment has been made in accordance with the Taupō District Council and Waikato Regional Council standards and guidelines.

1.1 Background

The site has a total area of approximately 344.2 ha and is situated across three parcels (Lot 1 DP 378264 and Lots 2 & 4 DP 408156). A locality map of the site is provided in Figure 1.1.



Figure 1.1: Site Location (Image source: Waikato 0.3m Rural Aerial Photos (2021-2024))

A 33 lot rural residential subdivision is proposed for the site. Lot sizes are typically proposed to be over 10 ha. A main private access road is proposed for the site extending from the north to the south, along with a secondary road to the east.

1.2 Site Description

The site is situated on a ridgeline on the northern shores of Lake Taupō, approximately 11 km to the west of Taupō. The site has been used for grazing and agricultural purposes and is generally covered in pastoral grasses.

A topographic survey was carried out on the site which has been used for detailed design. The site is generally undulating.

A crown owned scenic reserve (Whakaipo Bay Reserve) is located adjacent to the site. This borders the proposed road for approximately 65 m.

1.3 Taupō District Plan

The site is situated within a 'General Rural Zone' under the Taupō District Plan.

The site is also situated within 'Amenity Natural Features and Landscapes' (ANFL) area and a 'Outstanding Natural Features and Landscapes' (ONFL) area.

Areas downstream of some portions of the site are zoned rural lifestyle zone, low density residential zone and general residential zone. Refer Figure 1.2 for an overview.

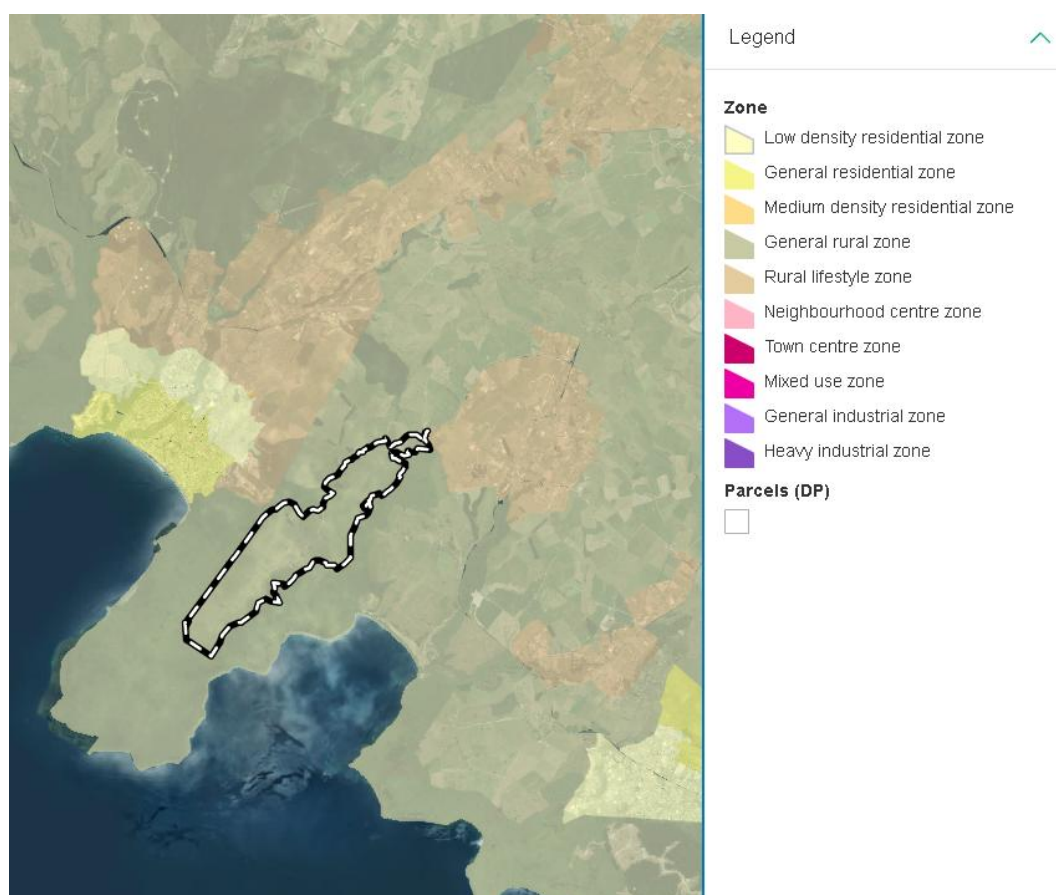


Figure 1.2: Taupō District Plan with site boundary outlined.

2 CATCHMENT ASSESSMENT

2.1 Hydrological Context

The development site is located within the Lake Taupō Catchment Management Zone, comprising nearly 350,000 ha in the central North Island. Lake Taupō forms approximately 17.5% of this catchment area. The catchment is located at the headwaters of the Waikato River, which flows through much of the Waikato region prior to discharging to the Tasman Sea at Port Waikato.

The Lake Taupō Zone Plan¹ indicates Lake Taupō is highly valued for its high water quality and indigenous biodiversity.

The Lake Taupō Catchment and the site location are shown in Figure 2.1.

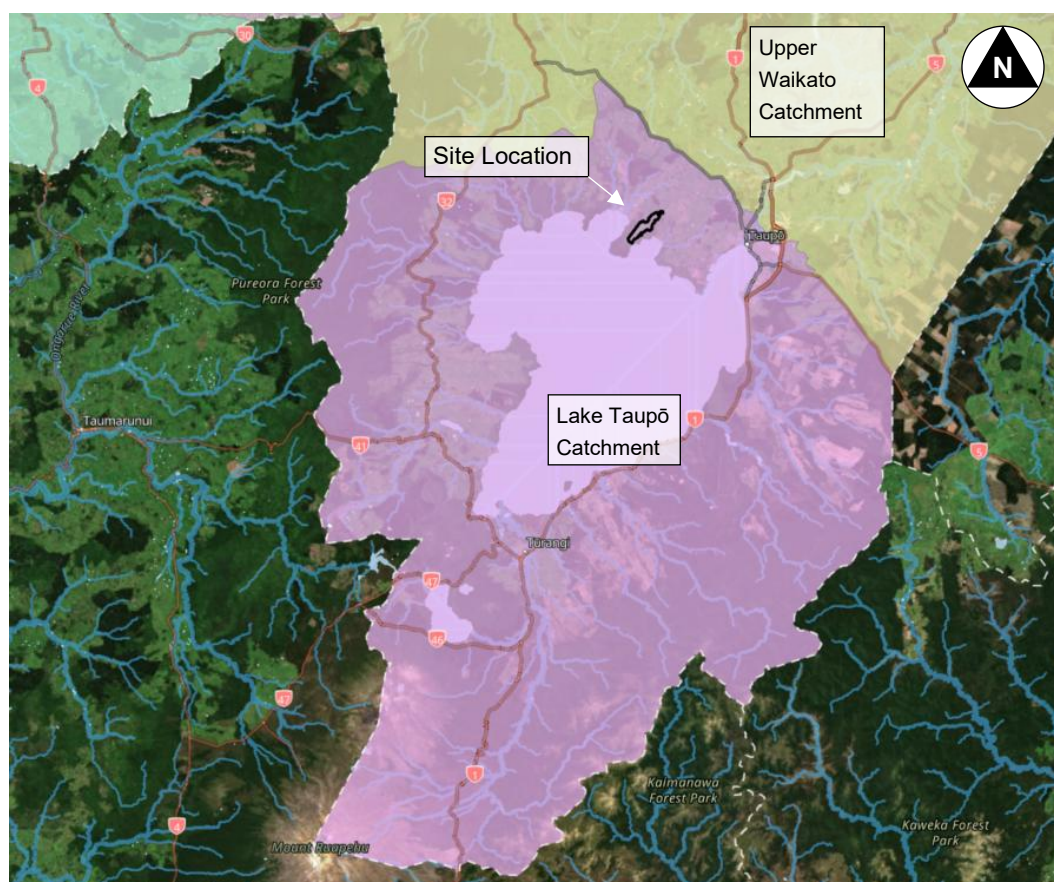


Figure 2.1: Site Location within the Lake Taupo Catchment (Source: Waikato Regional Council Catchment Management Zones Map)

2.2 Site Catchments

The site is located in an elevated location, with runoff generally draining to the east, west and south of the site. The majority of runoff will discharge through rural or conservation land to Lake Taupo, while a portion of the site discharges to Kinloch.

¹ Lake Taupō Zone Plan, Waikato Regional Council (2017). Accessed from <https://www.waikatoregion.govt.nz/assets/WRC/Services/regional-services/RCS/Lake-Taupo-zone/5663-Taupo-Zone-Plan-2017-web.pdf>

Due to the topography, all waterways on the site appear to be ephemeral. Based on review of aerial imagery, it appears that the majority of downstream waterways are also ephemeral or intermittent for at least several hundred metres beyond the site boundary.

Site catchments and main waterways are shown in Figure 2.2

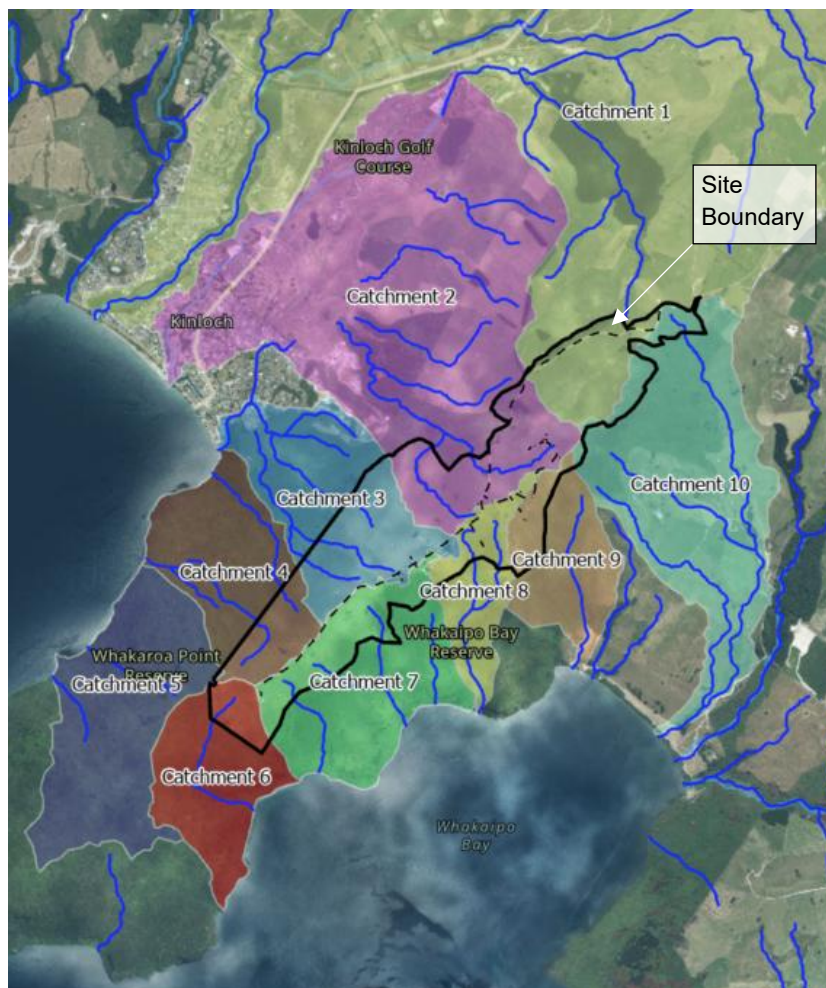


Figure 2.2: Site Catchments (proposed road shown as dashed lines)

Overland flow paths within and downstream of the site are indicated in Figure 2.3. The alignment of the proposed main road within the southern half of the site is generally along a ridgeline and does not cross any major overland flow paths, while the proposed main road crosses several notable flow paths on the northern half of the site.

All catchments currently drain via overland flow to Lake Taupō. Site catchments 1, 2 and 3 discharge via the Kinloch township.



Figure 2.3: Site overland flow paths

2.3 Waikato Regional Plan

Several waterways downstream of the site have water body classifications under the Waikato Regional Plan (WRP). Relevant classifications are shown in Figure 2.4.

This indicates minor portions of the site discharge to water bodies classified as 'Natural State Water Class' under the WRP. These water bodies are noted to be in a "naturally unmodified or substantially unmodified state" and are highly valued as "sources of high biodiversity, stable flow regimes and high water quality".

Some of the site also discharges to the Whangamata Stream which passes through Kinloch, this is noted to be "Trout Habitat" under the WRP.

The full site discharges ultimately to Lake Taupō which is classified as a Contact Recreation Zone under the WRP.



Figure 2.4: Water body classifications under Waikato Regional Plan (Data source: WRC Water Classification map)

2.4 Historic Imagery

A review of historic imagery on the LINZ Basemaps website indicates that restoration planting undertaken in the 1980s has significantly grown, stabilising land in Catchment 2. Aside from this, no notable changes to the landform were identified.

2.5 Existing Infrastructure

Existing on-site stormwater infrastructure is limited, and typical for rural land use. Existing drainage infrastructure, including cut-off drains and culverts have been installed along the existing access road.

Some stormwater from upstream catchments of the existing access road are conveyed across the road via culverts, but the majority of runoff from upstream catchments informally sheet flows across

the road to the receiving environment. This appears to have caused erosion on and beside the access road in some sections.

2.6 Downstream Environment

The downstream environment consists of a mixture of pastoral farmland, conservation land, and the township of Kinloch. Due to the elevation of the site, many downstream channels are steep, and prone to erosion due to the overlying pumice soils.

New residential and rural residential development has occurred on the fringes of Kinloch in the past few decades. Minor tributaries or ephemeral tributaries in this area appear to have been infilled and/or channelised, reducing stormwater conveyance capacity.

While development intensification would be unlikely for the majority of the areas downstream of the site due to the General Rural zoning of the land, Kinloch is considered subject to further intensification due to the residential and rural lifestyle zoning of the area downstream of Catchment 2 of the site.

2.7 Downstream Flooding

The Taupō District Plan flood overlay appears to only indicate lakeshore flooding around Lake Taupō (Figure 2.5). Riverine flooding on the site and within Kinloch may not have been modelled.

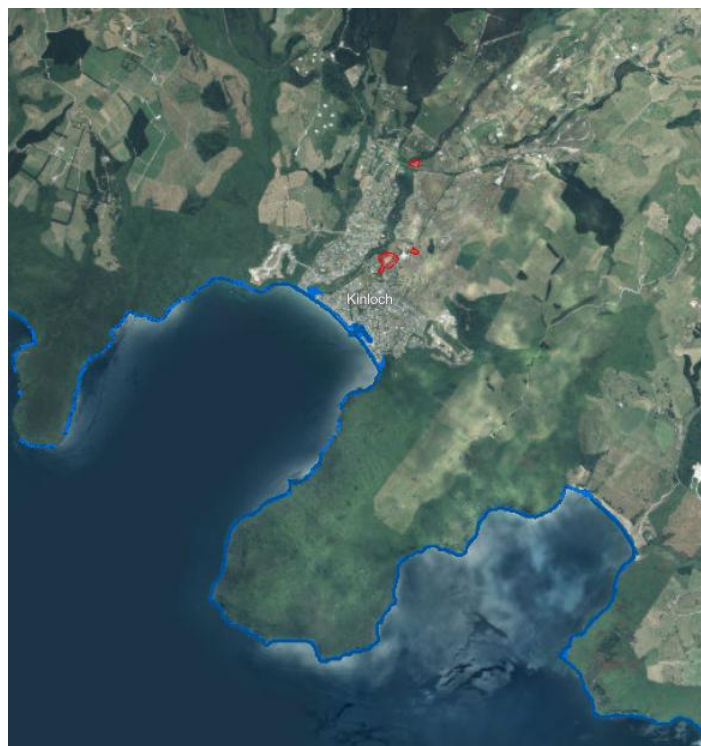


Figure 2.5: Taupō District Plan Flood Hazard Area overlay

The NIWA national flood hazard modelling provides an overview of potential flooding on the site and within its downstream environment. It generally indicates flooding within the site and its downstream environment is confined to defined waterways, however some flooding of residential properties in Kinloch is indicated to be possible. The 3°C temperature increase scenario (generally aligning with an RCP 8.5 scenario) is shown in Figure 2.6.

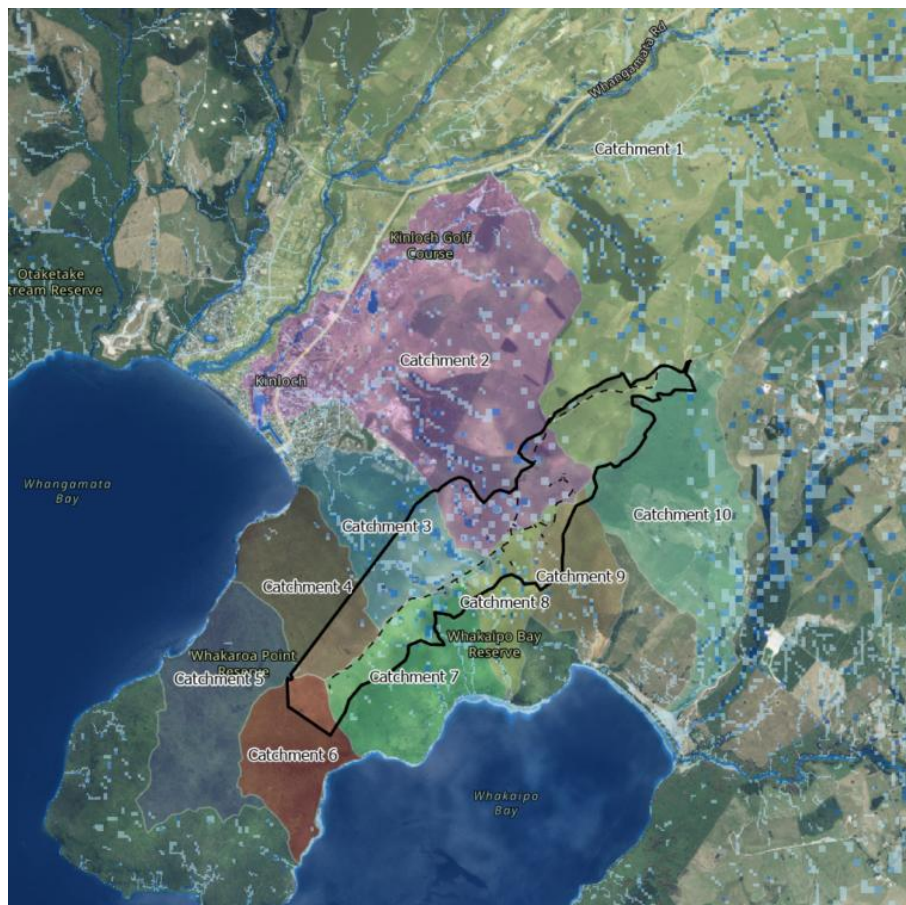


Figure 2.6: Indicative flooding on site and surrounds in 1%AEP event with 3°C climate change (Source: NIWA)

2.8 Soil Description

Preliminary geotechnical desktop assessment was undertaken by Core50². The assessment indicated that the site is predominantly underlain by granular shallow soils, which overlay intact rock at various depths.

A review was undertaken of soil drainage properties on the Landcare Research site, the site is shown to be well drained. The New Zealand Soil Classification indicates the site is overlain with 'Orthic Pumice'.

Pumice soils are typically highly permeable and have high infiltration rates.

Pumice soils have low strength when disturbed and easily erode if surface vegetation and topsoil are removed. Measures will be required to protect the soils from erosion and scour³ if this occurs.

Pumice soils should also be protected from compaction during construction to allow for pre-development infiltration.

² Core50 Geotechnical Desktop Assessment Report. 387 Whakaroa Road, Kinloch, 27/02/2026.

³ Waikato Regional Council Stormwater Management Guideline (TR20-07), May 2020.

Review of aerial imagery indicates erosion is present in many locations along the existing farm track, likely due to inadequate drainage. This shall be addressed in the roading and stormwater system design.

2.9 Groundwater Level

The site is expected to be 5 to 80 m above the groundwater table, refer Figure 2.7.

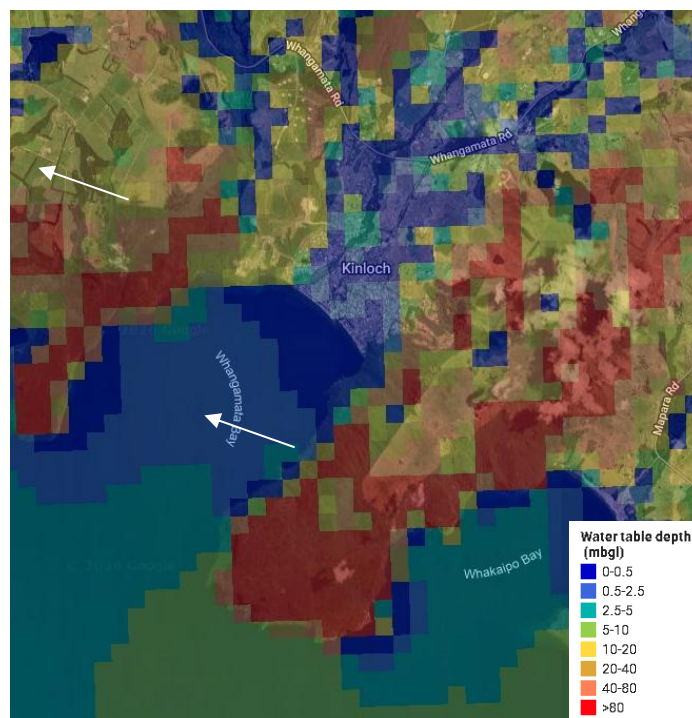


Figure 2.7: Groundwater level estimation⁴

2.10 Cross-Boundary Flows

Stormwater discharges from the site to neighbouring properties, including private farmland and conservation land. The site is elevated, therefore negligible to no cross-boundary inflows are expected to the site.

Cross boundary flows shall be maintained across the proposed new road via new and existing culverts as required. Erosion protection shall be installed directly downstream of proposed and existing culvert outlets.

⁴ Westerhoff et al., 2018. Application of an improved global-scale groundwater model for water table estimation across New Zealand, Hydrol. Earth Syst. Sci., 22, 6449–6472, doi:10.5194/hess-22-6449-2018

3 FLOOD HAZARD RISK ASSESSMENT

A flood hazard risk assessment has been undertaken to understand the flood risk to the development site.

The site is generally elevated and located on a ridgeline. Flooding is expected to be confined to channels due to the topography of the site. Due to the rural nature of the subdivision, and the general site location on the ridgeline of the peninsula, all proposed lots are expected to have multiple flood free building platforms.

Building platforms shall be located outside of all secondary overland flow paths. New stormwater outfalls downstream of the proposed road will be designed as per best practice guidelines to prevent erosion. Finished floor levels shall be set as per the New Zealand Building Code, Clause E1.

Assessing the developed site against the flood hazard provisions of the National Policy Statement for Natural Hazards 2025 (NPS-NH), the site is considered a 'low' risk. There is a low risk of damage to property or harm to people as a result of flooding. Refer Table 3.1 for a risk matrix.

		Likelihood Level						
		Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
Consequence Level	ARI (years)	up to 10	10-20	20-50	50-100	100-500	500-5000	> 5000
	AEP	10% or more	10% to 5%	5% to 2%	2% to 1%	1% to 0.2%	0.2% to 0.02%	< 0.02%
	Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
	Major	Very High	Very High	High	High	Medium	Medium	Medium
	Moderate	High	High	High	Medium	Medium	Low	Low
	Minor	Medium	Medium	Medium	Medium	Low	Low	Low
	Negligible	Low	Low	Low	Low	Low	Low	Low

Table 3.1: Site assessment against NPS-NH risk matrix

4 STORMWATER MANAGEMENT

4.1 Design Objectives

This assessment provides a framework for the development of a technically sound and workable overall stormwater management system, fit for purpose for the proposed rural/residential development. Stormwater management approach has been designed in general accordance with the level of protection and level of service requirements of NZS 4404:2010, the Taupō District Council Code of Practice for Development of Land (2009) and adopts stormwater management principles from the Waikato Stormwater Management Guideline (Waikato Regional Council TR20-07).

The stormwater management approach has been prepared in accordance with the following objectives:

- Develop a technically sound and workable overall stormwater management system for the proposed rural lifestyle subdivision, that provides stormwater management in general accordance with Taupō District Council (TDC) requirements, appropriate to the rural environment.
- Give effect to Te Mana o te Wai by prioritising the health and well-being of the receiving water bodies and freshwater ecosystems by designing a stormwater management system that is consistent with this approach.
- Complete a wider catchment assessment and understand the site-specific restraints and requirements in respect to the overall catchment and the downstream environment.
- Provide a workable concept layout of a stormwater system that meets the TDC level of protection and level of service requirements, accounting for climate change.
- Develop catchment specific stormwater management recommendations to be developed during detailed design.

4.2 Catchment Assessment Outcomes and Design Criteria Discussion

The catchment assessment and background information has determined the following key points which inform the design criteria for the preparation of a Stormwater Management plan for the development:

- The site is located within the Lake Taupō catchment, at the headwaters of the Waikato River. The lake has high water quality and biodiversity values.
- The site discharges to the east, south and west.
 - The majority of site discharges to Lake Taupō via overland flow through Department of Conservation land.
 - Some of the site runoff discharges to Lake Taupō via pastoral farmland
 - A minor portion of the site discharges via waterways passing through the township of Kinloch.
 - The site waterways are ephemeral. Immediate downstream waterways are also likely ephemeral or intermittent.
- The site and catchment soils are indicated to be pumiceous and well drained. They are expected to have high infiltration and percolation rates and be suitable for on-site soakage.

- Catchment imperviousness is proposed to increase negligibly. Catchments 3-10 are currently less than 3% impervious and will remain so based on review of the topography and current district plan.
- Any flooding on the site is expected to be limited to defined waterways and channels due to the general steep topography.
- Existing secondary flow paths and discharge locations should generally be maintained.
- Review of NIWA national flood hazard data indicates it is possible that minor to moderate flooding may occur in localised areas of Kinloch downstream of the site during severe storm events. Site catchments 1, 2 and 3 are located upstream of Kinloch.
 - The receiving environment of Catchment 2 is especially sensitive to flows from the site due to downstream overland flow paths through an urban environment which are not confined to defined stream channels.
 - The receiving environment of Catchment 1 and 3 is less sensitive as overland flows are observed to be generally confined to defined channels.

4.3 Basis of Design

Stormwater design criteria for the proposed development have been determined from the catchment review based on the above considerations as outlined in Table 4.1.

Table 4.1: Stormwater design objectives

DESIGN OBJECTIVES	DESIGN CRITERIA	DESCRIPTION	COMMENT	REFERENCE
<i>STORMWATER MANAGEMENT</i>				
Flood Hazard Management	Required: All catchments	Flood hazard mitigation provided in accordance with NZS4404 level of protection requirements. Secondary flow routes for 1% AEP design storm provided via road corridors into adjacent stormwater areas.	Secondary flow paths to be clearly defined and targeted within road reserve. Where located in private property secondary flow paths to be protected via consent notice or easements. All building platforms to be located outside of secondary flow paths.	NZS4404
Peak Flow Control – 100-year ARI event	Recommended: Catchment 2	Limit peak flow in 100-year ARI event to 80% of pre-development rate where there is documented flooding of habitable structures and catchment location is suitable.	Potential flood areas identified in downstream Kinloch. Where practically possible it is recommended flow and volume mitigation controls are provided to mitigate increases in hardstand. Road drainage design should avoid diversion of runoff into more sensitive catchments.	WRC TR20-07, Section 14.5.3

DESIGN OBJECTIVES	DESIGN CRITERIA	DESCRIPTION	COMMENT	REFERENCE
Peak Flow Control – intermediate storm events	Recommended: Catchment 2	Match pre-development flow rates for the 2- and 10-year ARI events.	Potential flood areas identified in downstream Kinloch. Where practically possible it is recommended flow and volume mitigation controls are provided to mitigate increases in hardstand. Road drainage design should avoid diversion of runoff into more sensitive catchments.	WRC TR20-07 Taupō CoP 2009
Water Quality Treatment	Required: All catchments	Water quality treatment for runoff from impervious surfaces, and/or control of the quality of water from those surfaces, required prior to discharge into the natural waterways for 90 th percentile 24-hour storm. Water quality volume is stormwater runoff volume determined by calculating runoff volume from 1/3 of the 2-year 24-hour rainfall, or up to 30 mm (TR2020-07). Devices which rely on flow rate to treat runoff shall be designed based on a 10 mm/hr flow rate.	Highly valued receiving environment sensitive to changes in water quality. Formalised treatment shall be provided where practical through swales, filter strips, existing vegetated networks, supplemented with proprietary systems where required. Additional treatment through flow in existing grassed and/or vegetated ephemeral channels in the landform may also be utilised to achieve treatment.	WRC TR2020-07 (Section 7.3.1)
Stream Protection / Extended Detention	Recommended: Catchment 1-2	Initial abstraction of pre-development runoff losses from all site impervious areas should be retained on site in conjunction with either 1 or 1.2 times the water quality volume, to mitigate stream erosion.	Not specifically required where catchment imperviousness is less than 3% however recommended to provide protection to stream channels and habitats downstream of development. Design to consider practical implementation where controls are feasible – ie check dams or swale retaining initial abstraction.	WR TR20-07 Section 7
Initial abstraction to be retained (reuse or soakage)	Recommended	Retention of minimum 15 mm runoff depth within select soakage infrastructure. Onsite soakage of onsite runoff in accordance with requirements of the NZBC.	Groundwater recharge not required, significant depth to groundwater. To be provided via on-site soakage as per item below.	WR TR20-07 NZBC - E1
Manage Cross Boundary SW Flows	Required: All catchments, specifically relevant to Catchment 1-3	The concept design of the drainage system should consider and allow for surrounding development areas. Secondary flow paths shall be provided with capacity up to 1% AEP event.	Potential for future development within downstream environment of Catchment 1-3. Unlikely for significant future development elsewhere due to general rural zoning. Pre-development flow paths and discharge locations to generally be maintained.	NZS 4404 Taupō CoP 2009

DESIGN OBJECTIVES	DESIGN CRITERIA	DESCRIPTION	COMMENT	REFERENCE
On-site Soakage	Recommended: All lots and ROWs	Required by NZBC E1 for all lots and ROWs for 10%AEP event. Ground conditions likely suitable for onsite soakage.	To be provided as a minimum as per NZBC E1 for all hardstand (driveway and carpark) areas on all lots, and within ROWs, and for roof areas. Discharge to receiving environment may be considered if onsite disposal is not feasible considering recommendations within this report. Specific assessment to occur with detailed design.	NZBC E1
Onsite Water Reuse	Recommended	Rainwater could be captured and reused for gardening, or for household water (where provided with drinking water treatment as per Taumata Arowai requirements).	Not required for development, but likely included in development strategy to provide potable water supply to residential homes. Opportunity for rainwater harvesting and reuse.	WRC TR20-07
STORMWATER RETICULATION				
Primary drainage system	Conveyance capacity for a 10-year ARI design storm.	Roadside collection via network of catchpits and swales, discharging into stormwater reticulation and/or soakage (if feasible). Alternatively, runoff will be allowed to sheet off into filter strips, with flow discharging diffusely into the downstream environment similar to pre-development. Where required, primary infrastructure (pipelines and open channels) shall be provided to convey stormwater to an appropriate discharge using gravity flow. Infrastructure design will be undertaken using the HIRDS V4 RCP 6.0 2081-2100 climate change scenario for rainfall intensity.	To be provided for development through a combination of reticulation and green infrastructure. Prioritise green infrastructure where possible. Aim for practical reuse of existing drainage infrastructure, with upgrades to be identified where existing under capacity infrastructure provides an unacceptable level of service or risks damage to access infrastructure.	NZS 4404 Taupō CoP 2009
Inlet and Outlet Hydraulic Energy Management - Energy Dissipation and Scour/Erosion Protection	10-year ARI design storm	Scour protection at reticulation inlets and outlets using energy dissipaters. Design to disperse flows and/or provide hydraulic energy reduction, with consideration towards environmental, cultural, social and economic factors	Design of inlets and outlets to be provided as per current best practice to protect against scour while also accounting for cultural, social and environmental factors, i.e. visual amenity of proposed outlet scour reduction techniques, inlet design for swales to protect against traffic and provide distributed flow.	WRC TR20-07 ARC TP10 AC TR2013/018

4.4 Design Strategy

The stormwater management strategy is summarised in the following key points:

- Onsite disposal of stormwater runoff shall be provided with at source management of runoff from lots and ROWs.
- Develop a stormwater management plan that respects the pre-development catchment conditions, existing drainage system and discharge locations.
- Develop a roading and drainage network across the site which provides a suitable primary and secondary stormwater system and conveys site runoff to suitable discharge locations.
 - The new road will closely follow the existing farm access track alignment. Existing culverts and drainage infrastructure are present throughout the length of the existing farm tracks, these are proposed to remain where practical.
 - The road shall be stabilised through sealing and formalising drainage. Sections of the existing road are subject to surface rilling and erosion, likely due to inadequate drainage. Additional culverts, surface reshaping to achieve adequate crossfall, installation of kerb and channel, and table drain shaping will be required.
 - Inlets and outlets of new and existing culverts will require adequate scour protection. Some existing culverts have had their inlets buried. Inlets and outlets will be provided with headwalls and rock aprons where required.
- The existing access track is subject to informal sheet drainage from reasonable upstream catchments in several sections. Formalisation of drainage pathways through providing roadside drainage will further concentrate flows, leading to potential erosion downstream of the road. Additional culverts will be required to reduce inflows to existing defined channels. Culvert crossing locations should be appropriately identified.
- Manage and maintain existing cross boundary flow paths, across the subdivision boundary and across proposed lot boundaries.
- Integrate stormwater management infrastructure into the road drainage system that provides appropriate stormwater management to site runoff before being discharged into the receiving environment. The design should deliberately attempt to achieve the design criteria identified within the basis of design. However, given the rural environment, and the downstream buffer zone, this should be implemented where practical. The following design criteria are recommended:
 - Water quality treatment to hardstand runoff
 - Peak flow / volume control (Catchment 1 & 2 only). Where practically possible it is recommended flow and volume mitigation controls are provided to mitigate increases in hardstand. – ie installing check dams in swales.

4.5 Design Features

Key features of the stormwater management approach are summarised below:

- On-site disposal - Residential Lots / Right of Ways. Onsite disposal of stormwater runoff to ground shall be provided as ground conditions are expected to generally be suitable for on-site soakage.
- Road cross-section designed to discharge stormwater to most appropriate downstream flow paths, matching existing catchment discharge rates and locations where possible. Green infrastructure is preferred.

- Roadside drainage has been provided for as follows:
 - Preference is for road runoff to sheet off from a road with a central crown as shallow, diffuse flow through filter strips following pre-development flow paths.
 - Where runoff is unable to sheet off to the receiving environment, grassed swales are proposed to direct runoff to the most appropriate discharge points.
 - Where grades are too steep for either swales or filter strips, kerb and channel is proposed to convey runoff to an appropriate outlet to prevent erosion.
- Culverts are proposed to be installed at locations where concentrated flows cross the road. Existing culverts and flow paths shall be retained where possible
 - Where necessary due to concentrated flows crossing roads, or steep road grades, collection and conveyance system consisting of swales, catchpits and culverts is proposed to provide a primary level of service to the new road development.
- Secondary stormwater system – Overland flow paths are generally proposed to be unmodified due to the rural nature of the proposed subdivision. The secondary network has been designed to generally maintain pre-development catchments and hydrology.
- Grassed swales and filter strips – Swales and filter strips are proposed to service the western catchment and shall be generally designed to provide water quality treatment for hardstand runoff.
- Stabilised, formalised drainage network – a stabilised, formalised drainage network will reduce erosion of the access road and table drains. Check dams, rip rap lining, and inlet/outlet protection shall be installed where required.

4.5.1 On-site Stormwater Disposal

Desktop geotechnical studies have identified that the in-situ subsurface material is pumice material which has high soakage rates and is suitable for the discharge of onsite stormwater.

On-site stormwater disposal via soakage will be required for all lots and ROWs. Runoff from hardstand areas (roof and driveway) shall be collected and discharged to soakage devices. Horizontal soakage systems and soakage trenches are expected to be suitable for the pumiceous sand soils expected to be encountered on site. Design of the specific devices should ensure appropriate setback from adjacent steep slopes.

Discharge to receiving environment may be considered if onsite disposal is not feasible considering the receiving environment and the assessment and recommendations within this report. Specific assessment to occur with detailed design.

Due to the rural nature of the subdivision, it is anticipated there will be more than sufficient room for installation of soakage infrastructure. Detailed design shall be undertaken at the time of building consent.

4.5.2 Road Drainage

Roading Cross-Section

The proposed road cross-section has been minimised to limit the increase in impervious area. The existing access track is approximately 3 m wide, and this is proposed to increase to 6.0 m to allow two-way rural traffic. A sealed shoulder is not proposed to limit the impervious area increase. The proposed road alignment will be approximately the same as the existing access track.

Where the alignment of the proposed road differs from the existing road, the existing access track shall be removed and re-grassed.

Swales and filter strips are preferred for roadside drainage, aside from areas where a limited road width is available due to topography and the presence of conservation areas. Kerb and channel will be installed in these sections.

Where grades are steep, swales will be protected from erosion with either rock rip rap lining or check dams. Where swales are impractical, kerb and channel with inlet structures will be provided.

Stormwater Reticulation

The reticulated stormwater network shall have a minimum capacity to convey the 10% AEP design storm.

Where kerb and channel is proposed to collect stormwater, catchpits and associated reticulation will be required. Other inlet structures such as scruffy dome lidded manholes may be used in conjunction with swales and channels.

Swales and Channels

Grassed Swales

Grassed swales have been designed to form part of the primary stormwater network servicing the western catchment. They will provide water quality treatment to the hardstand runoff in their catchments as per WRC TR20-07 where possible.

An underdrain may be required where grades are less than 2%. Check dams are proposed where grades exceed 5% but do not exceed 8%.

Where runoff currently sheets off into the receiving environment, the swales shall be shallow and of low capacity to encourage diffuse discharge into the receiving environment to limit concentrated flow, similar to the present scenario.

Preliminary calculations indicate the proposed grass swales can be designed to provide appropriate water quality treatment and flow conveyance.

Rock Check Dams

Rock check dams will be provided to impound stormwater within channels, either where intended to provide stream erosion protection, or to mitigate erosion in channels where grades are between 5% and 8%.

Rock Lined Channel

Rock lined channels are proposed where longitudinal grades exceed 8% to prevent erosion. They are to only be used in locations where channel velocities are estimated to exceed 1.5 m/s.

Grassed Filter Strips

Grassed filter strips are proposed alongside roads where runoff is able to sheet off without immediately concentrating. This will provide water quality treatment in general accordance with the requirements set out in WRC TR20-07.

Preliminary calculations indicate the proposed grass swales can be designed to provide appropriate water quality treatment and flow conveyance.

Infiltration Swales

Infiltration swales could be utilised to provide water quality treatment to runoff and provide at source stormwater management and runoff volume reduction. In particular these could be utilised along Road 2 as it is primarily located in Catchment 2 and is outside the conservation area.

The infiltration swales could be designed to provide runoff from stormwater events up to the 10-year ARI event. Specific design shall be undertaken with detailed design.

Culverts

Culvert upgrades will be required to service the updated development. Where existing culverts in good condition are present, they may need to be extended to provide sufficient length for the road widening.

Culverts will generally be required to provide adequate conveyance of primary flows minor rainfall events. Preliminary capacity calculations of the existing culverts have indicated generally their capacity is sufficient to provide a reasonable level of service to the proposed road.

The road widening and formalisation of drainage pathways will increase concentration of flows discharging to the receiving environment. Outlet stabilisation and energy dissipation should be provided. Where existing and proposed culverts are to discharge to a steep slope, it is recommended that an inspection of the downstream area is undertaken at the time of detailed design to identify scour risk and appropriate erosion protection measures.

4.5.3 Secondary Overland Flow Paths

Existing secondary overland flow paths are generally proposed to be maintained. Building platforms have been selected to be outside concentrated secondary overland flow paths. Surface water runoff in major design storm events will be safely directed away from roads and building platforms. The development's overland flow paths direct runoff along carriageways and to the designated discharge points.

Existing sheet flows shall be maintained where possible, and the road will avoid concentrating flows where possible. The road cross section shall be specifically designed to achieve this.

Secondary flow paths shall be stabilised to prevent erosion in events up to 1% AEP.

4.5.4 Cross Boundary Flow

The existing cross-boundary flow paths are proposed to be maintained. External cross-boundary flows to and from the property are generally proposed to remain the same as the pre-development case.

4.6 Finished Floor Levels

Flooding is expected to be confined to channels due to the topography of the site. Due to the rural nature of the subdivision, and the general site location on the ridgeline of the peninsula, all proposed lots are expected to have multiple flood free building platforms.

The TDC CoP requires appropriate building platforms on each lot to be flood free in a 1% AEP event, and/or elevated at least 500 mm above the 1% AEP flood level to provide an appropriate level of protection.

It is generally expected that the New Zealand Building Code, Clause E1, Acceptable Solution 1 will be suitable for defining finished floor levels for new buildings on the site .

4.7 Peak Flow Control

The catchment assessment identified catchment 2 may be sensitive to increases in runoff. Where practically possible it is recommended flow and volume mitigation controls are provided to mitigate increases in hardstand.

This is also the catchment where the scenic reserve and conservation land is present on steep terrain, hence limiting the available area for stormwater management without additional removal of native vegetation.

Some stormwater runoff from Catchment 2 will be detained or infiltrated on the site, to a minimum of the pre-development initial abstraction volume.

Attenuating stormwater within the existing drainage pond upstream of Culvert 9 (located at approximately CH 2490) may be possible if required. The pond would likely need to be enlarged and a formalised outlet structure would be required.

Road drainage design should avoid diversion of runoff into more sensitive catchments.

5 CONCLUSION AND RECOMMENDATIONS

This Stormwater Management Plan provides a framework for a technically sound and workable stormwater management system which is fit for purpose for the proposed rural/residential subdivision in general accordance with the requirements of the Taupō District Plan and the Waikato Regional Plan.

The stormwater management strategy has been developed to ensure that the proposed development gives effect to Te Mana o te Wai by prioritising the health and well-being of the receiving waterbody and ecosystem.

The stormwater design approach has been prepared to mitigate any adverse effects on downstream waterbodies and adjacent waterways by providing the following controls:

- Stormwater Disposal
 - All lots and Right of Ways shall manage all hardstand runoff from storms up to 10% AEP on-site as per NZBC E1/VM1.
- Stormwater Reticulation
 - All public roads will have appropriate sump and reticulation network to collect and convey stormwater runoff. The reticulation network will have a minimum capacity to collect and convey the 10% AEP design storm in accordance with the Taupō District Council Code of Practice (2009).
- Stormwater Management Requirements
 - Integrate stormwater management infrastructure into the road drainage system that provides appropriate stormwater management to site runoff before being discharged into the receiving environment. The design should deliberately attempt to achieve the design criteria identified within the basis of design. However, given the rural environment, and the downstream buffer zone, this should be implemented where practical. The following design criteria are recommended:
 - ♦ Water quality treatment to hardstand runoff
 - ♦ Peak flow / volume control (Catchment 1 & 2 only). Where practically possible it is recommended flow and volume mitigation controls are provided to mitigate increases in hardstand. – ie installing check dams in swales.
 - Water quality treatment/extended detention, stream protection and flow mitigation for runoff is proposed to be provided through a combination of on-site management measures and through provision of grassed vegetated swales. Infrastructure has been recommended for each catchment separately, considering their individual characteristics.
 - Catchment 1
 - ♦ Grassed swales and filter strips are proposed to provide water quality treatment to the hardstand runoff. Stream erosion protection could be provided via rock check dams and infiltration trenches alongside the road.
 - Catchment 2
 - ♦ Kerb and channel is required along much of the road through Catchment 2 due to the steep topography and proximity to the scenic reserve. Catchpits and connecting pipework shall be provided to collect stormwater from this area. Proprietary stormwater treatment devices such as gross pollutant traps (GPTs)

may also be required in this area due to the lack of available space for other stormwater treatment infrastructure.

- ◆ Where possible, grassed swales are proposed to provide water quality treatment to road runoff prior to discharge to the receiving environment.
- Catchment 3 -10
 - ◆ Runoff from the road shall generally be provided with water quality treatment via vegetated swales and filter strips prior to discharge into the receiving environment.
- Existing secondary overland flow paths shall generally be maintained to ensure that surface water runoff in major design storm events is safely directed away from building platforms and does not cause nuisance. The road cross section should be specifically designed to achieve this and specific design should be included to prevent erosion at the overflow points.
- Existing culverts may need to be extended, and new culverts will be required to provide adequate conveyance of primary flows in events up to 10% AEP. Outlet stabilisation and energy dissipation should be provided to ensure protection from scour. Where existing and proposed culverts are to discharge to a steep slope, it is recommended that an inspection of the downstream area is undertaken at the time of detailed design to identify scour risk and appropriate erosion protection measures.
- Flooding is expected to be confined to channels due to the topography of the site. Due to the rural nature of the subdivision, all proposed lots are expected to have multiple flood free building platforms.
 - The site is considered to be at 'low' risk of flood hazards under the National Policy Statement for Natural Hazards (2025). Refer Section 3 for the full assessment.
 - The TDC CoP requires appropriate building platforms on each lot to be flood free in a 1% AEP event, and/or elevated at least 500 mm above the 1% AEP flood level to provide an appropriate level of protection.

The preliminary location and layout of the required stormwater management infrastructure is defined in the BTW Stormwater Drawings attached in Appendix A.

Details of the proposed stormwater management approach, including the location, size and layout of proposed infrastructure will be confirmed during the detailed design process.

APPENDIX A PRELIMINARY STORMWATER DRAWINGS

TE TUHI HIGH COUNTRY ESTATE

Whakaroa Road, Kinloch – Taupō District

Infrastructure Summary Report

Plan Change	Taupō District Plan – Plan Change 44 (Residential Environment)
Site Address	287, 351 & 387 Whakaroa Road, Kinloch, Taupō
Client	Big Ball Holdings Limited
Prepared for	Appendix G to Section 32 Evaluation Report
Date	May 2026
Status	Final

This Infrastructure Summary Report consolidates the key infrastructure findings from technical reports prepared in support of the proposed rezoning of 287, 351 and 387 Whakaroa Road, Kinloch from General Rural Zone to Low Density Residential Zone, and is intended to serve as a concise reference document. Full technical reports are attached as separate appendices to the Section 32 Evaluation Report.

1. Executive Summary of the Proposal

The Te Tuhi High Country Estate proposal seeks the rezoning of approximately 44 hectares across three discrete areas of a 344.2 hectare site at 287, 351 and 387 Whakaroa Road, Kinloch from General Rural Zone (“GRUZ”) to Low Density Residential Zone (“LRZ”) under Taupō District Plan Change 44.

The site is a working sheep and beef farm on the Whakaroa Peninsula, overlooking Lake Taupō. The proposed rezoning will enable the development of the comprehensively planned Te Tuhi High Country Estate, comprising up to 33 primary residential lots and 33 associated minor dwellings (66 dwellings in total), clustered across three defined residential pockets within the larger pastoral landscape.

This approach is demonstrably superior to the permitted baseline of 33 × 10 ha lots with 66 dwellings dispersed across the full extent of the site. By concentrating development in defined pockets, the proposal:

- Retains the majority of the 344 ha site as a functioning pastoral farm;
- Minimises adverse effects on the Whakaroa Peninsula Outstanding Landscape Area (OLA 65) and Lake Taupō ONFL 9 (TDP OLA 60);
- Enables a coordinated, site-wide response to geotechnical constraints (active faults, slope stability);
- Achieves nitrogen neutrality through targeted pastoral retirement within a communal wastewater strategy;
- Allows proactive avoidance of archaeological sites and SNA buffers;
- Delivers infrastructure through efficient private shared systems with no public cost burden.

Infrastructure Conclusion

The Infrastructure Report by Simpli Consulting Limited (May 2026) concludes there are no infrastructure servicing constraints that should affect the development's viability. Water supply, wastewater, roading, and stormwater have each been assessed as feasible through independent technical investigation.

2. Key Infrastructure Matters – Overview

The following table summarises each infrastructure domain, the primary source document, and the key finding or status.

Infrastructure Domain	Primary Report	Key Finding / Status
Water Supply	Infrastructure Report – Simpli Consulting Limited (May 2026)	Two independent sources confirmed. Combined capacity exceeds 66-dwelling demand. Feasible.
Wastewater & Nitrogen	Infrastructure Report – Simpli Consulting Limited (May 2026); Overseer TAND 2022	Communal advanced treatment system and separate nitrogen reducing advanced wastewater systems. Nitrogen neutral through pastoral retirement offset.
Stormwater	Stormwater Management Plan – BTW Company (Rev WD, Apr 2026)	On-site soakage via permeable pumice soils. Low flood hazard risk under NPS-NH 2025.
Roading – Internal	Infrastructure Report – Simpli Consulting Limited (May 2026); Transport Impact Assessment	Private 5 km road network. Legal maintenance instrument. Follows existing farm tracks.

Infrastructure Domain	Primary Report	Key Finding / Status
	– Urban Connection (May 2026)	
Roading – External	Transport Impact Assessment – Urban Connection (May 2026)	Road network can accommodate traffic. Upgrades to Whakaroa Road and Mapara Road intersection required.
Geotechnical	Preliminary Geotechnical Report – CORE50 Engineers (Apr 2026)	TC1 Like (no liquefaction risk). Two active faults require FAZ avoidance. BSLs applied for slopes.
Electricity Transmission	NES-ETA; Simpli Consulting Limited Infrastructure Report (May 2026)	Transmission lines traverses site. Area A lots comply with setbacks. Unison to be consulted.
Telecommunications	Infrastructure Report – Simpli Consulting Limited (May 2026)	Use of wireless technology. No constraints identified.
Fire-fighting Water	Infrastructure Report – Simpli Consulting Limited (May 2026)	Individual on-site storage with 7,000 L/dwelling. Compliant with TDC CoP.

3. Water Supply

3.1 Supply Sources

Two independent water supply sources have been confirmed as feasible for the development through the Infrastructure Report by Simpli Consulting Limited (May 2026).

Public Rural Supply Main (Primary Source)

An existing Taupō District Council (TDC) public rural supply main runs through the site along Whakaroa Road. TDC has advised this supply provides 66,800 L/day (0.77 L/s), sufficient as a trickle supply of 1,600 L/day to approximately 39 properties. This supply would service primary lots, with additional storage and pumping where required for elevated sites.

On-site Private Bore (Secondary Source)

An existing on-site bore has been tested at 14,000 L/hr (3.89 L/s) over a 12-hour period with no significant drawdown observed. The bore alone is capable of supplying the full development demand. This source provides robust redundancy to the public supply.

3.2 Demand Assessment

Total water demand for 66 dwellings at the TDC Code of Practice rate of 1,600 L/day per dwelling is 105,600 L/day. This is well within the combined capacity of the two sources. Each dwelling will be provided with a minimum of 24 hours of on-site storage. Roof-collected rainwater may supplement non-potable demand. The bore water will be provided as a raw water supply and individual dwellings will be required to have individual storage and treatment such as UV filtration.

3.3 Fire-fighting Supply

Individual on-site storage is proposed, requiring a minimum of 25,000 L per dwelling for the 5000m² or large low density lots. Where any smaller lots are proposed, the onsite storage requirements will still provide suitable firefighting capacity from a shared communal water storage for water demand and will be detailed in the future subdivision application and at the time of lodging building consents.

Water Supply Conclusion

Water supply for 66 dwellings is confirmed as feasible through two independent sources with a combined capacity significantly exceeding the 105,600 L/day total demand. No public infrastructure upgrades are required.

4. Nitrogen Allowance and Discharge Management

4.1 Lake Taupō Catchment Context

The subject site is located within the Lake Taupō Catchment, which is subject to the Lake Taupō nitrogen cap established under the Waikato Regional Plan (WRP). Lake Taupō is classified as a Contact Recreation Zone under the WRP and is of outstanding value for water quality. Any development must ensure nitrogen discharge does not contribute to a deterioration of lake water quality.

Primary treatment is not a permitted activity within the Lake Taupō Catchment once a site drops below 4ha in size. Secondary-treated effluent disposal (achieving $\leq 20\text{g/m}^3$ BOD, $\leq 30\text{g/m}^3$ SS, $\leq 25\text{g/m}^3$ TN) is permitted under WRC rules, subject to consent conditions.

4.2 Current Pre-Development Nitrogen Load

A 2022 Overseer Reference Dataset report confirms the current pre-development total nitrogen discharge allowance (TAND) from pastoral use across the site is 4,337 kgN/yr. This is the baseline against which the residential development's nitrogen contribution must be measured.

4.3 Proposed Wastewater System and Nitrogen Treatment

The proposed wastewater system is made up of two options:

- A communal advanced treatment system to be used where sites are under 5000m².
- Individual advanced wastewater systems where sites are over 5000m².

Treated effluent from either system option will be disposed via a dripper line irrigation system over an identified disposal field at no more than 5 mm/day.

4.4 Nitrogen Neutral Design Strategy

The development has been designed to achieve nitrogen neutrality as a minimum, ensuring no net increase in nitrogen discharge from the property compared to the current pastoral baseline. The strategy operates as follows:

- Residential nitrogen contribution: estimated at 3.5 kgN/yr per dwelling via the advanced communal treatment system achieving 12 mg/L N. For 66 dwellings, this equates to approximately 231 kgN/yr.
- Pastoral retirement offset: an area of the farm's pastoral land within the current TAND allocation (4,337 kgN/yr) will be retired from active grazing to offset the residential nitrogen contribution. The specific offset area and methodology will be determined through Overseer-based nitrogen management modelling at resource consent stage.
- Additional reduction: steeper gullies and riparian areas adjacent to the residential development are proposed to be retired from pastoral use and replanted in native or amenity vegetation. These areas are expected to produce a further net reduction in nitrogen discharge beyond the minimum offset requirement, though the specific quantum has not yet been assessed.

The balance land will remain as a working pastoral farm integrated with the residential development. The overall nitrogen outcome is expected to be a modest reduction from the current pastoral baseline.

Nitrogen Conclusion

The development is designed to be nitrogen neutral through targeted pastoral retirement within the working farm. The communal treatment system exceeds WRP secondary treatment standards at 12 mg/L TN. A detailed nitrogen management plan confirming offset areas and Overseer modelling will be prepared at resource consent stage.

5. Geotechnical Assessment

5.1 Overview

A Preliminary Geotechnical Report was prepared by CORE50 Engineers (April 2026, Job Ref CR 260139-SR01) through a desktop assessment, subsoil investigation (52 hand augers, 4 CPTu tests, 4 machine augers), and qualitative/quantitative geohazard assessment across the 344 ha site.

5.2 Site Classification and Soils

The site is classified as a TC1 Like site. Soils are predominantly loose to medium dense pumiceous granular materials (silty sands, sands, silts, and gravels) derived from Taupō Group volcanic deposits. Soils generally do not meet the definition of “good ground” under NZS 3604:2011, requiring design or site works solutions at building consent stage. Groundwater was not encountered in any borehole.

5.3 Geohazard Assessment

Liquefaction

Quantitative assessment using CLiq software (Boulanger & Idriss 2014 method, Mw 6.1, ULS 0.39g) at all four CPT locations returned Liquefaction Potential Index (LPI) = 0 and Liquefaction Severity Number (LSN) = 0 across both SLS and ULS cases, indicating 100% low liquefaction probability. The site presents negligible liquefaction risk. Section 106 of the RMA can be addressed for the site.

Active Faults

The site is crossed by two active fault lines:

- Ngangiho Fault (northwestern boundary) – well-defined, recurrence interval $\leq 2,000$ years, classified as active.
- Ngangautu Fault (eastern area) – similarly classified as active.

Building platforms for lots 4, 5, 7, 8, 15, 17, 19, 21, 22, and 25 currently encroach Fault Avoidance Zones (FAZs) and must be relocated outside confirmed FAZ extents. Further fault trace investigation by GNS Science is recommended for these lots. Lots 7, 8, 17, 21, and 25 have significantly restricted platform areas outside the current FAZ mapping. The proposed plan change approach enables site-wide, coordinated building platform avoidance of FAZs, which is superior to the permitted baseline of 10 ha grid subdivision assessed on a lot-by-lot consent basis.

Slope Stability

Site topography varies from less than 5° to cliff areas exceeding 70°. Building Setback Lines (BSLs) are applied from slope crests as follows:

- 5 m setback from minor slopes (<15°);
- 10 m setback from moderate slopes (15– 25°);
- 15 m setback from major slopes (>25°).

Some evidence of existing slope movement is present near vehicle accessways. The main road cutting at approximately CH 1700–2300 m traverses a potentially unstable slope area, requiring detailed geotechnical assessment and minimisation of fill as a condition of engineering approval.

Flood Hazard

No flood hazard is identified for the subject site on TDC GIS maps. The site is assessed as ‘low’ flood hazard risk under the NPS-NH 2025, as confirmed in the BTW Stormwater Management Plan.

5.4 Earthworks and Foundation Design

Cut and fill earthworks are proposed to create building platforms, with cuts up to 4.0 m and fills up to 7.0 m. All earthworks require observation and testing by a suitably qualified geotechnical engineer. Specific engineering foundation design will likely be required across most lots (undercutting with certified granular fill, enhanced raft foundations, or piled foundations). Private way design requires an engineer-designed pavement or 600 mm undercut with certified granular fill.

Geotechnical Conclusion

The site presents negligible liquefaction risk (TC1 Like). Active fault risk is managed through building platform avoidance of FAZs, with further GNS investigation proposed for 10 affected lots. Slope stability setbacks are applied consistently. No geotechnical constraints preclude the development from proceeding.

6. Roding

6.1 Internal Road Network

The internal road network will be fully private, comprising approximately 5 km of road from the end of Whakaroa Road (the public road end), gated for private access. No roads within the development will vest in Taupō District Council. A high level initial engineering design has been completed by BTW to show how a compliant road corridor can be constructed through the site.

The network comprises:

- Main spine road: runs north-south through the site, serving the majority of residential lots. Designed to TDC Engineering Code of Practice (ECOP) standards, 6 m wide, 50 km/h target operating speed.
- Secondary road: branches from the spine to serve the low-density residential sites in Area A, located below the transmission tower area.

The road alignment has been planned to closely follow the existing formed farm tracks across the site to limit earthworks and maintain the working farm character of the balance land. One section through a heavily planted area with steeper and narrower terrain will require detailed cut and fill design at engineering approval stage. Turning heads with a minimum 15 m turning radius will be provided at the end of all access roads.

6.2 Legal Road Management Instrument

The entire internal road network will remain private and be managed under a legal instrument – such as a body corporate, incorporated society, or road maintenance agreement registered on title – to be established as a condition of subdivision consent. The instrument will set out funding contributions, maintenance responsibilities, and decision-making processes on behalf of all future residents, ensuring no road maintenance liability falls on Taupō District Council.

6.3 External Roding Effects

A Transport Impact Assessment (TIA) was prepared by Urban Connection Limited (August 2023) for a previous iteration of the Te Tuhi development (115 lots plus a tourism lodge), providing directly relevant baseline data. Applying the TIA's surveyed trip generation rates, the 66-dwelling proposal is estimated to generate approximately:

- 297 vehicle trips per day (vpd); and
- 30 vehicle trips per hour (vph) in the peak hour.

This is approximately 38% of the traffic volume assessed in the TIA. The Whakaroa Road/Mapara Road intersection is assessed as operating at a maximum degree of saturation of 0.29 for the larger 115-lot scenario; the 66-dwelling proposal would produce substantially lower loading.

6.4 Required Road Network Upgrades

The TIA identifies the following infrastructure improvements required as conditions of subdivision consent:

- Widening of Whakaroa Road to a minimum 6.7 m carriageway width along its 2.9 km length (currently 4.3–5.7 m at isolated cutting sections);
- Upgrade of the Whakaroa Road/Mapara Road intersection: Diagram E right-turn widening, give way controls, flag lighting, chevron board, and advance warning signage;
- Turning heads with 15 m minimum turning radius at the end of all private access roads;
- Discussion with the Ministry of Education regarding school bus stop accommodation.

Mapara Road does not require widening. Existing sight distances at the Whakaroa/Mapara intersection comply with TDC requirements (270 m north, 160 m south against a 160 m requirement). An updated TIA is recommended at subdivision consent stage to confirm the adequacy of recommended upgrades for the 66-dwelling scenario.

Roading Conclusion

The road network can accommodate traffic from the proposed 66-dwelling development with manageable infrastructure upgrades. All internal roads will be private and maintained by a legal instrument at no cost to TDC. Intersection upgrades at Whakaroa/Mapara Road will be required as consent conditions.

7. Stormwater Management

7.1 Site and Catchment Context

The subject site discharges across ten identified catchments to the east, west, and south. Catchments 1, 2, and 3 discharge via the Kinloch township; the remainder discharge through rural or conservation land to Lake Taupō. All on-site waterways are ephemeral.

Site soils are Orthic Pumice – well drained, highly permeable, with high infiltration rates. Groundwater is estimated to be 5–80 m below ground level, making on-site soakage the primary and highly viable disposal method. Pumice soils are, however, vulnerable to erosion when disturbed and require careful construction management.

7.2 Flood Hazard Risk

The site is assessed as 'low' flood hazard risk under the National Policy Statement for Natural Hazards 2025 (NPS-NH 2025) by the BTW Stormwater Management Plan. Due to the ridgeline topography, flooding is expected to be confined to defined channels. All proposed lots are expected to have multiple flood-free building platforms. Finished floor levels will comply with NZBC Clause E1 and will be flood-free in a 1% AEP event (or elevated at least 500 mm above the 1% AEP flood level), as required by the TDC Code of Practice. Climate change has been assessed using NIWA national flood hazard modelling and HIRDS V4 RCP 6.0 (2081–2100), consistent with the NPS-NH requirement to consider climate change to at least 100 years in the future.

7.3 Design Approach and Green Infrastructure

The stormwater management strategy gives effect to Te Mana o te Wai by prioritising the health and wellbeing of receiving water bodies and freshwater ecosystems within the Lake Taupō catchment. The strategy is designed in accordance with NZS 4404:2010, TDC Code of Practice, and WRC Stormwater Management Guideline (TR20-07). Key design elements are:

- On-site soakage: All lots and rights of way will manage rooftop and driveway runoff via on-site soakage devices (horizontal soakage systems and soakage trenches), consistent with NZBC E1 requirements for the 10% AEP event. This is the primary disposal mechanism.
- Road drainage: Road runoff managed by preference through (i) shallow sheet flow through grassed filter strips; (ii) grassed swales; or (iii) kerb and channel with catchpits where gradients preclude other options.
- Green infrastructure: Grassed swales, filter strips, rock check dams, and rock-lined channels throughout the site. Swales designed to provide water quality treatment per WRC TR20-07. Check dams where channel grades exceed 5%; rock-lined channels where grades exceed 8%.
- Culverts: Existing culverts to be retained and extended where practicable. New culverts at all concentrated flow crossings, with headwalls and rock aprons for scour protection. All culverts to comply with NES-F fish passage requirements.
- Peak flow control (Catchment 2): Flow and volume mitigation controls recommended to limit peak flows to 80% of pre-development rates in the 100-year ARI event, given downstream overland flow paths through Kinloch.

Stormwater Conclusion

Stormwater effects are manageable through on-site soakage, green infrastructure, and appropriately designed road drainage. The development is assessed as low flood hazard risk under NPS-NH 2025. The strategy gives effect to Te Mana o te Wai and is consistent with TDC and WRC standards.

8. Additional Infrastructure Matters

8.1 Electricity Transmission

A transmission line traverses the subject site. Area A. Key requirements under the NES for Electricity Transmission Activities 2009 (NES-ETA) and the NPS-ET 2008:

- National Grid Yard setbacks of 12 m from centreline (10 m for single-pole lines) apply to all lots in and near Area A;
- Sensitive land uses, including residential buildings, must not be located within the National Grid Subdivision Corridor;
- The secondary road serving Area A has been routed to comply with NES-ETA requirements;
- Earthworks within the National Grid Yard require prior written approval from Transpower New Zealand Limited;
- Unison will be notified and consulted on the plan change and all resource consent applications affecting the transmission line vicinity.

8.2 Telecommunications

Fibre telecommunications will not be extended into the site and wireless technologies will be used such as Starlink. Mobile coverage is available in the area. No telecommunications infrastructure constraints have been identified.

8.3 Soil Contamination (NES-CS)

The site is currently and historically used for pastoral farming with no HAIL activities on the residential parcels. Two transmission sites on separate titles are located within or near the site; these are known HAIL sites but are bounded by their own titles and are located well away from any proposed residential development areas. A Preliminary Site Investigation (PSI) is recommended at resource consent stage to confirm the contamination status of the residential development areas, consistent with the NES for Assessing and Managing Contaminants in Soil 2011.

8.4 Wetlands and Freshwater (NES-F)

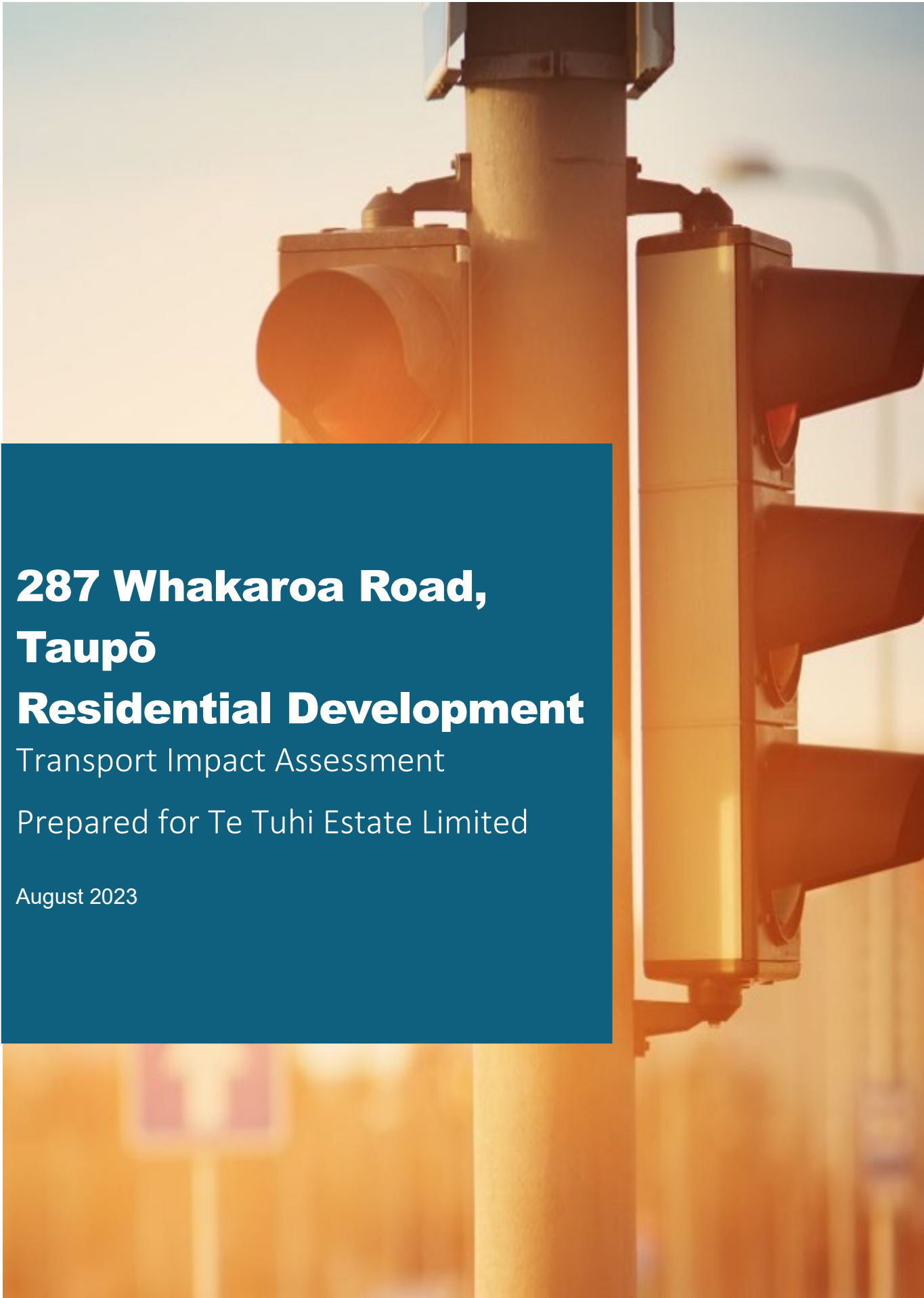
All on-site waterways are ephemeral. A wetland assessment should be undertaken at resource consent stage to confirm no natural inland wetlands are affected. Culvert design will comply with NES-F fish passage requirements. Proposed pastoral retirement of gullies and riparian areas will support NES-F freshwater quality outcomes by reducing stock access to watercourses.

9. Infrastructure Feasibility Summary

The following table summarises the feasibility status and key action items for each infrastructure domain.

Domain	Feasibility	Status	Key Action / Condition
Water Supply	Confirmed Feasible	Two sources; 105,600 L/day demand well within capacity	On-site storage per lot; pumping for elevated sites
Wastewater	Confirmed Feasible	Communal system for lots under 5000m ² and individual system for site over 5000m ²	Full system design at resource consent stage
Nitrogen Management	Confirmed Feasible – Neutral	Offset via pastoral retirement; TAND 4,337 kgN/yr baseline	Overseer nitrogen management plan at consent stage
Stormwater	Confirmed Manageable	On-site soakage; green infrastructure; low flood hazard	Detailed design at engineering approval stage; NES-F culvert compliance
Internal Roding	Confirmed Feasible	5 km private network; legal maintenance instrument	Detailed design and legal instrument at subdivision consent
External Roding	Confirmed Manageable	Road capacity adequate; upgrades required	Whakaroa Road widening and Mapara Road intersection upgrades as consent conditions
Geotechnical	Confirmed Manageable	TC1 Like; active faults require FAZ avoidance for 10 lots	GNS fault investigation; building platform relocation outside FAZs; BSLs applied
National Grid	Confirmed Manageable	NES-ETA setbacks complied with in Area A	Unison consultation; earthworks approval within Grid Yard
Telecommunications	Confirmed Feasible	Wireless connections suitable for rural setting.	Will be addressed by future owners.
Soil Contamination	Low Risk – PSI Recommended	Pastoral use; HAIL sites on separate titles not affecting residential areas	PSI at resource consent stage

This Infrastructure Summary Report is prepared for planning purposes as Appendix G to the Section 32 Evaluation Report for Taupō District Plan Change 44. Technical reports referenced herein are attached as separate appendices. Information in this report should be confirmed through detailed engineering design and updated technical reports at subdivision consent and engineering approval stages.



287 Whakaroa Road, Taupō

Residential Development

Transport Impact Assessment

Prepared for Te Tuhi Estate Limited

August 2023

Contents

INTRODUCTION	4
1.1. BACKGROUND	4
2. EXISTING TRANSPORT INFRASTRUCTURE	5
2.1. SITE LOCATION	5
2.2. EXISTING ROAD LAYOUT	5
2.3. EXISTING ACCESSWAYS	9
2.4. PUBLIC TRANSPORT	10
2.5. WALKING AND CYCLING FACILITIES.....	11
3. TRAVEL PATTERNS.....	13
3.1. PEAK HOUR TRAFFIC VOLUMES	13
3.2. DAILY TRAFFIC VOLUMES	14
3.3. EXISTING SITE TRAFFIC.....	14
3.4. PLAN CHANGE 42	14
4. ROAD SAFETY	16
5. THE PROPOSAL.....	17
6. TRAFFIC GENERATION AND DISTRIBUTION	19
6.1. TRAFFIC GENERATION ASSESSMENT	19
6.1. TRAFFIC DISTRIBUTION	20
7. TRAFFIC EFFECTS	22
7.1. INTERSECTION PERFORMANCE.....	22
8. LAYOUT AND DESIGN	23
8.1. INTERNAL ROAD DESIGN	23
8.2. WHAKAROA ROAD & MAPARA ROAD	23
8.3. INTERSECTION DESIGN	24
8.4. PARKING REQUIREMENTS	25
8.5. VISIBILITY ASSESSMENT	25
8.6. INTERSECTION SEPARATION DISTANCE	26
9. CONCLUSION.....	27
10. RECOMMENDATIONS	28

11. DISCLAIMER 29

Introduction

1.1. Background

This Transport Impact Assessment (TIA) has been prepared for Te Tuhi Estate Limited in relation to a residential development containing 115 lots and a tourism lodge at 287 Whakaroa Road, Taupō.

The proposed development site is approximately 344 Ha and is zoned Taupō Rural Environment under the Taupō District Plan. The proposal includes adding the proposed site into Plan Change 42 which involves creating a new Rural Lifestyle Environment from the General Rural Environment.

A new private road and road intersection with Whakaroa Road will be provided to serve the proposed site. Currently, the site is accessed by one existing accessway off the western end of Whakaroa Road.

Based on the scale of the proposed development and the immediate surrounding environment, the primary transport considerations are as follows:

- the level of traffic that is likely to be generated by the proposed 115 sites and tourism lodge;
- the likely effect traffic generation will have on the surrounding transport network;
- the ability of the site and its surroundings to meet the access demands created by development;
- address any road safety issues created by the proposed development.

These and other matters are addressed in the body of the report.

2. Existing Transport Infrastructure

2.1. Site Location

The site is located at 287 Whakaroa Road in Taupō. As such, it requires compliance with Taupō's District Plan and adopted standards and guidelines of the Road Controlling Authority (RCA).

The site is in the Northwest region of Taupō City, approximately a 15-minute drive from the central area.

The existing access to the site is located at the end of Whakaroa Road, approximately 2.9km to the southwest of the intersection with Mapara Road (see Figure 1). It is proposed that the existing access remains as the access to the site and will include a new site access spine road that serves the entire site.

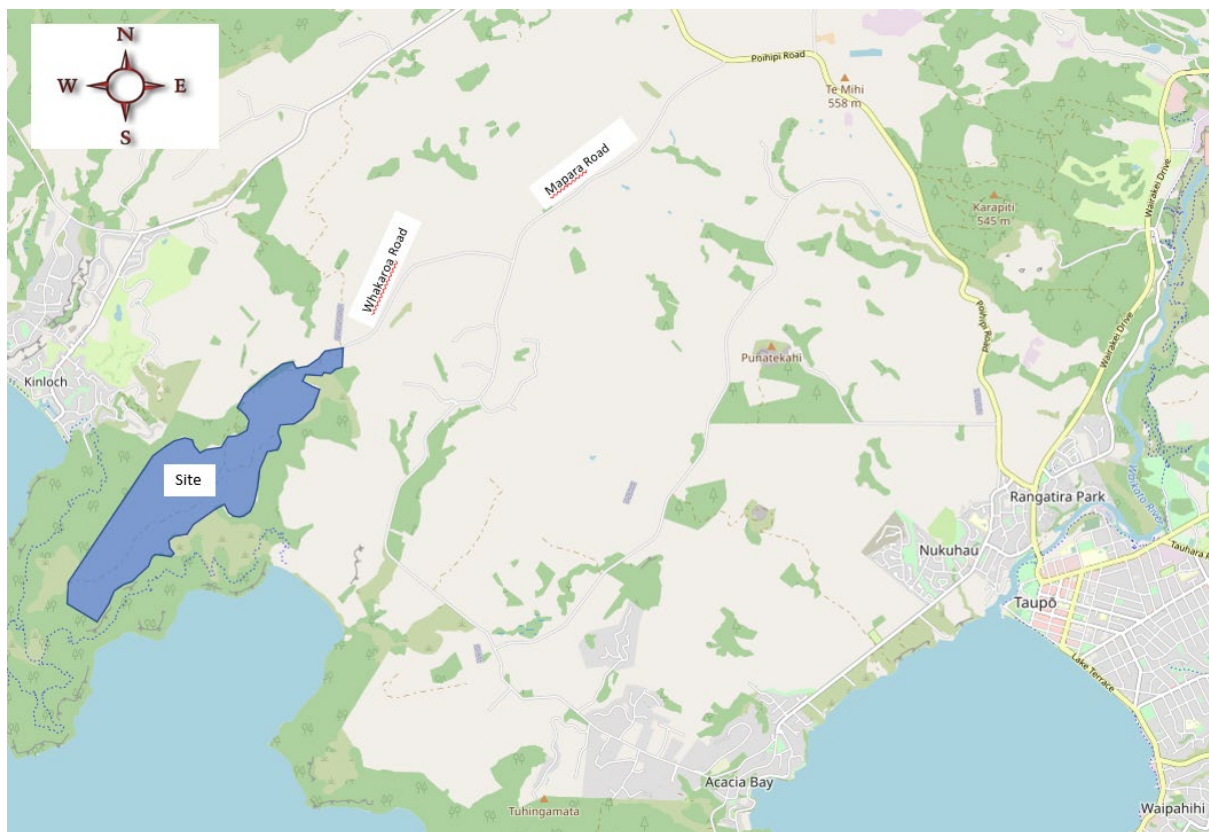


Figure 1: Site Location

2.2. Existing Road Layout

2.2.1. Whakaroa Road

Whakaroa Road is classified as a Low Volume Road under the One Network Road Classification (ONRC). It is 2.9 km long with a posted speed limit of 100 km/h along its length. It serves approximately 20 rural residential properties including a few farms and some accommodation services. It is not a through route and the traffic experienced on this road is solely generated by the immediate surrounding land uses.

The sealed carriageway ranges in width from 6.4 m at its southern end, to 6.9 m wide near the

intersection of Whakaroa Road and Mapara Road. However, there are three isolated locations where the width narrows to between 4.3 m to 5.7 m, through cuttings. There is no pedestrian or cycling facilities.

There is a narrow grass berm and large banks on both the northern and southern side of the road.

White centerline markings are provided throughout Whakaroa Road. The cross-section of the road through a narrow section is shown in Figure 2.

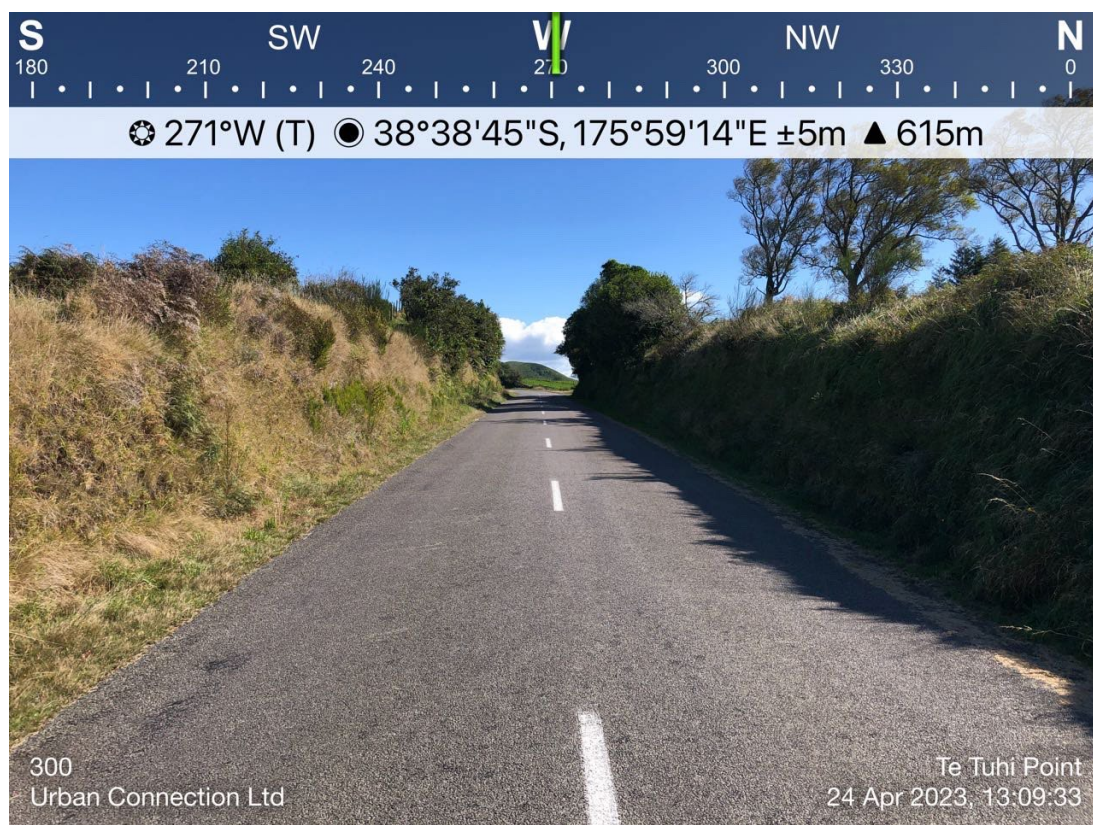


Figure 2: Whakaroa Road cross section layout

2.2.2. Mapara Road

Mapara Road is classified as a Secondary Collector Road under the One Network Road Classification (ONRC). It connects Acacia Bay via Acacia Bay Road to the east and heads out towards Poihipi Road and leads ultimately to Wairakei Drive and into central Taupo.

Mapara Road has a posted speed limit of 100 km/h and has a sealed width of approximately 6.4 to 6.9 m with narrow grass berms on both sides. There is no pedestrian or cycling facilities. The cross section of Mapara Road is shown in Figure 3.



Figure 3: Mapara Road cross section layout

2.2.3. Whakaroa Road / Mapara Road intersection

The intersection of Mapara Road and Whakaroa Road is an uncontrolled “T” intersection. The available intersection sight lines are over 270m to the north and 160m to the south (see Figure 4 and Figure 5). There is also a steep bank opposite the intersection (see Figure 6).



Figure 4: Whakaroa Road and Mapara Road intersection, looking northbound



Figure 5: Whakaroa Road intersection with Mapara Road, looking southbound



Figure 6: Steep bank opposite Whakaroa Road and Mapara Road intersection

2.2.4. Proposed Speed Limits

TDC have adopted an interim speed management plan (September 2022). This included a reduction in speed limits at almost all schools within the district, with a combination of static and variable school signs. TDC also included a reduction to 80 km/h for Mapara Road and Whakaroa Road, however the council decided on no change at this time due to limited support from the public. The safe and appropriate speeds taken from MegaMaps indicate 60 km/h for Whakaroa Road and 80 km/h for Mapara Road.

2.3. Existing Accessways

2.3.1. Main Access

The existing main access to the site is located at the western end of Whakaroa Road. It is approximately 4 m wide, unsealed and serves the existing land use (see Figure 7).

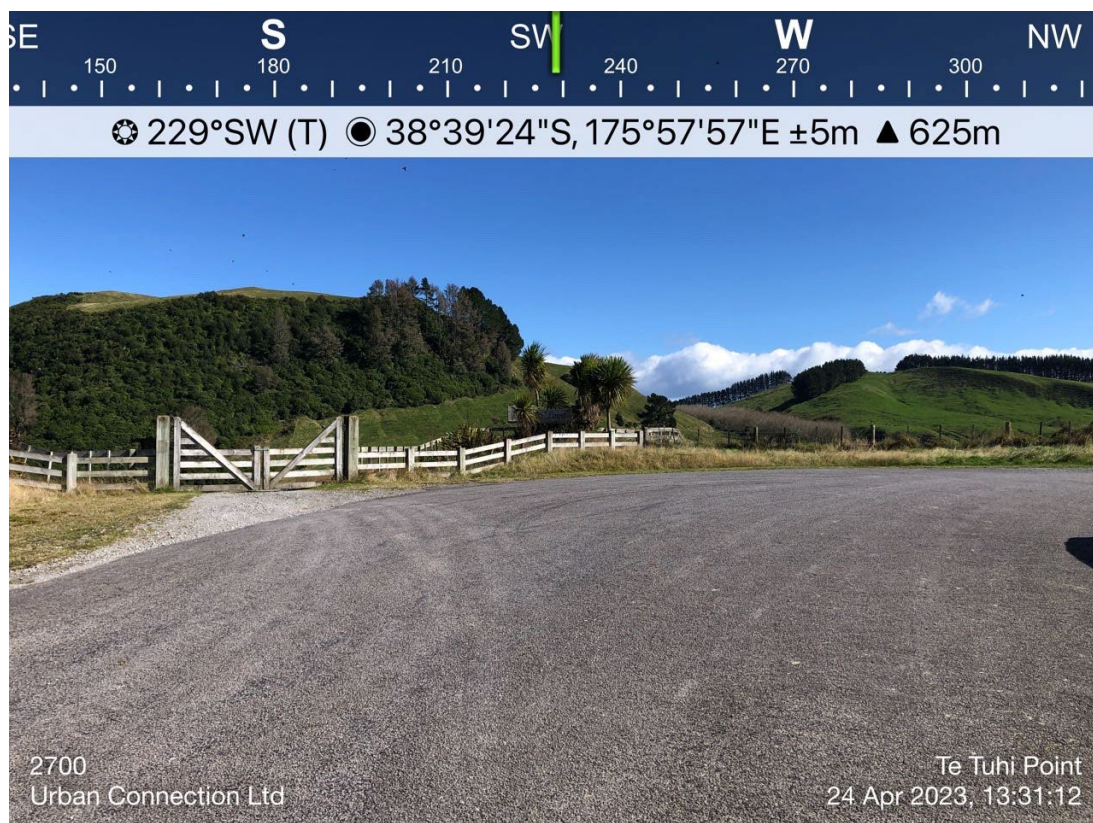


Figure 7: Unsealed entranceway with fence

2.4. Public Transport

2.4.1. School Bus

A school bus was observed stopping at the intersection of Whakaroa Road and Mapara Road intersection to take the local children to school. Parents drove to the intersection to drop their children off to the school bus. One child cycled to the bus.

There are warning signs on Mapara Road warning of a school bus route, and to watch out for horses. This is located south of the Whakaroa Road/Mapara Road intersection. See Figure 8.



Figure 8: Permanent Warning Sign on Mapara Road

It is expected that the new residential development will attract families with school age children. Discussions with Ministry of Education in regard to school bus pick up and drop off will be required to ensure the pick-up/drop off point is safe and suitable for any increased usage, or whether a new location is required perhaps within or closer to the residential development.

2.4.2. Bus Routes

There are no official bus routes within the vicinity of the site along Whakaroa Road and Mapara Road.

2.5. Walking and Cycling Facilities

As mentioned in previous sections, there are no walking or cycling facilities on Whakaroa Road or Mapara Road. There is a mountain biking trail that skirts the outside of the proposed site and is part of the “Great Lake Trail” within the nearby DoC reserves. See Figure 9. This is the “Day 2 or 3” W2K route (Whakaipo to Kinloch). It is proposed to provide a link from Whakaroa Road and the proposed site through to this “Great Trail”. However, it is not expected to generate additional traffic volumes or cyclists along Whakaroa Road.



Figure 9: Whakaipo to Kinloch Great Lake Trail

3. Travel Patterns

3.1. Peak Hour Traffic Volumes

A peak period traffic count survey has been undertaken to observe traffic volumes, flow conditions and split of trips at the Whakaroa Road/Mapara Road intersection. The survey was carried out manually in the network AM peak hour, undertaken from 7:45 to 9:00 AM, on Tuesday, 28 February 2023. The AM peak flows at the intersection during this period have been confirmed to be from 7:45 to 8:45 AM. The existing flows in the AM peak hour are further detailed in Table 1 and Figure 9.

Table 1: Peak Hour Traffic Volumes

Road Name	Total	% of HCVs
Whakaroa Road	9	0.0%
Mapara Road (Southbound approach to Whakaroa Road)	63	5.4%
Mapara Road (Northbound approach to Whakaroa Road)	58	5.4%

The AM peak survey shows an approximate 30/70 split between southbound and northbound vehicles. However, turning movements out of the Whakaroa Road are approximately 75% towards the north (noting that the actual turning volumes are low). Turning movements into Whakaroa Road from Mapara Road are approximately 80% from the north. The heavy vehicle percentages collected are lower than the Mobile Road estimate (presented in Table 2).

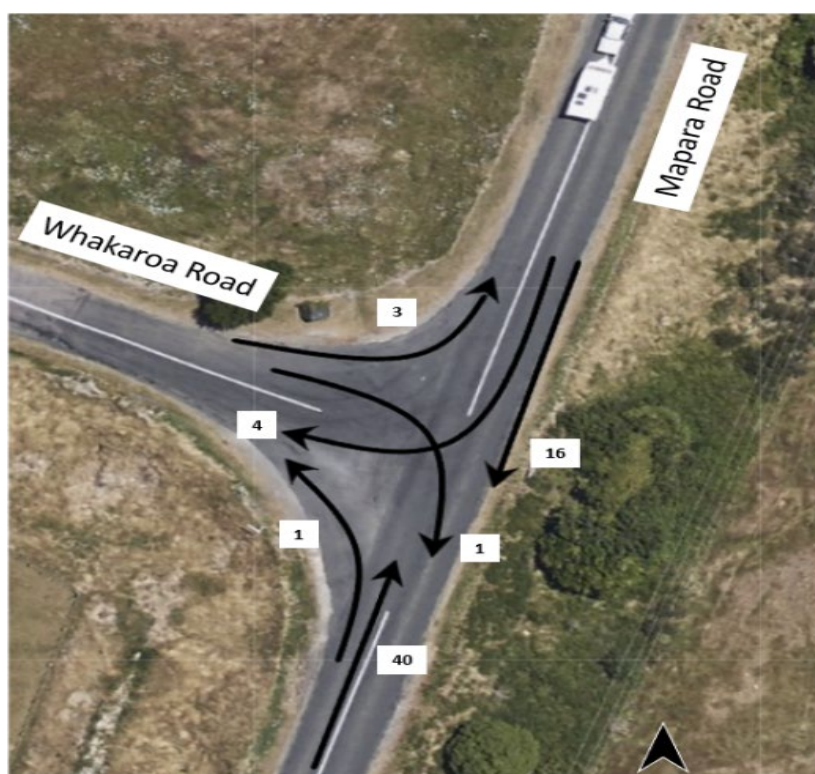


Figure 10: AM Peak Hour flows

3.2. Daily Traffic Volumes

The estimated Annual Average Daily Traffic (AADT) on Whakaroa Road and Mapara Road has been obtained from Mobile Roads. The daily traffic data is provided in Table 2.

Table 2: Daily Traffic Volumes

Road Name	Two-way daily flows (vpd)	% of HCVs	Traffic Count Year
Whakaroa Road	40*	10.0%	2000
Mapara Road (North of Whakaroa Road)	697*	26.6%	2022
Mapara Road (South of Whakaroa Road)	200*	10.0%	2000

*Estimated

As noted earlier, Whakaroa Road serves approximately 20 rural residential properties. To obtain a more likely daily traffic flow along this road, the on-site survey (refer to Section 3.1) carried out during the peak hour is the best moderator to understand daily traffic volumes. On the basis that 10% of daily trips occur in the peak, then a surveyed peak flow of 9 vehicles per hour equals 90 vehicles per day. This gives a daily rate of 4.5 trips per dwelling in the Whakaroa Road environment, recognising these are working farms and large rural lifestyle properties.

3.3. Existing Site Traffic

Presently, the intersection is utilised by the existing residential dwellings along Whakaroa Road (approximately 20 dwellings). Existing trips generated by the development site in its current form are considered minimal (one farm). This dwelling is expected to generate approximately 4.5 vpd and 0.45 vph in the peak hour using trip generation rates obtained from the traffic survey undertaken in March 2023.

The proposed development will generate a significant amount of extra traffic along Whakaroa Road. Most of the existing traffic is traveling to/from the north and this is expected to continue, however some traffic is expected to travel south toward Acacia Bay.

3.4. Plan Change 42

Plan Change 42 is a full review of the existing Rural Chapters within the Taupo District Plan. A key change is creating a new Rural Lifestyle Environment from the General Rural Environment, which this proposal is proposing to be part of. Parts of this will include a new set of objectives, policies and rules including relaxation of subdivision rules, allowance for minor dwellings and removal of the Mapara Valley Structure Plan. Figure 10 shows the new rural lifestyle zones near to the proposed Te Tuhi Point development and along Whakaroa Road.

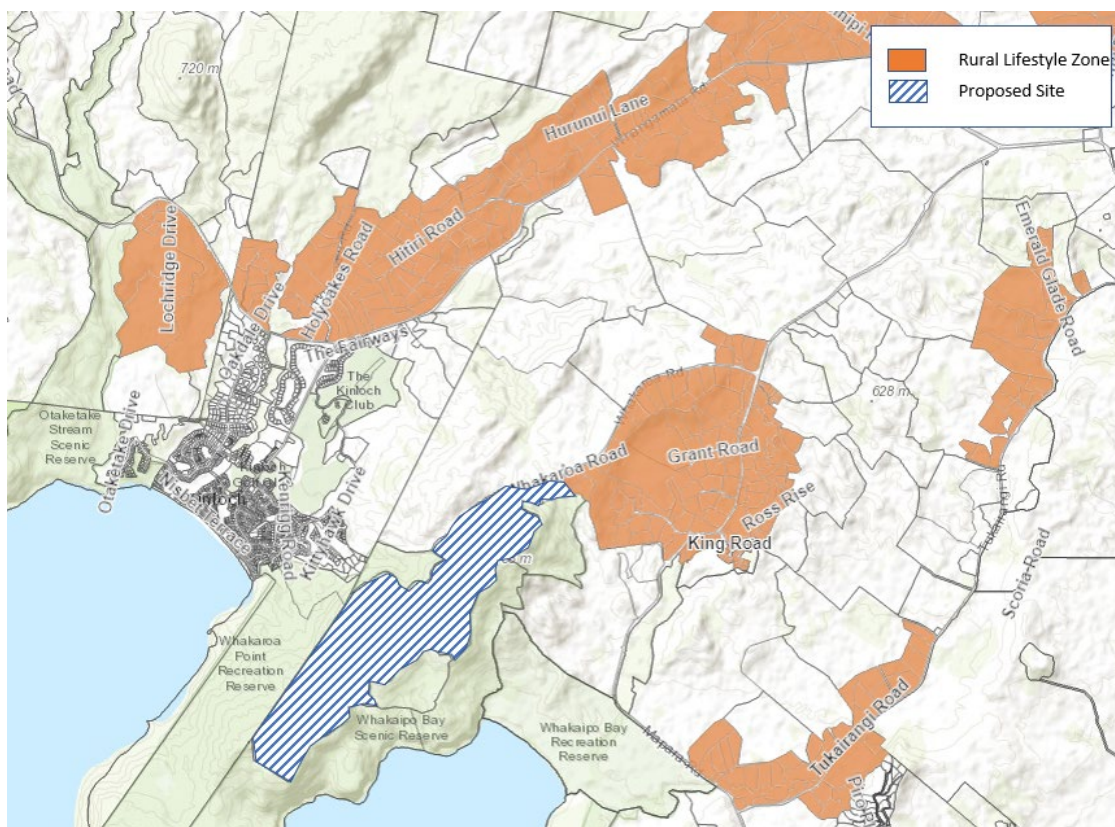


Figure 11: Plan Change 42 – Rural Lifestyle Zones

As shown in Figure 10, the Rural Lifestyle Zone includes all of the properties on the southern side of Whakaroa Road, and the first 4 or 5 properties on the northern side. Therefore, there are a total of approximately 15 lots on Whakaroa Road that are subject to the Plan Change 32 zone changes.

As part of the plan change, TDC engaged a consultant to undertake a high-level transport assessment of the proposed plan change to increase the supply of Lifestyle blocks in the vicinity of Taupo Township. The Rural Lifestyle zone will allow creation of sites down to 2 ha in area and allow for one minor residential unit per site. With this in mind, the traffic generation rate used in the report was 1.2 trips per peak hour and 12 trips per day, per Rural Lifestyle site.

4. Road Safety

A review of the current safety performance has been undertaken to determine the nature of crash types and severity along Whakaroa Road and at the Mapara Road intersection (200m either side of Whakaroa Road). Crash information has been extracted from Waka Kotahi's Crash Analysis System (CAS) database for the last ten-year period (2013 to 2023 to date). The extent of the assessment is shown in Figure 10.

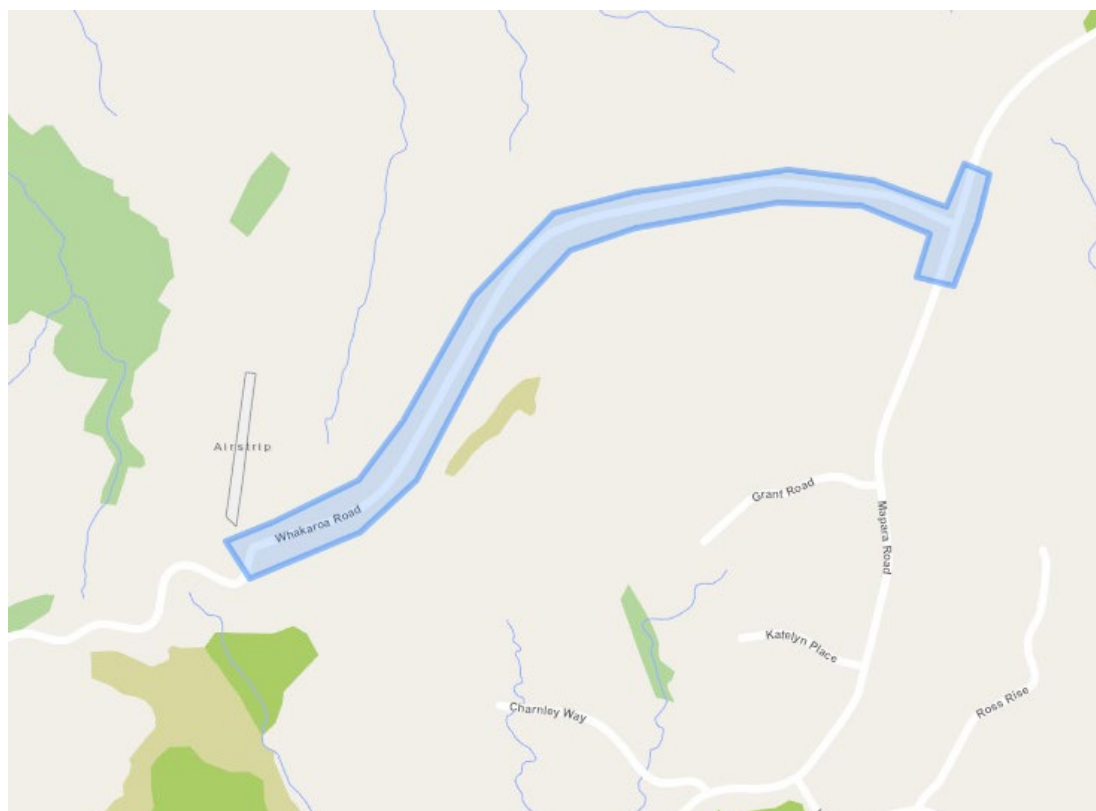


Figure 12: Extent of safety assessment

There has been no reported crashes through the extents of the assessment.

5. The Proposal

The proposed development encompasses approximately 344.56 Ha of land, known as Te Tuhi Point, and will accommodate 115 rural residential lots ranging in size from 3000m² to 5000m². Also included is a tourism lodge with 20 one-bedroom suites and 10 standalone chalets. The lodge includes a wellness centre, a restaurant and a chapel for wedding ceremonies. The proposal also includes a small high performance equestrian stable.

The proposal includes adding the proposed site into Plan Change 42 which involves creating a new Rural Lifestyle Environment from the General Rural Environment.

This assessment considers the expected traffic to be generated by the development. The concept plan for the proposed development is shown in Figure 12.

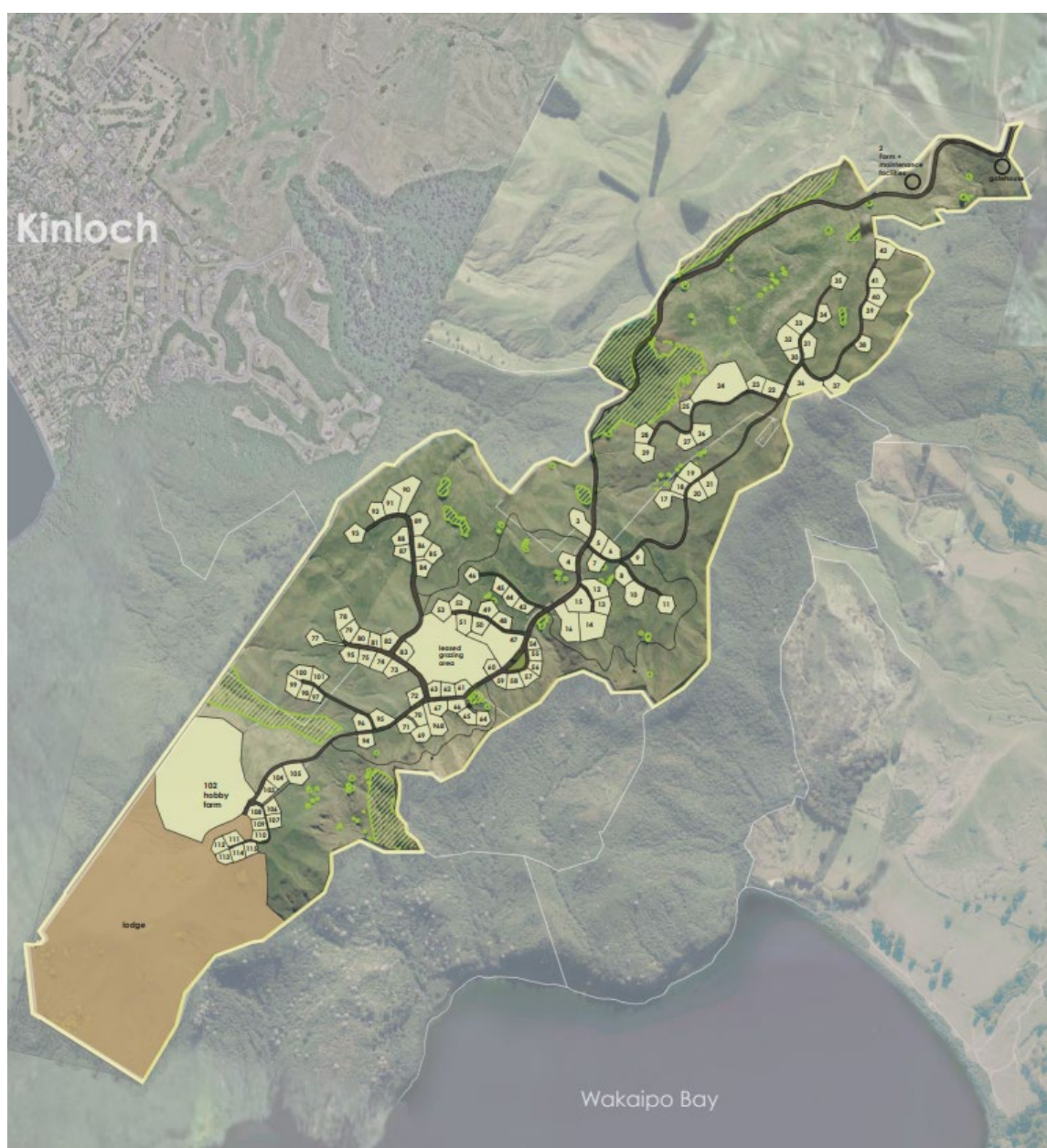


Figure 13: Site plan

The site proposes to have one access point onto Whakaroa Road at its western end. Internally, the site will be served by a network of private roads designed to TDC standards.

6. Traffic Generation and Distribution

6.1. Traffic Generation Assessment

The proposed site is expected to generate approximately 738 vpd and 98 vph in the peak hour.

With reference to Plan Change 42 (see section 3.4), the traffic generation rates used for that assessment was 1.2 trips per site per peak hour, and 12 trips per site per day (0.8 per peak hour and 8 per day for main residential dwellings, and 0.4 per hour and 4 per day for the secondary dwelling). These do seem high for this rural environment. It is worth noting that Plan change 42 enables intensification of the rural zone, however the degree of uptake is unknown at this stage. All affected landowners will not automatically upgrade or intensify their sites as a result of the change. Therefore, given the uniqueness of this land development proposal, standard trip generation rates¹ are unlikely to reflect the true nature of vehicle movements associated within the development. Therefore, we have based the rural-residential lots trip generation rates on the recent traffic survey undertaken at the intersection of Whakaroa Road/Mapara Road (refer to Section 3.2). This is the best moderator of traffic generation in this rural environment as all of the dwellings along Whakaroa Road are rural-residential, and similar in lot size to that proposed in the new development. The traffic generation rates for the 115 lots are therefore 0.45 trips per dwelling per peak hour, and 4.5 trips per dwelling per day. The rates used in the Plan Change assessment of 0.4 per hour and 4 per day will be applied to the additional 15 lots that can be developed on Whakaroa Road as Rural Lifestyle in accordance with Plan Change 42.

For the tourism lodge, the hotel rates contained in Waka Kotahi Research Report 453 (RR453) have been considered. These are 6.4 trips per room per day, and 1.2 trips per room per peak hour. These rates are considered conservative for this rural environment and are probably heavily weighted by urban hotels. Therefore, we have used a lower trip rate of 4 vehicles per room per day to better reflect the rural environment use and will use the 1.2 trips per room for peak hour trips. In regard to the restaurant and wedding chapel, it is understood that these are mutually inclusive with the accommodation and would not generate any additional traffic. i.e., it is expected that the accommodation/restaurant would be booked out for a wedding, as well as the chapel. Outside of weddings, the restaurant is expected to cater for accommodation guests and the public, and some wedding guests would stay in Taupo and drive to/from the venue. There is also some limited traffic generation from the high-performance equestrian centre. For these, an allowance of 100 daily trips and 10 peak hour trips have been allowed for in the assessment.

The generation rates are typically based on the development's gross floor area (GFA). Trip rates derived for the development and the expected site's trip generation are detailed in Table 3.

¹ Waka Kotahi Research Report 453 (RR453), Trips and parking related to land

Table 3: Site's trip generation

Development Type	Design units	Daily Rate (vpd/100m ² GFA)	Peak Hour Rate (vph/100m ² GFA)	Total Daily Trips (vpd)	Peak Hour Trips (vph)
Rural residential lots	115	4.5	0.45	518	52
Tourism Lodge (30 rooms)	30	4	1.2	120	36
Restaurant / equestrian / external wedding guests	N/A	N/A	N/A	100	10
Sub-total				738	98
Rural Lifestyle lots on Whakaroa Road*	15	4.5	0.45	68	7
Total				806	105

6.1. Traffic Distribution

Due to the development's location in the rural area north-west of Taupo, the directional split from Whakaroa Road of 70:30 to the north:south is predicted, as per the existing traffic counts. The northern route along Mapara Road to Poihipi Road and into Taupo would be the preferred route as it is shorter and quicker for vehicles, rather than heading south and through Acacia Bay and Nukuhau area of Taupo (both have 50 km/h speed limits). However, there are services to the south such as a 4-Square, restaurant/cafes and some schools/kindergartens/early childhood centres. Therefore, it is more likely that a larger proportion would head south than that indicated above. Based on these available services, a further adjustment to the directional split has been made. For the purpose of the assessment, a directional split of 60:40 north:south has been used.

The traffic flows obtained during the AM peak hour have been updated to represent a future condition (10-year flows), i.e., 2032. A standard growth rate of 2% per annum has been applied to through movements on Mapara Road.

The in:out split from the site is expected to be 15:85 in the AM peak period and the reverse in the PM peak, as is typical for residential areas.

Furthermore, the traffic flows obtained in the AM peak period have been assumed to be the reverse in the PM peak period. The distribution of trips to be generated by the proposed development in the peak periods is illustrated in the traffic diagrams (shown in Figure 13 and Figure 14).

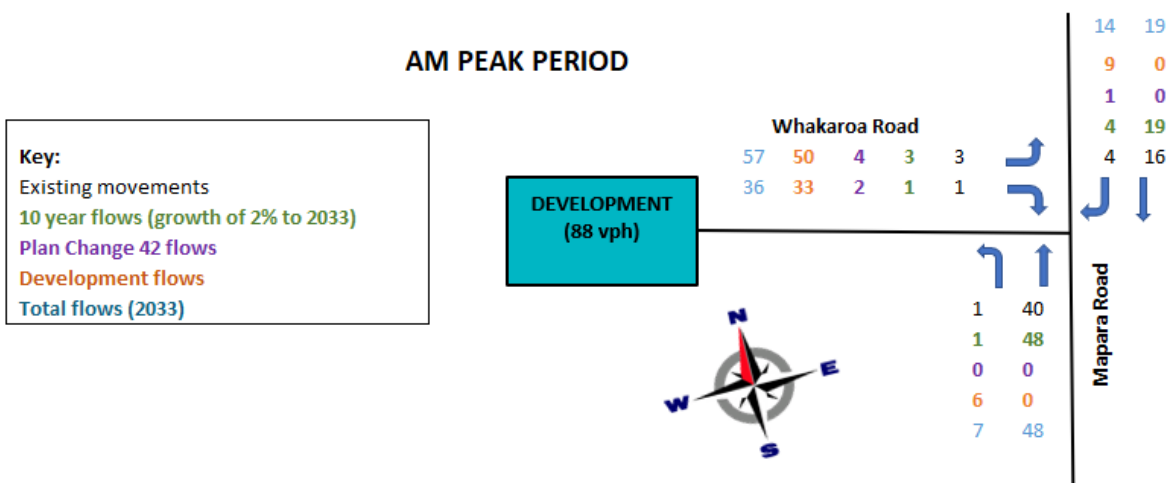


Figure 14: AM peak hour traffic flows

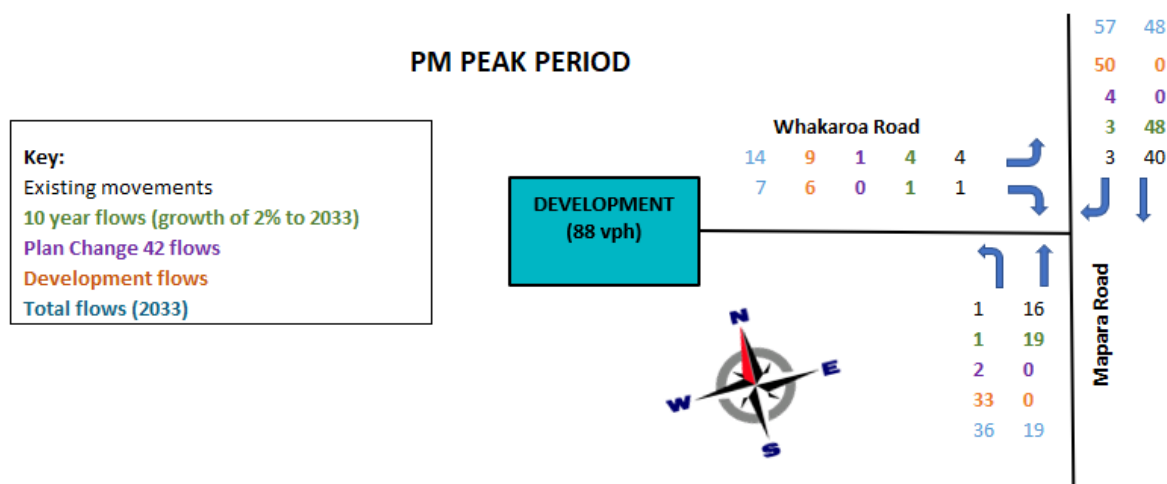


Figure 15: PM peak hour traffic flows

7. Traffic Effects

7.1. Intersection Performance

The impact of the expected traffic generated by the developed site applied to the volumes of the existing roading network (including a future 10-year assessment and the addition of the Plan Change 42 generated traffic volumes) has been assessed to determine the Practical Absorption Capacity of the Whakaroa Road / Mapara Road intersection. This has the purpose of assessing the ability of the intersection to absorb the traffic generated by the proposed development in peak hours. The results are shown in Table 4.

Table 4: Practical Absorption during Peak Hours

Intersection	Scenario	Peak period	Total volume (vph)	Practical Absorption Capacity of Minor Approach (vph)	Remaining Available Capacity (vph)	Degree of saturation
Whakaroa Road/Mapara Road	2023 Existing	AM	8	1107	1099	0.21
Whakaroa Road/Mapara Road	2033 Existing (including Plan Change 42)	AM	15	1035	1020	0.21
Whakaroa Road/Mapara Road	2033 (w/ development)	AM	107	947	840	0.29
	2023 Existing	PM	8	1074	1066	0.21
Whakaroa Road/Mapara Road	2033 Existing (including Plan Change 42)	PM	13	1147	1134	0.21
Whakaroa Road/Mapara Road	2033 (w/ development)	PM	78	1209	1131	0.25

* Based on critical acceptance gaps and follow-up headways from Austroads GRD Part 4A, Table 3.5

It is assessed that the required capacity is significantly less than the practical absorption capacity of the intersections in the vicinity of the site, indicating that the surrounding network can absorb the traffic to be generated by the developed site.

For the Whakaroa Road/Mapara Road intersection, degrees of saturation range from 0.21 in the existing situation to 0.29 in the AM peak for the developed situation. This indicates that the intersection would operate at a maximum of 29% of the available capacity in the future condition, suggesting that vehicles would be unlikely to experience poor levels of service. Delays and queueing would likely be minimal.

Therefore, it is concluded that the traffic flows are expected to be appropriately accommodated in the adjacent roading network with no significant adverse impacts.

8. Layout and Design

8.1. Internal Road Design

The proposed roading parameters comply with or exceed the requirements of the Taupō District Plan. Furthermore, the roading infrastructure is recommended to be constructed following the requirements for residential land use given in Figure 3.1R of the Taupō DC Engineering Code of Practice (ECOP) for Development of Land and section 6.5.10 of the District Plan, shown in Table 5.

Table 5: Roading infrastructure parameters

Lots served	Annual Daily Traffic	Target operating speed	Min. legal road width	Max. grade	Traffic / Carriageway	Parking	Min. Verge	Edging
≤ 100	< 1,500	100 km/h	20 m	10%	6.7 m	-	3.5 m	1.2 m grass

All the roads within the development site will be private. However, they will be designed in accordance with the TDC requirements. The target operating speed will be 50 km/h, and the main access road, from Whakaroa Road, will be 6.7 m wide. Turning heads will be provided at the end of all access roads.

8.2. Whakaroa Road & Mapara Road

The proposed development is expected to generate an additional 738 vpd on Whakaroa Road and Mapara Road (442 vpd to the north and 295 vpd to the south, of Mapara Road). In the future scenario (10-year flows, i.e., 2033), considering a fully developed site, the total volume on Whakaroa Road is expected to increase to around 900 vehicles per day (existing; 90, plus PC 42; 68, plus proposed; 738). Mapara Road will increase to approximately 1,150 vehicles per day.

Whakaroa Road is 6m to 7m wide typically, with three isolated locations where the width further narrows, through cuttings. The ECOP for a road carrying up to 1,500 vpd is required to be 6.7m wide (as per Table 5 above). The road is therefore under width in some sections to accommodate the level of expected traffic to be generated by this proposal and Plan Change 42 in accordance with the ECOP.

In general, it is expected that the road would need to be widened by up to 1m to achieve this standard, noting that some isolated sections (as discussed in Section 2.2.1) will be challenging to achieve.

It is recommended that widening is undertaken where feasible.

Areas that are constrained would require further cuttings and potentially impact on private land ownership along the corridor. There is no ability to confirm that access over private land is obtainable at this stage. It is therefore recommended that the applicant agree with Council appropriate mitigations if desirable widening is unobtainable. Suitable mitigations may include;

- Formation of passing areas;
- Reduced speed limits;
- Improved delineation and signage.

Mapara Road is approximately 6.9m wide and therefore no widening is required or expected.

8.3. Intersection design

8.3.1. Whakaroa Road / Mapara Road

The intersection is currently uncontrolled and features very limited delineation or guidance. This is due to the level of traffic currently using the intersection.

Given the increased level of traffic associated with this development, an assessment has been undertaken to ascertain if a right turn lane is required for safety and or capacity reasons.

Austrroads GTTM 2017 Part 6:2020 Figure 3.25 (provided in Figure 15) indicates that turning lanes are not required from a capacity perspective. This assessment used traffic flows from Figure 13 and Figure 14.

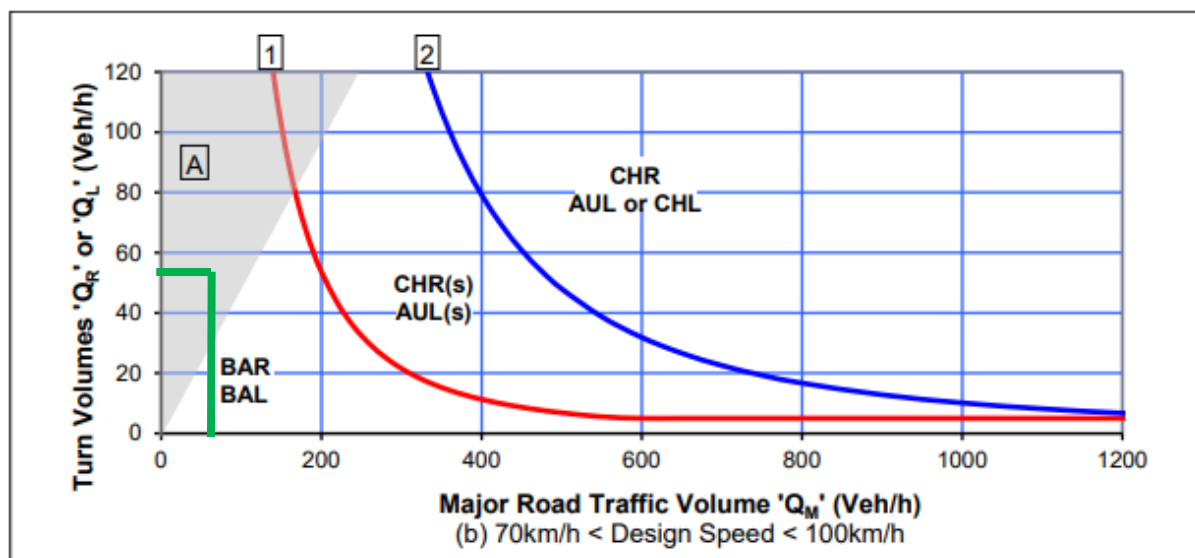


Figure 16: Turning warrants at Whakaroa Road/Mapara Road intersection (Figure 3.25(a) Austrroads GTM Part 6)

The Waka Kotahi planning policy manual Appendix 5B has guidance on accessway standards which also provide relevant guidance in this instance. For a road/accessway that has between 31 and 100 car movements per day, and heavy or slow-moving traffic, a Diagram E widening is required. See Figure 16.

This means the existing intersection, with the existing traffic volumes, warrants a Diagram E widening (an extra 2.5 m of seal width for right turn traffic either side of the intersection). This provision is currently not provided.

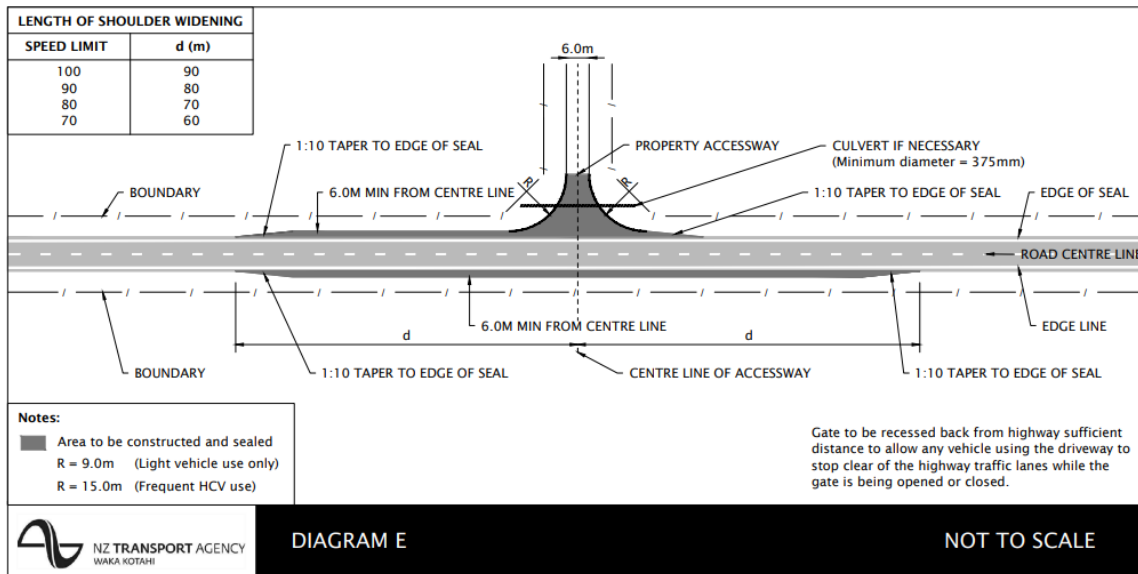


Figure 17: Waka Kotahi Diagram E widening

Although reasonable turning movements are proposed, with an additional 54 right turn movements into Whakaroa Road in the PM peak hour (proposed development plus Plan Change 42), the low northbound through movements on Mapara Road (19 vph) means there will be plenty of available gaps for right turning traffic with very few vehicles having to wait to turn. As stated earlier, there are no capacity constraints, and no vehicle queuing is predicted.

However, given the increase in traffic, and the safety considerations of this high-speed rural environment, it is recommended that the intersection includes the following upgrades to improve the level of safety at the intersection.

- Widen Mapara Road to provide for a right turn lane (although not required for capacity reasons, this is recommended for safety reasons)
- Install give way markings and signage;
- Install intersection Flag lighting;
- Replace black/white intersection chevron board with a yellow/black one;
- Install advance warning signs of the intersection ahead.

8.4. Parking Requirements

The minimum parking requirements have been removed from the district plan as per guidelines from the National Policy Statement for Urban Developments (NPSUD). New developments are required to provide sufficient parking to meet the anticipated demand. This is expected to be up to two parking spaces per lot in the rural residential environment. The design of the parking areas is to be in accordance with Section 6.3 of the Taupō District Plan.

8.5. Visibility Assessment

The minimum sight distance of 160 m for posted speeds of 100 km/h (on a district collector road) is

required at the crossing points (Section 6.5.3 of the Taupō District Plan). The achieved visibility at the crossing to/from the site is presented below.

Table 6: Visibility from Whakaroa Road onto Mapara Road

Required Sight Distance	Achieved visibility		
	North	South	Comply/Not Comply
160 m	270 m +	160 m	✓



Figure 18: Sight distance from the Whakaroa Road and Mapara Road intersection to the North

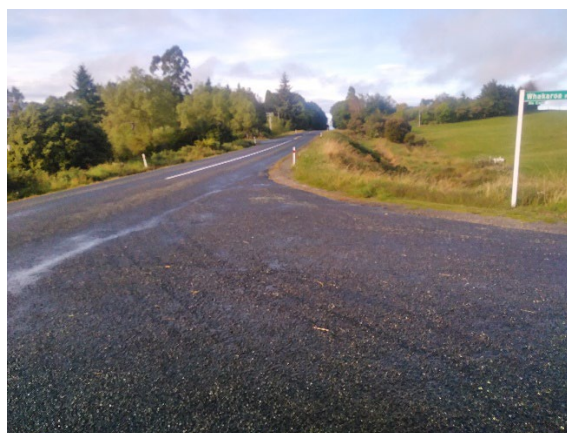


Figure 19: Sight distance from the Whakaroa Road and Mapara Road intersection to the South

This is for the existing intersection of Whakaroa Road and Mapara Road. Furthermore, the new accesses within the site are also expected to meet the sight distance requirements of 50 m on collector roads with a posted speed limit of 50 km/h.

8.6. Intersection Separation Distance

The Taupō District Plan requires a minimum separation distance of 60 m between vehicle crossings and intersections on a 100 km/h posted speed zone on a local road. The nearest vehicle crossing to the existing intersection is located approximately 72 m to the south, and on the true left side.

Separation distances are important to provide space between turning vehicles to avoid direct conflicts and reduced observation time between turning vehicles. The spacings listed above allow for clear intervisibility between vehicles and, therefore, are expected not to generate adverse effects.

Table 7: Intersection Separation Distances

Required Separation Distance	Achieved separation		
	North	South	Comply/Not Comply
60 m	76 m	72 m	✓

9. Conclusion

Based on the assessment detailed above, it is concluded that the proposed 115 sites and tourism lodge development can be appropriately accommodated within the local traffic and transportation environment, noting that the proposed site is intended to be included with the Rural Lifestyle Environment as part of Plan Change 42.

The traffic generation of the proposed 115 rural residential sites and tourism lodge with 30 accommodation units' development is expected to be approximately 738 vpd, and 98 vph in the peak hour. It is assessed that the local road of Whakaroa Road and the collector road of Mapara Road can accommodate the additional traffic flows (plus those from Plan Change 42) with some additional widening and supporting mitigation measures on Whakaroa Road.

While the peak hour traffic flows at the site are likely to coincide with the surrounding network peak, the development's traffic flows are expected to be absorbed by adjacent intersections and the existing roading network.

The internal roading layout, including the proposed development, complies with the requirements of the Taupō District Plan.

The minimum visibility is achieved on both approaches to existing Whakaroa Road and Mapara Road intersection.

Therefore, it is concluded that the traffic associated with the proposed development can be accommodated on the adjacent road network and that there are no traffic planning reasons to preclude the approval of the proposed development provided that the recommendations given in this report are followed.

10. Recommendations

Based on the findings of this report and the associated conclusions, it is recommended that the following be provided:

- The roading infrastructure is designed and constructed in accordance with the Taupō District Plan and Code of Practice for Development of Land;
- Turning heads with a minimum turning radius of 15 m are designed and constructed at the end of the new site access road;
- Upgrade the intersection of Whakaroa Road and Mapara Road to include a right turn lane with a Give Way controlled intersection, with appropriate signs, markings and a flag light;
- Widening of Whakaroa Road to a minimum width of 6.7 m along its entire 2.9 km length (noting isolated sections are currently only 4.5m to 5.5m wide and other supporting measures may be more appropriate);
- Discussions with Ministry of Education are required in regard to school bus pick up and drop off to ensure the existing pick-up/drop off point is safe and suitable for any increased usage.

11. Disclaimer

This report has been prepared by Urban Connection Limited for Te Tuhi Estate Limited and may only be used and relied on by Te Tuhi Estate Limited for the purpose agreed between Urban Connection Limited and Te Tuhi Estate Limited as set out in this report. By default, this means that Te Tuhi Estate Limited can use and rely on this report for the purposes of supporting the consent application.

Urban Connection Limited otherwise disclaims responsibility to any person other than Te Tuhi Estate Limited arising in connection with this report. Urban Connection Limited also excludes implied warranties and conditions, to the extent legally permissible. The services undertaken by Urban Connection Limited in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

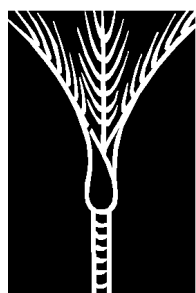
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. Urban Connection Limited has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

© Urban Connection Limited 2023

This document is and shall remain the property of Urban Connection Limited. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

004-074_Te Tuhi Point TIA_rev1
 Document Status: Final

Rev	Date of Issue	Author	Reviewer	
			Name	Signature
1	1 August 2023	Steve James	Aaron Campion	
0	1 May 2023	Steve James	Aaron Campion	



LA4

Taupō District Plan – Plan Change 44: Residential Zones
Te Tuhi High Country Estate – Whakaroa Road, Kinloch

Landscape and Visual Effects Assessment



LA4 Landscape Architects
PO Box 5669, Victoria Street West
Auckland 1142

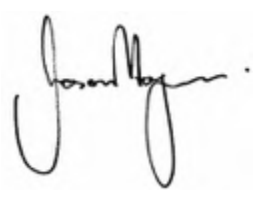
**Landscape and Visual Effects Assessment
Quality Assurance Statement**

Prepared by:



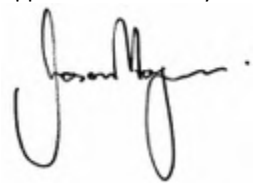
Director

Reviewed by: _____



Director

Approved for issue by: _____



Director

Status: **Final**
Date: 29 May 2026

File Number/Name	26024 Te Tuhi High Country Estate LVA
Author	Rob Pryor, Director NZILA Registered Landscape Architect
Client	Big Ball Holdings Limited

Taupō District Plan – Plan Change 44: Residential Zones
Te Tuhi High Country Estate – Whakaroa Road, Kinloch

Landscape and Visual Effects Assessment

Table of Contents

1.0	Introduction ...	... 4
2.0	The Proposal ...	... 4
3.0	Assessment Methodology ...	... 4
4.0	The Subject Site and Surrounding Environment ...	... 5
5.0	Statutory Context ...	... 12
6.0	Evaluation of the Proposal ...	... 15
7.0	Conclusions ...	... 25

Annexure 1: Proposed Rezoning Plan

Annexure 2: Viewpoint Photographs

Taupō District Plan – Plan Change 44: Residential Zones Te Tuhi High Country Estate – Whakaroa Road, Kinloch

Landscape and Visual Effects Assessment

1 Introduction

- 1.1 LA4 Landscape Architects have been engaged by Big Ball Holdings Limited (**'applicant'**) to undertake a Landscape and Visual Effects Assessment (**'LVA'**) for the proposed rezoning of parts of the site (the **'proposal'**) at 287, 351 and 387 Whakaroa Road, Kinloch, (the **'site'**).
- 1.2 This assessment investigates the existing rural character and the key landscape and visual features of the site and surroundings, and outlines the effects of the proposal on the landscape character and visual amenity values of the site and surrounding area. Investigations of the site and surrounding Kinloch and Lake Taupō environment were undertaken in May 2026.

2 The Proposal

- 2.1 The proposal is for the rezoning of approximately 44 hectares of the 344.2165 hectare site from General Rural Zone (**'GRUZ'**) to Low Density Residential Zone (**'LRZ'**) within three discrete areas throughout the site. The rezoning will enable the future development of the comprehensively planned Te Tuhi High Country Estate. The areas to be rezoned are illustrated on the RC Rezoning Plan in **Annexure 1**. Building Design Guidelines and requirements for indigenous landscape mitigation and restoration planting will ensure that the future built development integrates into the landscape setting.
- 2.2 Of note for this assessment is the recognition that the General Rural Zone allows development to be undertaken as a Permitted Activity (**'PER'**) of one primary residential unit and one minor residential unit per 10 hectares. This would allow for thirty three primary dwellings and thirty three minor residential units dispersed across the site, plus internal roading.

3 Assessment Methodology

- 3.1 The key to assessing the landscape character and visual amenity effects of the proposal on this landscape is first to establish the existing characteristics and values of the landscape and then to assess the effects of this proposal on them. In accordance with the Resource Management Act (1991) (**'RMA'**) this includes an assessment of the cumulative effects of the proposal combined with existing developments.
- 3.2 The methodology used in this assessment is in accordance with the Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines, 2022 (**'TTatM'**), and designed to assess whether the proposal would have adverse effects on the landscape values and visual amenity of the site and surrounding environment. The following methodology has been used in this assessment.

Background Review

- 3.3 A review of the background information and site layout plans was undertaken in relation to the landscape character and visual amenity aspects of the proposal. Key landscape

and environmental factors which could potentially be affected by the proposal were identified and reviewed.

Statutory Context

- 3.4 A review of the relevant Resource Management Act 1991 and the Operative Taupō District Plan ('TDP') statutory provisions was undertaken to identify the key landscape character and visual amenity related objectives and policies. The purpose of reviewing the statutory provisions was to help frame the landscape assessment.

Site and Landscape Evaluation – Landscape and Visual Environment

- 3.5 Detailed site investigations by foot and boat, and an analysis of the site and surrounding environment were undertaken. The landscape, rural character, and visual amenity values were identified and outlined and a photographic record of the site and surrounding environment compiled. Key landscape elements and features were identified and an analysis of the existing landscape values and the landscape's ability to accommodate change as a result of the proposal undertaken.

Visual Catchment and Viewing Audience

- 3.6 The physical area that would be visually affected by the proposal was defined. In turn, this indicated the range, type and size of viewing audiences that would be impacted upon and their sensitivity to change as enabled by the proposal.

Viewpoint Selection

- 3.7 The next step was to establish a platform from which detailed analysis could be carried out. The most practical platform for conducting such analysis is a series of viewpoints, strategically located within the visual catchment in order to assess the impact of the proposal for most of the potential viewing audiences.

Landscape Character and Visual Effects Assessment

- 3.8 A specific analysis and assessment was undertaken and key questions addressed derived from the very nature of anticipated effects on the landscape values, rural character, and visual amenity. This process assessed the effects of the proposal and identified the aspects which were likely to have high or adverse landscape character or visual amenity effects.

Conclusions

- 3.9 An evaluation of the proposal as a whole considering all the preceding analysis was undertaken in relation to potential effects on landscape character and visual amenity values. Conclusions were made in relation to the potential landscape character and visual amenity effects of the proposal including recommendations for avoiding, remedying, or mitigating these effects.

4 The Site and Surrounding Landscape Context

The Site

- 4.1 The application site is located at 287, 351 and 387 Whakaroa Road, Kinloch, comprising 344.2165 hectares of land that occupies the full extent of the upper area of the Whakaroa Peninsula. The site is part of a large working sheep and beef farm and has been run as such for a number of years. The site is accessed from the southern end of Whakaroa Road which connects to Mapara Road approximately 3 kilometres to the north.

- 4.2 There are no dwellings on the site, but a number of farm sheds, stock yards, water tanks and hay barns. Two transmission sites with large transmission towers and associated infrastructure including generators and electronic equipment are located in the southwestern and northeastern parts of the site.
- 4.3 Access through the site is by way of an unsealed but formed rural access track that commences from Whakaroa Road in the northeast, following the natural contours along the western boundary, before climbing up to a central point that then runs all the way to the southwest corner of the site where the half barn is located.
- 4.4 The site is largely in pasture grass slopes that undulate from steep escarpments through to more gentle rolling land. A small area of indigenous bush is located in the northwestern part of the site adjacent to the access track and a gully has been fenced and planted. There are some planted areas with a mixture of indigenous and exotic planting that are not protected through any identified significant natural areas ('SNA's'). A number of specimen trees are located throughout the site including eucalyptus, willow, pine and poplar.
- 4.5 The site is located on the elevated upper escarpment of the Whakaroa Peninsula and has an Outstanding Landscape Area ('OLA') overlay in the Operative Taupō District Plan ('TDP') (OLA 65 Whakaroa Peninsula) in its entirety as well as a very small area of Amenity Landscape Area ('ALA') (ALA 66 Whakaroa Hills) in the northern part. Other Outstanding Landscape Areas include Lake Taupō OLA (OLA 20) Whakaipo Bay Amenity Landscape Area (ALA 63), Te Kauwae Peninsula OLA (OLA 45).
- 4.6 Lake Taupō and the Whakaroa Peninsula are also identified as an Outstanding Natural Feature and Landscape (ONFL 9 Lake Taupō) in the Waikato Regional Policy Statement ('WRPS').
- 4.7 The attributes for Whakaroa Peninsula's OLA are described as: *High physical prominence when viewed from within the lake and from Kinloch. Forms part of the framing view from Kinloch settlement, with Te Kauwae Peninsula. Combination of bush clad areas on the headland, with grazed pasture on the plateau. Presence of farm structures including sheds, and transmission aerial. Highest point 707m above sea level (330m above lake level). Although not as physically prominent as some of the other lakeside cliffs, have very high cultural significance to Kinloch Community and local iwi.*
- 4.8 The attributes for Lake Taupō's OLA are described as: *Last eruption some 1800 years ago, creating a large caldera lake with a series of bays, river tributaries, pumice beaches and sheer cliff edges. Tapuaehāruru Bay forms a prominent enclosed bay; its flat terraces forming the platform for the Taupō township. The lake forms the focal point for surrounding settlements. The identification of the lake as an outstanding feature also extends to its margins and Motutaiko Island. Highly valued recreation resource, water quality, and sense of place. Very high historical and cultural values.*
- 4.9 The attributes for Whakaroa Hills ALA are described as: *Back hills of the Whakaroa Peninsula, providing an important hill and ridge backdrop to Kinloch township. Predominantly rural setting, interspersed with clusters of regenerating bush, plantation forestry, and small hillside settlements on the foot slopes. Not as physically outstanding as the Whakaroa Peninsula due to lack of native vegetation, less prominent ridge peaks and location being inland from the lake. Also forms part of the Kinloch Ridgeline Protection Area.*

- 4.10 The site adjoins Department of Conservation ('DoC') land to the south, east and west which has SNA overlays 309 (east) and 277 (west) dominated by podocarp-broadleaf species, beech species and mixed conifer-broadleaf species. Common canopy species include tōtara (*Podocarpus totara*), rimu (*Dacrydium cupressinum*), mataī (*Prumnopitys taxifolia*), kahikatea (*Dacrycarpus dacrydioides*), and miro (*Prumnopitys ferruginea*). Mānuka (*Leptospermum scoparium*) and kānuka (*Kunzea robusta*) scrub is also prevalent.
- 4.11 The landform of the site and its immediate margins is defined by its position on a dramatic volcanic escarpment and catchment system which serves as a physical transition from the elevated inland volcanic plateau down to the edge of the Lake Taupō caldera. The eastern and inland portions of the site consist of elevated, gently undulating to rolling hills typical of the wider Taupō volcanic landscape. Deeply incised catchment gullies traverse the site funnelling water down towards the lake. Towards the southwest toward Whangamata Bay, the rolling landform morphs (beyond the site) into the steep, rugged escarpments and bluffs dropping towards the lake margins. The main ridges and upper plateau of the site extend between 620m and 794m above sea level with the high points at the southwestern end at 707m (by the haybarn) and northeastern area in the vicinity of the transmission tower at 794m.



Figure 1: Aerial view of the site and surrounding landscape context



Figure 2: Looking towards the northern part of the site



Figure 3: Looking towards the northeastern part of the site



Figure 4: Looking towards the southern part of the site



Figure 5: Looking towards the northeastern part of the site



Figure 6: Looking towards the northwestern part of the site

The Wider Landscape Context

- 4.12 Whakaroa Road and Mapara Road are characterised by a number of 4 hectare lots that form a solid ribbon of rural lifestyle for the much of the road, creating a strong character of lifestyle development that has been supported by much of these areas being rezoned as Rural Lifestyle Zone ('RLZ'). A number of smaller lifestyle blocks are established around Hillview Drive and currently under development to the east is the largely sold out 'Kaipo Bay' subdivision with 5000m² lots.
- 4.13 Framing the site to the south, east and west and extending around the Whakaroa Peninsula is the continuous, highly natural rural-conservation lake margin characterised by the dense, regenerating native kānuka and broadleaf forest with the steep, sharp ignimbrite and rhyolitic bluffs forming vertical volcanic cliffs that drop straight into the lake.
- 4.14 The Whakaroa Point Recreation Reserve extends around the peninsula and is a public conservation parcel managed by the Department of Conservation. Together with the adjacent Whakaipo Bay Scenic Reserve to the east, it forms a continuous, protected environmental buffer that covers over 800 hectares of land. Hunting of pigs and goats is permitted by DoC.
- 4.15 The reserve is popular with mountain bikers and hikers with the W2K (Whakaipo to Kinloch) track, extending through it as a segment of the Great Lake Pathway. The scenic Headland Loop snakes through the native bush canopy of the peninsula offering vantage points over Lake Taupō.
- 4.16 Whakaipo Bay is located to the east of the site, characterised by its deep embayment flanked by the headlands of Whakarariki Point to the east and Te Itarata Point in the west. Whakaipo Bay Scenic Reserve is a popular freedom camping area with toilet facilities and an accessible gravel and sand beach for swimming, kayaking, water skiing and fishing.

- 4.17 Whakaipo Bay holds deep historical and spiritual meaning for Ngāti Tūwharetoa. The bay was traditionally a vital kainga and resource gathering zone. The shelter of the headlands provided a safe landing place for the waka navigating the lake, and the rich soils and forest margins provided abundant food and materials.
- 4.18 Whangamata Bay is a broad bay to the west of the site, defined by two distinct headlands that frame the bay – Te Kauwae Point to the west and Whakaroa Point in the east. Kinloch township sits at the head of the bay introducing a highly modified character to the area, with a structured network of residential settlement clustered around the Kinloch Marina and Whangamata Bay. The landform transitions from the valley floor northwards to the rolling and undulating terrain inland. Originally developed as holiday destination with baches being built next to the lake, its popularity has seen Kinloch grow to include residential subdivision development, a world class golf course and luxury accommodation.
- 4.19 Inland and uphill from the site, the landscape opens up into the expansive, rural character of the volcanic plateau defined by vast, open productive pastoral land divided by rural fencing and shelterbelts. The landform consists of large scale undulating hillslopes and smooth ridges creating a highly open, expansive and exposed feeling with panoramic views over the wider lake catchment. This is a working rural landscape heavily modified for high-intensity dairy, sheep and beef farming. The landform is incised by a highly legible network of deeply incised gullies, often densely vegetated with regenerating bush.
- 4.20 The Mapara Valley extends inland from Whakaipo Bay and Whangamata Bay, characterised by its valley landform carved out by the Mapara Stream and the Whangamata Stream flowing south into the lake. The valley sits between elevated landforms, flanked to the west by Te Kauwae and Motumoa and to the east by the ridge extending down to Tuhingimata and Mine Point. The valley is characterised by an open pastoral landscape with shelterbelts, tracts of pine forestry, specimen tree plantings, and indigenous bush stands along the stream gullies.
- 4.21 Rural land use and development patterns influence the character and visual amenity of the wider area, with the open spatial character of the landscape compartmentalised by large tracts of production forestry, rural plantings, hedgerows, and, typically in steeper or less accessible areas, remnant native vegetation.
- 4.22 The wider landscape's character is further influenced by land use, land management and development patterns including nodes of urban development populating the shoreline extending east to the Taupō township; extensive areas of reserve land on the Taupō shoreline within the northern and western bays; clusters of rural residential and rural utility buildings punctuating the productive farmland; extensive pastoral development and agrarian land-use patterns; and large tracts of production forestry.
- 4.23 At the southern end of Lake Taupō, Mt Tongariro, Mt Ruapehu and Mt Ngauruhoe, form the backdrop to the views across the lake and are key visual elements from the northern bays and the site.
- 4.24 Overall, the wider landscape is of moderate-high landscape amenity value influenced by the presence of the more natural features associated with Lake Taupō including the lake itself, the OLA's, ONFL's and SNA's and the distant volcanic landforms of the central plateau to the south.

5. Statutory Context

- 5.1 The statutory context is covered fully in the assessment of environmental effects ('AEE') prepared by Simpli Consulting Limited in support of the application. The application site is zoned General Rural Zone in the TDP.
- 5.2 The relevant key landscape character and visual amenity provisions from the RMA, WRPS and TDP have been reviewed for this assessment. The purpose of reviewing the statutory provisions is to help frame the landscape assessment. It is not to undertake a planning assessment of the proposal against the provisions, which is outlined fully in the AEE.

Resource Management Act (1991)

- 5.3 Part 2 of the Resource Management Act sets its purpose and principles. Part 2, Section 5 states that the purpose of the RMA is to promote the sustainable management of natural and physical resources.
- 5.4 Section 6 sets out the matters of national importance that must be recognised. Of relevance to this proposal are 6(a) – the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development, and 6(b) – the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:
- 5.5 Section 7 identifies a range of matters that shall be given particular regard to in achieving the purpose of the RMA. Of relevance to this proposal is s 7(c) – the maintenance and enhancement of amenity values and s 7(f) – the maintenance and enhancement of the quality of the environment. These are considered in this assessment in relation to potential effects on landscape character and visual amenity. Section 8 states that the principles of the Treaty of Waitangi must be considered in achieving the purpose of the RMA.

Taupō District Plan

- 5.6 The Rural Zone makes up most of the land within the district and has been categorised into two distinct areas, being the General Rural Zone and the Rural Lifestyle Zone. These separate areas highlight the increasing need to protect the open space characteristics of the Rural Zone and its production values, while also providing for the growth of the district and the demand for rural lifestyle living in specific locations.
- 5.7 The GRUZ also contains sites that are of significance, some of these are identified as Outstanding Natural Features and Landscapes. The GRUZ objectives and policies seek to manage subdivision and land use activities in a way that reflects the productive nature of the land, the rural level of infrastructural services and the amenity values of the landscape, as well as managing effects and enabling rural lifestyle living in appropriate areas.
- 5.8 The key planning provisions in the TDP relevant to this assessment that have been taken into consideration are as follows:

13.4 GRUZ – General Rural Zone Objectives and Policies

GRUZ-O1 Enable Primary Production and the use of Natural Resources

GRUZ-O2 Maintaining General Rural character

GRUZ-P1 Maintaining the General Rural Character

GRUZ-P2 Rural Lifestyle Subdivision and Residential Units

GRUZ-P8 Primary Production and Ancillary Activities

11 SUB – Subdivision: Objectives and Policies

SUB-08 Outstanding Natural Features and Landscape Areas

SUB-09 Outstanding Natural Features and Landscape Areas

SUB-P6 Outstanding Natural Features and Landscapes

SUB-P7 Amenity Natural Features and Landscapes

6.5 Natural Environmental Vales (NEV)

10.3 NFL – Natural Features and Landscapes

5.9 With respect to the landscape matters addressed in these objectives and policies, I comment as follows:

- i) The rezoning of parts of the site would be compatible with, and cumulatively would not erode rural character.
- ii) Primary production would be enabled as the main rural activity within the site.
- iii) There would be no reverse sensitivity effects on activities within the GRUZ.
- iv) The important relationship that tāngata whenua have with their ancestral lands and the wider GRUZ would not be adversely affected by the proposal.
- v) The rural character of the zone would be maintained through a predominance of primary production activities with large open spaces.
- vi) The rural character would not be adversely affected through the density, scale and location of built development enabled by the rezoning. There would be a predominance of rural productive activity within the grazed pastoral slopes.
- vii) The landscape attributes of the OLA's would not be adversely affected by the proposal. The Whakaroa Peninsula would retain its high physical prominence when viewed from within the lake and from Kinloch. The bush clad areas on the headland, with grazed pasture on the plateau would be retained albeit interspersed with a limited level of built development. The site is well buffered from Lake Taupō's OLA through the extensively vegetated SNA's surrounding the site.
- viii) Similarly, the landscape attributes for the Whakaroa Hills OLA would not be adversely affected by the proposal. The back hills of the Whakaroa Peninsula, would remain, providing an important hill and ridge backdrop to Kinloch township.
- ix) While there would be limited fragmentation of open space character, it would not lead to any cumulative adverse effects on the OLA's, through the majority of the site being retained in primary production.
- x) The scale, location, design and nature of the proposal would be sympathetic with the landscape attributes of the OLA's. Earthworks would be minimised and rehabilitated following the completion of earthworking activities. There would be no indigenous vegetation clearance required as part of the proposal.
- xi) Proposed mitigation measures to address adverse landscape and visual effects of future development enabled by the rezoning will include building design guidelines to assist integrate the built development into the landscape and mitigating planting to screen or soften built structures.

- xii) The natural and landscape values of the site and surrounding area would be retained by the proposal.
- xiii) The proposed Building Design Guidelines and indigenous mitigation and restoration planting requirements will assist to maintain and enhance amenity values within the OLA's, ONFL's and ALA.

Waikato Regional Policy Statement

- 5.10 Lake Taupō is identified as an ONFL in the WRPS – ONFL 9 Lake Taupō which coincides with TDP's OLA 60. The key planning provisions in the WRPS relevant to this assessment that have been taken into consideration are as follows:

12 Landscape (including seascape), natural character and amenity

Policy 12.1 Outstanding natural features and landscapes

Policy 12.2 Preserve natural character

Policy 12.3 Maintain and enhance areas of amenity value

NATC – Natural Character objectives and policies

NATC-O1 – Natural character

Policies NATC-P1 – Preserve natural character

NFL – Natural features and landscapes objectives and policies

NFL-O1 – Outstanding natural features and landscapes

NFL-P1 – Outstanding natural features and landscapes

- 5.11 With respect to the landscape matters addressed in these objectives and policies, I comment as follows:
- i) The natural character values of the site have been compromised by productive rural activities and land use practices. The rezoning of parts of the site would be compatible with the level of natural character existing. The proposal is contained within a modified part of the site. No indigenous vegetation removal is required. The natural features, elements and processes within the site would not be adversely affected by the proposal.
 - ii) Proposed mitigation measures to address adverse effects of future development enabled by the rezoning on the natural character values of the site and surrounding area include building design guidelines to assist integrate the built development into the landscape and mitigating planting to screen or soften built structures.
 - iii) The scale, location, design and nature of the proposal would be sympathetic with the landscape attributes of the ONFL's. The identified values and characteristics of the ONFL's would not be adversely affected by the proposal. Earthworks would be minimised and rehabilitated following the completion of earthworking activities. There would be no indigenous vegetation clearance required as part of the proposal.
 - iv) The qualities and characteristics for which the amenity values are valued would not be adversely affected by the proposal. The site is in productive rural land use from which the current amenity values are derived. The majority of the site will remain in pastoral farming, thereby protecting the site's amenity values.
 - v) The characteristics and values of Lake Taupō's ONFL including the expansive area of water, and memorable and vivid attributes would not be adversely affected by the proposal. The physical, aesthetic and associative attributes would be retained.

- 5.12 I therefore consider that the proposal meets the overall intent of the relevant landscape and amenity objectives, policies and rules of the relevant statutory provisions and is acceptable in landscape character and visual amenity terms.

6 Evaluation of the Proposal

- 6.1 The key to assessing the landscape character and visual amenity effects of the proposal on this landscape is first to establish the existing characteristics and values of the landscape and then to assess the effects of the proposal on them. In accordance with the RMA this includes an assessment of the cumulative effects of the proposal combined with existing developments. The purpose of this section is to provide an assessment of the nature and degree of potential landscape effects and the appropriateness of the proposal. The assessment responds to matters related to landscape character, natural character and visual amenity.
- 6.2 The assessment of landscape effects takes into consideration physical changes to the landscape as a resource which may give rise to changes to its character and quality and perceived landscape values. Landscape character results from a combination of physical elements together with aesthetic and perceptual aspects that combine to make an area distinct. Landscape character is influenced by natural and built elements as well as types, patterns and intensity of land use, historic, cultural and other intangible qualities.
- 6.3 Natural character relates to the degree of 'naturalness' of a landscape. It is primarily determined by the nature and extent of modification to a landscape and can be expressed in relation to natural processes, patterns and elements in the landscape.
- 6.4 Visual effects are a consequence of landscape effects as this is how we mainly perceive effects on landscape values. Landscape and visual effects are therefore inextricably linked and are influenced by the sensitivity of the receiving environment combined with the type and magnitude of change associated with the proposal.
- 6.5 Sensitivity to change considers not only the receiving environment but also the nature and characteristics of the proposal. The ability of a landscape to accommodate change is dependent on a variety of considerations such as the:
- i) existing land use and resultant landscape patterns;
 - ii) physical characteristics of the landscape;
 - iii) scale of the landscape, the quality and values placed on a landscape; and
 - iv) the ability to mitigate any effects.
- 6.6 The objective of Landscape and Visual Effects assessments is not to assess change or visibility but the nature and magnitude of effect of change on the existing landscape values. With all assessments the objective is not to determine the proposal's extent of visibility, it is to determine how the proposal will impact on existing landscape values, including landscape character and visual amenity. Visibility of itself is not an adverse effect¹.
- 6.7 Matters to be addressed in this landscape assessment in relation to the landscape character and visual amenity include the following:
- i) Natural character effects
 - ii) Landscape character effects
 - iii) Visual amenity effects

¹ Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines, [p. 146]

iv) Cumulative effects

Natural Character Effects

- 6.8 The Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines 2022 ('**TTatM**') adopt the interpretation that natural character is a type of character – the distinct combination of an area's natural characteristics and qualities, and that naturalness is one attribute of that natural character. Natural character has been interpreted as the naturalness or degree of modification of an area and an area's distinct combination of natural characteristics and qualities.² Natural character is evaluated across three core dimensions of natural elements, natural processes, and natural patterns alongside experiential attributes. Natural character is an area's distinctive combination of natural characteristics and qualities, including degree of naturalness.
- 6.9 This is consistent with Objective 2 of the NZCPS, which is (amongst other things) to recognise the characteristics and qualities that contribute to natural character; and with the matters listed in Policy 13(2), of which the range of natural character between pristine and modified (i.e. naturalness) is only one matter.
- 6.10 I have examined the existing natural character in terms of the environment's abiotic elements, biotic attributes and experiential attributes including the physical elements, natural processes and perceptual attributes. As the site itself has historically been utilised for rural production and pastoral farming, the property consists predominantly of open pasture with low natural character values.
- 6.11 The characteristics and qualities that contribute to the natural character values of the surrounding area are Lake Taupō's ONFL and OLA, Whakaroa Peninsula's OLA, the Whakaroa Hills ALA and the surrounding SNA's, where the natural elements, natural processes, and natural patterns alongside experiential attributes remain highly legible. These include:
- i) The physical elements and processes refer to the biophysical attributes of the landscape/lakescape within the area. These include the geographical features that contribute to the natural character including landform – transforming from the rolling pastoral slopes down to the rugged volcanic escarpments and bluffs, pumice beaches, bays, river tributaries, volcanic landform and steep gully systems.
 - ii) The landform which is entirely natural at the lake margin and the transition from the water to the escarpment and bluffs up to the terrestrial slope is largely natural in profile, before the upper ridge and plateau which has been extensively modified for rural production.
 - iii) Natural processes (biophysical and hydrological) including the lake dynamics and processes with water level fluctuations due to rainfall in the catchment area, seasonal weather patterns, wave action and controlled outflows managed for hydroelectric generation; sediment deposition and erosion, wind exposure and hydrological processes.
 - iv) Ecological values (flora and fauna) including the ecosystem and vegetation patterns with the lake margin heavily lined with extensive indigenous vegetation providing highly effective protection against shoreline erosion and storm surges, acting as

² Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines, [p. 205]

nurseries for local fauna, binding the soil and stabilising water quality by filtering water from the surrounding land uses; and

- v) The macrofaunal communities within and around the lake environs, including native and exotic fauna and benthic communities.
- 6.12 Perceptual and experiential factors involve subjective human responses to the visual, auditory and tactile qualities of a landscape. This includes the sensory experience of natural character such as the visual vividness and coherence of the Whakaroa Peninsula, wildness aesthetic, remoteness or openness in the lake environment and dark sky values. The experiential qualities of natural character are the visual and physical connection to the lake environs, perceptions of naturalness, exposure to the water, atmospheric conditions, seasonal variation, wind movement through the trees, sounds of the water, birdlife and aquatic life.
- 6.13 Effects on natural character are measured against the extent of modification to the physical (abiotic and biotic) and experiential attributes of natural character and then considered in the round to determine a level of effect. The assessment of natural character addresses the extent to which these attributes and qualities have been and/or will be affected by the introduction of human modifications resultant from the proposal.
- 6.14 In my opinion, the proposed rezoning would have low adverse effects on the natural character values of the site and surrounding area in that:
- i) The natural characteristics and qualities that contribute to the natural character of the surrounding environment would not be adversely affected by the proposal. The physical and visual integrity of the area would be retained, and the biophysical and hydrological natural processes of the location would not be adversely affected. The proposal would have no adverse effects on the ecological values of the lake environment or the macrofaunal communities within and around the lake margin including native and exotic fauna.
 - ii) The landscape attributes of the OLA's would not be adversely affected by the proposal. The Whakaroa Peninsula would retain its high physical prominence when viewed from within the lake and from Kinloch. The bush clad areas on the headland, with grazed pasture on the plateau would be retained albeit interspersed with a limited level of built development. The site is well buffered from Lake Taupō's ONFL and OLA through the extensively vegetated SNA's surrounding the site.
 - iii) The characteristics and values of Lake Taupō's OLA and ONFL including the expansive area of water, and memorable and vivid attributes would not be adversely affected by the proposal. The physical, aesthetic and associative attributes would be retained.
 - iv) The proposal would not result in adverse effects on the abiotic or biotic attributes of Lake Taupō or its tributaries, as the site is physically separated from the lake and does not contain any permanent streams or wetlands.
 - v) In terms of the experiential qualities of natural character, while the perception of natural character may be reduced slightly by increased built development within a modified part of the site, built development is a characteristic of the wider landscape. Other experiential attributes including access to the water, sounds and smell of the lake environs, lake surface conditions, water movements, atmospheric conditions and riparian birdlife and aquatic life will be unaffected by the proposal.

Landscape Effects

- 6.15 A landscape effect is a consequence of change in a landscape's physical attributes on that landscape's values. Change is not an effect – landscapes change constantly. It is the implications of change for a landscape's values that is the effect³. Landscape effects take into consideration physical effects to the land resource. Assessments of landscape effects therefore investigate the likely nature and scale of change to landscape elements and characteristics. Landscape effects are primarily dependent on the landscape sensitivity of a site and its surrounds to accommodate change. Landscape sensitivity is influenced by landscape quality and vulnerability, or the extent to which landscape character, elements/features and values are at risk to change.
- 6.16 Landscape assessments are based on the links between landscape character and values. Character is an expression of the landscape's collective attributes. Values are the reasons a landscape is valued but are embodied in attributes. Effects are consequences for a landscape's values of changes to the attributes on which the values depend. Landscape character results from a combination of physical elements together with aesthetic and perceptual aspects that combine to make an area distinct. Landscape values relate to people's aesthetic perception of the biophysical environment, including considerations such as naturalness, vividness, coherence, memorability and rarity.
- 6.17 Effects on landscape values are assessed against the existing environment, and the outcomes sought in the relevant statutory provisions. Whether effects on landscape values are appropriate would therefore depend both on the nature and magnitude of effect on the existing landscape values and what is anticipated by the provisions.
- 6.18 Landscape effects take into consideration the physical effects on the land resource. Assessments of landscape effects therefore investigate the likely nature and scale of change to landscape elements and characteristics. Landscape effects are primarily dependent on the landscape sensitivity of a site and its surrounds to accommodate change and development. Landscape sensitivity is influenced by landscape quality and vulnerability, or the extent to which landscape character, elements/features and values are at risk to change.

Landscape Effects Analysis

- 6.19 The site and surrounding environment to the north have been subjected to high degrees of modification and are not high in landscape character values. This is as a result of the removal of natural cover, pastoral farming activities and associated rural, rural residential, and the wider Kinloch urban settlement pattern.
- 6.20 I consider that the proposal is an appropriate development and use of this part of the rural environment. The proposal will have low adverse effects on the landscape character values of the site and surrounding area, given that:
- i) The site is within a modified environment characterised by a productive rural landscape, and where the landscape character values are already compromised through these activities. The elements and features that contribute to the landscape values of the area would not be adversely affected by the proposal.
 - ii) Any potential landscape effects would be localised due to the type and scale of change and existing on-site and surrounding landform and vegetation patterns. The

³ Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines, [p. 135]

proposal would not introduce elements or features that would adversely influence the landscape values and character of the surrounding area.

- iii) The proposal will not impact on any key landscape features nor alter the distinctive patterns found within the surrounding landscape. The site's moderate landscape values means it has a low sensitivity to change associated with the proposal. The broader rural character and modified rural setting of the environment will be maintained by the proposal.
- iv) The characteristics and qualities that contribute to the landscape character of the rural environment will not be adversely affected by the proposal. The location, scale and design of the proposal is appropriate in this modified rural environment. The physical and visual integrity of the rural area will be retained, and the natural processes of the location will not be adversely affected.
- v) The natural character attributes of the OLA's would not be adversely affected by the proposal. The natural characteristics and values of Lake Taupō's OLA including the expansive area of water, and memorable and vivid attributes would not be adversely affected by the proposal. The physical, aesthetic and associative attributes would be retained.
- vi) The proposal would result in a change in landscape character but will ensure a suitable level of amenity is achieved.

Visual Effects

- 6.21 The assessment of visual effects analyses the perceptual (visual) response that any of the identified changes to the landscape may evoke, including effects relating to views and visual amenity. Visual sensitivity is influenced by a number of factors including the visibility of a proposal, the nature and extent of the viewing audience, the visual qualities of the proposal, and the ability to integrate subsequent changes within the landscape setting, where applicable. As with landscape effects, visual effects relate to landscape values. Visibility and change are not effects in and of themselves⁴.
- 6.22 The nature and extent of visual effects are determined by a systematic analysis of the visual intrusion and qualitative change that a proposal may bring, specifically in relation to aesthetic considerations and visual character and amenity. The methodology used in this assessment is designed to assess whether or not the proposal would have adverse visual effects on the nature and quality of the surrounding environment.

Visual Catchment and Viewing Audience

- 6.23 The visual catchment is the physical area that will be exposed to the visual changes associated with the proposal. Topography and vegetation within the site and surrounding area result in a restricted visual catchment. The steep terrain and vegetated characteristics of the Whakaroa Peninsula and DoC reserve flanking the site to the east, south and west provides a high level of screening from lower elevations and from close locations on the lake. View will not be gained from the W2K Great Lake Trail due to the densely vegetated nature of the reserve. The closest dwellings are located at the southern end of Whakaroa Road and the eastern end of Locheagles Rise in Kinloch. Views from these locations will be highly variable due to intervening landform and vegetation.

⁴ Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines, [p. 245]

- 6.24 Views will be gained to varying degrees from the wider surrounding area including Whangamata Bay, Whakaipo Bay, Whakaipo Bay Recreation Reserve, Whangamata Valley, Mapara Valley, parts of Kinloch township and the rural areas to the north. Views will be gained from parts of Lochridge Estate, to the north of Kinloch. Motorists travelling southeast along parts of Whangamata Road and northwest along Mapara Road will be exposed to brief and transient views towards the site.
- 6.25 Distant views will be gained from some of the elevated rural and lifestyle properties to the east and southeast including the residential settlement area around Hill View Road and the Kaipo Bay subdivision off Taumata Rise. Views may be gained from parts of the Te Kauwae Peninsula on the western side of Whangamata Bay and Waikarariki Peninsula on the eastern side of Whakaipo Bay. Views are not gained from the Kinloch foreshore, being screened by landform and vegetation on the peninsula and within the urban area.
- 6.26 The primary viewing audiences that would be exposed to the proposal would be restricted and therefore comprise:
- i) Recreational users of Whakaipo Bay Recreation Reserve
 - ii) Recreational users in Whangamata Bay and Whakaipo Bay
 - iii) Motorists travelling southeast along parts of Whangamata Road and northwest along Mapara Road
 - iv) Residents in properties at the southern end of Whakaroa Road and the eastern end of Locheagles Rise
 - v) Residents and workers in some of the rural landholdings Mapara Valley and Whangamata Valley
 - vi) Residents in the lifestyle properties to the southeast in the Hill View and Kaipo Bay settlements
 - vii) Distant viewers within parts of the wider surrounding land and water area.

Visual Amenity Effects Analysis

- 6.27 The visual effects of the proposal have been assessed from locations within the visual catchment area which have potential for visual effects. This is achieved by using both descriptive and analytical means. The analysis from the surrounding area is representative of the potential views from the most affected surrounding properties and public areas.
- 6.28 Nine viewpoints have been identified from which the visual effects have been assessed. This is achieved by using both descriptive and analytical means. The viewpoints were selected as locations that capture and fairly represent the range of public and private views towards the site. The analysis from the viewpoints is representative of the potential views from the most affected surrounding properties and roads.
- 6.29 The assessment is from each of the following viewpoints:
- Viewpoint 1:** Whakaipo Bay Recreation Reserve
 - Viewpoint 2:** Whakaipo Recreation Reserve foreshore
 - Viewpoint 3:** Whakaipo Bay
 - Viewpoint 4:** Whangamata Bay
 - Viewpoint 5:** Whangamata Bay
 - Viewpoint 6:** Kinloch Marina
 - Viewpoint 7:** Lochridge Estate
 - Viewpoint 8:** Piro Place
 - Viewpoint 9:** Taumata Rise

- 6.30 A detailed assessment and analysis of potential visual effects has been undertaken to ensure that each view and changes within each view are evaluated thoroughly and consistently. The total rating given in the descriptions denote the overall visual effects rating. The following seven-point scale has been used to rate effects, based on the guidelines contained within the Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines, 2022. The 7-point scale is a rating of magnitude, whereas an assessment of whether effects are minor (or less than or more than) is a reasoned consideration of the magnitude and importance (significance) of such effects in context⁵.

Very Low | Low | Low-Moderate | Moderate | Moderate-High | High | Very High

						SIGNIFICANT	
LESS THAN MINOR		MINOR		MORE THAN MINOR			
VERY LOW	LOW	LOW-MOD	MODERATE	MOD-HIGH	HIGH	VERY HIGH	

Figure 7: TTatM rating scale

- 6.31 The assessment has been undertaken in terms of the following criteria:
- Sensitivity and quality of the view** – the relative quality and sensitivity of views into the site, including landscape character and visual amenity values.
 - Viewpoint | perceptual factors** – the type and size of population exposed to views into the site, the viewing distance to the site, and other factors which indicate its sensitivity in terms of both viewing audience and the inherent exposure of the view towards the site due to its physical character.
 - Rural amenity** – the impact of the proposal on the wider surrounding rural amenity.
 - Rural form** – the degree to which the proposal would fit into the existing rural context of the surrounding environs.
 - Visual intrusion | contrast** – the intrusion into or obstruction of views to landscape features in the locality and beyond and the impact upon key landscape elements and patterns.
 - Mitigation potential** – the extent to which any potential adverse effects of the proposal could be mitigated through integration into its surrounds by specific measures.

Viewpoint 1 – Whakaipo Bay Recreation Reserve

Viewpoint 2 – Whakaipo Bay Recreation Reserve foreshore

- 6.32 Viewpoint 1 is taken from the access track into the Whakaipo Bay Recreation Reserve looking in a northwesterly direction towards the site at approximately 2 kilometres distance. The viewing audience from here comprises recreational users of the reserve and lakeside. The reserve is a highly used recreational facility with freedom camping, toilets, car park, open grassed areas, picnicking and access to the W2K Great Lake Trail.

⁵ Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines, [6.40]

- 6.33 From here the majority of the site is screened by the intervening landform and densely vegetated slopes of the Whakaroa Peninsula. The northern transmission tower is visible to the right of the view, demarcating the northern extent of the rezoning area. The three power poles towards the centre of the view approximate the southern extent of the northern residential cluster. The rural lakeside characteristics of the area are evident with the interplay of the grassed areas and specimen tree plantings and the dominant and dramatic vegetated landform. Vegetation along the foreshore encloses the reserve from the lake margin.
- 6.34 From here, future development enabled by the rezoning is unlikely to be visible, being screened by the landform and vegetated slopes. If any roof form did protrude into the skyline, it would be hard to differentiate from the vegetated skyline vista from this distance and viewing angle. Overall, there would be very low adverse visual amenity effects from here.
- 6.35 Viewpoint 2 is taken from the foreshore in the vicinity of the public facilities, and from here only the southwestern part of the site is visible with the area to be rezoned screened by the vegetated bluffs to the right of the view. Subsequently there would be no adverse visual amenity effects from here.

Viewpoint 3 – Whakaipo Bay

- 6.36 Viewpoint 3 is taken from the water in Whakaipo Bay (38°41'54"S, 175°56'57"E) looking in a northwest – northerly direction towards the site. From here the rocky bluffs, cliffs and escarpments of the Whakaroa Peninsula are dominant rising steeply from the water's edge, clothed with indigenous vegetation. The land – water interface is a striking feature drawing the viewer's eye towards it. The contrasting colours and textures between the water, land and sky add to the experiential attributes of the view, constantly changing in weather and light conditions. From here the northern extent of the rezoning area is demarcated by the transmission tower and the vehicle on the skyline approximates the southern extent.
- 6.37 The viewing audience from here includes recreational users of the lake, predominantly in boats or kayaks. The majority of users would be transient, travelling through the water, although some may be static (if fishing). From here the views are panoramic encompassing the entirety of Whakaipo Bay and south towards the distant volcanic landforms.
- 6.38 Again from this lower viewing location, the steep landform of the rocky bluffs, cliffs and escarpments of the Whakaroa Peninsula will largely screen views of future development enabled by the rezoning, being located largely on the western side of the ridgeline. Potentially some built form may be visible within the rezoning area in the vicinity of the northern transmission tower. Mitigation measures including Building Design Guidelines and landscape planting requirements would assist to integrate future development into the landscape.
- 6.39 In cognisance of the scale and expanse of the wider landscape setting and the small scale nature of the proposal, I consider that the adverse visual amenity effects would be low from here. The proposal could be accommodated without adversely affecting the visual amenity values of the OLA.

Viewpoints 4 and 5 – Whangamata Bay

- 6.40 Viewpoints 4 (38°40'43"S, 175°53'41"E) and 5 are taken from the water in Whangamata Bay looking in northeasterly directions towards the site. The densely vegetated rocky

escarpments and cliffs of the Whakaroa Peninsula are again dominant from the bay, rising steeply from the water's edge with no access enabled along the foreshore. As the landform opens out to the north, the rolling pastoral slopes and isolated stands of exotic forestry characterise the inland landscape. From here, the northern extent of the rezoning area is demarcated by the transmission tower on the skyline. The remainder of the site is entirely screened by the densely vegetated peninsula.

- 6.41 The Kinloch residential settlement pattern is evident from here, extending north inland up the valley floor and the lower slopes of the Whakaroa Peninsula, to the west of the site. The viewing audience from here would largely be transient, in vessels on the water, and again the views are wide and all encompassing, extending around the bay.
- 6.42 From here, development within the northern rezoning area would be visible to varying degrees, more so as the viewer approaches the Kinloch shoreline. Development enabled by the rezoning would be viewed beyond the Locheagles Rise settlement on the western slopes and foregrounded by the stand of indigenous vegetation. The proposal would be viewed within the context of the Kinloch settlement pattern, albeit it a higher elevation.
- 6.43 Mitigation measures including Building Design Guidelines and landscape planting requirements would assist to integrate future development into the landscape. The foreground stand of indigenous vegetation would also assist in providing a visual break from Locheagles Rise and provide lower screening towards parts of the rezoning area. The landscape has the capacity to absorb development as enabled by the proposal through the Kinloch settlement characteristics, the densely vegetated slopes of the Whakaroa Peninsula and open pastoral slopes of the Whakaroa Hills to the north.
- 6.44 The visual amenity attributes of the OLA's would not be adversely affected by the proposal. The Whakaroa Peninsula would retain its high visual and physical prominence when viewed from within the lake. The dense bush clad cliffs and escarpments, with grazed pasture on the plateau would be retained albeit interspersed with a limited level of built development. The site is well buffered from Lake Taupō's OLA through the extensively vegetated SNA's surrounding the site.
- 6.45 The visual characteristics and values of Lake Taupō's OLA including the expansive area of water, and memorable and vivid attributes would not be adversely affected by the proposal. The physical, aesthetic and associative attributes would be retained.
- 6.46 The proposed rezoning area forms but a small part of the expansive landscape setting and within the context of the landform and lake characteristics the adverse effects on visual amenity are considered to be low.

Viewpoint 6 – Kinloch Marina

- 6.47 Viewpoint 6 is taken from beside the Kinloch Marina in Mata Place opposite the General Store looking in an easterly direction towards the northern part of the site in the saddle between the vegetated slopes. The remainder of the site is screened from view by the Whakaroa Peninsula landform and vegetated SNA. The viewing audience from here encompasses locals, visitors and pedestrians along the footpath in the vicinity.
- 6.48 The urban settlement pattern is dominant from here with dwellings and baches set into the lower slopes, integrated well with specimen tree plantings within the properties. The marina infrastructure reinforces the lakeside characteristics with pontoons, piles and the moored boats. The terrain rises up towards the Whakaroa Peninsula ridgeline clothed with indigenous vegetation within the SNA.

- 6.49 From here parts of the northern rezoning area will be visible behind the vegetated foreground slopes. Development enabled by the rezoning would be viewed above the Locheagles Rise settlement on the western slopes. The proposal would be viewed within the context of the Kinloch urban settlement pattern, albeit it physically and visually separated by the indigenous bush stand.
- 6.50 From within the Kinloch environs, mitigation measures including Building Design Guidelines and landscape planting requirements would assist to integrate future development into the landscape. The landscape has the capacity to absorb development as enabled by the proposal through the Kinloch urban settlement characteristics, the densely vegetated slopes of the Whakaroa Peninsula and the open pastoral slopes of the Whakaroa Hills extending to the north.
- 6.51 Overall, the adverse effects on the visual amenity values would be low.

Viewpoint 7: Lochridge Estate

- 6.52 Viewpoint 7 is an elevated view taken from Lochridge Drive in Lochridge Estate, looking in a southeasterly direction from approximately 4.75 kilometres. The undulating pastoral slopes of the Whakaroa Hills are punctuated with stands of forestry, shelterbelts and tracts of indigenous bush with isolated pockets of specimen tree plantings. The Kinloch urban settlement sits within the valley floor and lower western slopes of the Whakaroa Peninsula.
- 6.53 From this viewing distance, development enabled by the proposal will be subservient within the context of the wider viewshed. From here the views are expansive encompassing the Whakaroa Peninsula, Whangamata Bay, the Kinloch urban area, Te Kauwae Peninsula, Lake Taupō and south towards the distant volcanic landforms of Ruapehu, Tongariro and Ngauruhoe. While built form will be visible to varying degrees, the extensively vegetated foreground slopes and proposed mitigation measures will assist to integrate the proposal into the landscape.
- 6.54 The visual amenity attributes of the OLA would not be adversely affected by the proposal. The Whakaroa Peninsula would retain its high visual and physical prominence when viewed from elevated locations. The dense bush clad cliffs and escarpments, with grazed pasture on the plateau would be retained albeit interspersed with a limited level of built development. The site is well buffered from Lake Taupō's OLA through the extensively vegetated SNA on the western side of the site.
- 6.55 Overall, the adverse effects on the visual amenity values would be low.

Viewpoint 8: Piro Place

Viewpoint 9: Taumata Rise

- 6.56 Viewpoint 8 is an elevated view taken from Piro Place, looking in a westerly direction from approximately 5.5 kilometres and Viewpoint 9 from Taumata Place looking in a northwesterly direction from 5 kilometres away. These views are broad and expansive encompassing the Mapara Valley floor, inland undulating slopes and the densely vegetated Whakaroa Peninsula. The site extends from the southern haybarn to beyond the northern transmission tower, although the proposed rezoning is restricted to the central part of the site.
- 6.57 From these locations future development enabled by the proposal will be more visible, being elevated and exposing more of the site. Visibility will however be reduced through the viewing distance and wider landscape context. The views from these locations are

extensive and diverse. In cognisance of the scale and expanse of the wider landscape setting, the small scale nature of the proposal, and the proposed mitigation measures, I consider that the adverse visual amenity effects would be low from these elevated locations. The proposal could be accommodated without adversely affecting the visual amenity values of the Whakaroa Peninsula OLA.

Wider Surrounding Area

- 6.58 From other locations within the wider surrounding area, views towards the proposal would be highly variable due to distance, orientation of the view, diversity of elements within the view and screening elements (buildings, landform, shelterbelts, prevailing vegetation patterns). Where visible from these areas, the proposal would integrate sensitively into the landscape due to the scale of the proposal relative to the site context and surrounding environs. Any potential adverse visual effects would be localised and would have very low adverse visual effects on the visual amenity and landscape values of the site and surrounding area.

Cumulative effects

- 6.59 Cumulative effects come into play in circumstances where an additional effect takes a landscape beyond a 'tipping point' which would normally require a benchmark against which the effects are to be measured. Such benchmarks might include the character envisaged in the district plan or the 'capacity' of a landscape to accommodate development before compromising its landscape values (its valued attributes).⁶
- 6.60 In my opinion the rezoning of 44 hectares of the site the will not exceed the capacity of the landscape to absorb the changes or compromise its existing landscape values or attributes. I do not consider that the proposal would adversely diminish and affect the local landscape character, values and pattern of the rural environment. The site has a restricted visual catchment and the existing landform and vegetation patterns within the site and outside it provide a good visual buffer to the site. Clustering the future development into three defined areas, in appropriate parts of the site allows for an extensive area of the site to remain in primary production while retaining the rural character values. The Building Design Guidelines and comprehensive mitigation and restoration planting will ensure that future development enabled by the rezoning integrates well into the rural landscape.
- 6.61 In my opinion, the permitted baseline of sixty six dwellings dispersed across the site with minimal design integration could potentially result in adverse cumulative effects through the resulting scattering of dwellings and structures of varying architectural designs and styles and no coordinated landscape strategy.
- 6.62 I therefore consider that there will be no adverse cumulative effects resulting from the proposed rezoning.

7 Conclusions

- 7.1 The application site and surrounding area are well suited for the proposal in that they contain a number of natural landscape elements and features that would assist in integrating and/or screening development enabled by the rezoning from the surrounding environment. The containing ridgeline, densely vegetated peninsula landform, elevation of the site, localised landforms and on and off-site vegetation

⁶ Te Tangi a te Manu Aotearoa New Zealand Landscape Assessment Guidelines, 6.46 [p. 155]

patterns mean that views towards the proposal would be screened from a number of public and private areas.

- 7.2 The proposal would result in a change in the character of the site, introducing a level of built form into the landscape and reducing the existing rural character. The proposal, however, sits in a landscape that has been modified extensively for productive farming and well buffered from the surrounding area by the vegetated SNA's on the Whakaroa Peninsula.
- 7.3 In my opinion, clustering future development enabled by the rezoning into three defined areas, in appropriate parts of the site, allows for an extensive area of the site to remain in primary production and retaining the rural character values.
- 7.4 The proposal would not be out of character with the surrounding rural lifestyle activities to the north and east and urban settlement within the Kinloch Township and the potential landscape and rural character effects from the proposal on the character and amenity of the environment are considered to be acceptable.
- 7.5 The proposal is of a small scale in relation to the wider surrounding environment. The restricted visual catchment, existing landform and vegetation patterns would mitigate any adverse effects on the existing rural character and ensure that the amenity values of the surrounding area would be maintained. The proposal would be an appropriate use for the location and would be of a scale which would integrate well into the landscape setting.
- 7.6 The natural characteristics and qualities that contribute to the natural character of the surrounding environment would not be adversely affected by the proposal. The physical and visual integrity of the area would be retained, and the biophysical and hydrological natural processes of the location would not be adversely affected. The proposal would have no adverse effects on the ecological values of the lake environment or the macrofaunal communities within and around the lake margin including native and exotic fauna.
- 7.7 The characteristics and values of Lake Taupō's OLA including the expansive area of water, and memorable and vivid attributes would not be adversely affected by the proposal. The physical, aesthetic and associative attributes would be retained.
- 7.8 The landscape attributes of the OLA's would not be adversely affected by the proposal. The Whakaroa Peninsula would retain its high visual and physical prominence when viewed from within the lake and surrounding areas. The bush clad areas on the headland, with grazed pasture on the plateau would be retained albeit interspersed with a limited level of built development. The site is well buffered from Lake Taupō's OLA and ONFL through the extensively vegetated SNA's surrounding the site.
- 7.9 The proposal is located within an already modified part of the Whakaroa Peninsula, thereby reducing adverse effects on the key attributes and values of the Whakaroa Peninsula OLA.
- 7.10 The characteristics and values of Lake Taupō's OLA including the expansive area of water, and memorable and vivid attributes would not be adversely affected by the proposal. The physical, aesthetic and associative attributes would be retained.
- 7.11 Any potential adverse landscape effects (including effects on rural character) of the proposed development would be localised and would have low adverse effects on the

quality, character, and aesthetic values of the wider rural setting. The proposal is not of a scale or appearance which would dominate or detract significantly from the rural environment.

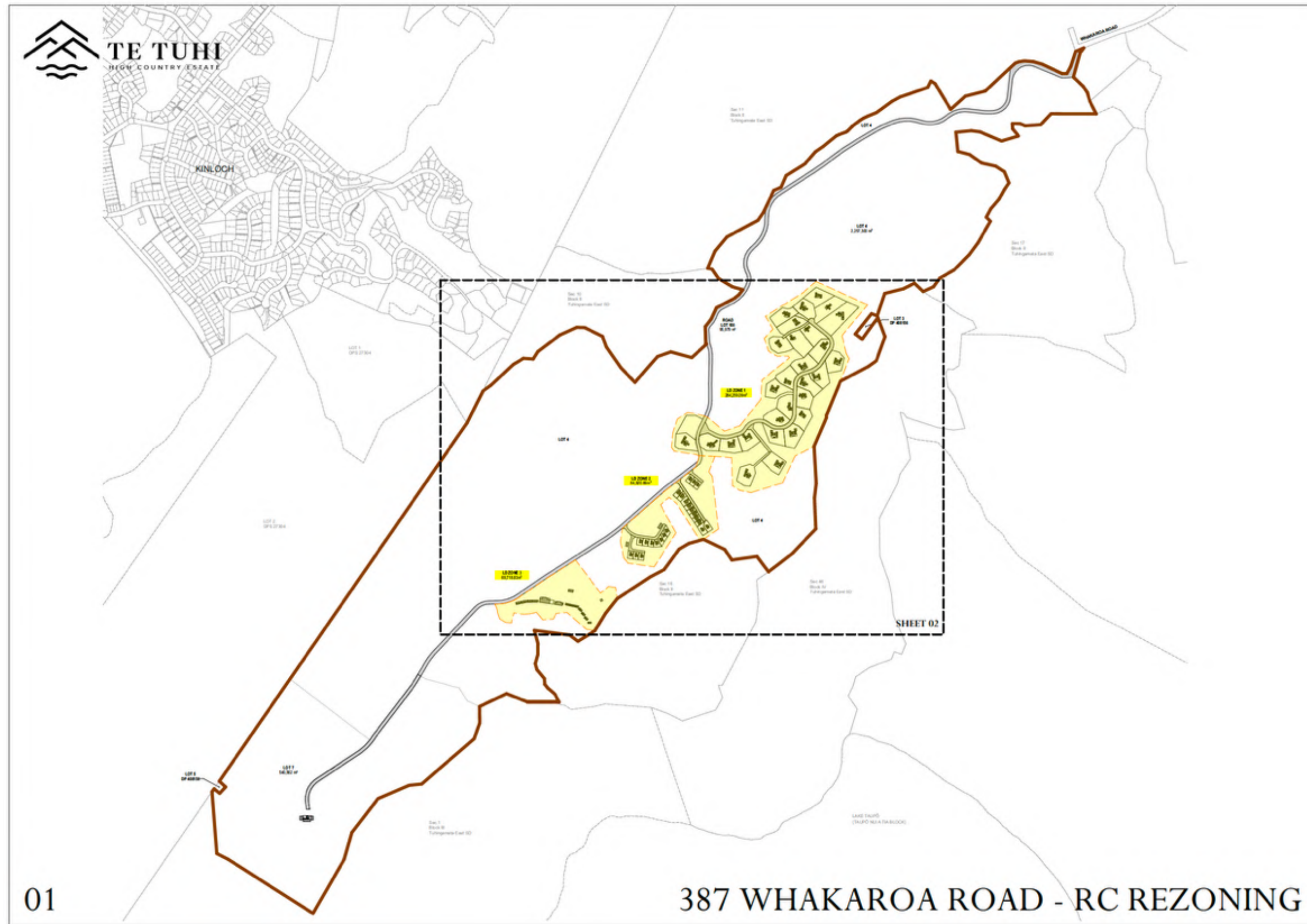
- 7.12 In my opinion I consider that within the context of the established rural environment the proposal could be effectively integrated and assimilated into the site and surrounding landscape. Overall, the adverse effects on the natural character, landscape character, and visual amenity values of the surrounding Taupō environment would be low (less than minor).



Rob J Pryor
NZILA Tuia Pito Ora Registered Landscape Architect
May 2026



Annexure 1: Te Tuhi RC Rezoning Plan



Annexure 2: Viewpoint Photographs



Viewpoint 1: Whakaipo Bay Recreation Reserve



Viewpoint 2: Whakaipo Recreation Reserve foreshore



Viewpoint 3: Whakaipo Bay (1 of 3)



Viewpoint 3: Whakaipo Bay (2 of 3)



Viewpoint 3: Whakaipo Bay (3 of 3)



Viewpoint 4: Whangamata Bay



Viewpoint 5: Whangamata Bay



Viewpoint 6: Kinloch Marina



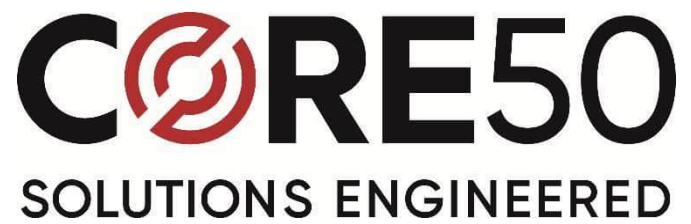
Viewpoint 7: Lochridge Estate



Viewpoint 8: Piro Place



Viewpoint 9: Taumata Rise



Preliminary Geotechnical Report

387 Whakaroa Road,
Taupo
Big Ball Holdings Ltd

Job Reference: CR 260139-SR01

PROJECT DETAILS

Job Number		
CR 260139-SR01		
Client	Contact	Address
Big Ball Holdings Ltd	Jamie Keehan	387 Whakaroa Road, Taupo
Legal Description		Local Authority
LOT: 4 DP: 408156		Taupo District Council

REPORT REGISTER

Version	Date	Issued To	Details
1	23 April 2026	Jamie Keehan	Initial Report Issue

QUALITY CONTROL

Authorised			
Version	Prepared by	Reviewed by	Approved and signed by
1	JOE SMITH Engineering Technician	MICHAEL RICHARDSON Chartered Professional Engineer CPENG 1005467	MICHAEL RICHARDSON Chartered Professional Engineer CPENG 1005467  -----

CONTACT US

To discuss this report: 0800 26 73 50

To book an inspection relating to this report: Waikato: 027 910 5494, Taupo: 027 274 4299

CONTENTS

PROJECT DETAILS	2
REPORT REGISTER	2
QUALITY CONTROL.....	2
CONTACT US	2
1. SUMMARY.....	4
2. INTRODUCTION	4
3. BACKGROUND INFORMATION.....	5
4. SITE ASSESSMENT AND SOIL INVESTIGATION.....	5
4.1 Site Topography.....	5
4.2 Subsoil Investigation.....	6
4.3 Soil Properties.....	6
5. GEOHAZARDS.....	7
5.1 Quantitative Liquefaction Assessment.....	7
5.1.1 Design Parameters	7
5.1.2 Analysis Summary	8
5.1.3 Liquefaction Potential	8
5.2 Expansive Soils.....	9
5.3 Slope Stability	9
5.4 Flood Hazard.....	10
5.5 Fault Lines.....	10
5.6 Further Geohazards.....	10
6. DEVELOPMENT CONSIDERATIONS.....	12
6.1 Earthworks.....	12
6.2 Services.....	13
6.3 Retention Structures	14
6.4 Stormwater Management	15
6.6 Wastewater Management.....	15
6.7 Private Way Construction.....	16
7. PRELIMINARY FOUNDATION RECOMMENDATIONS.....	17
8. LIMITATIONS	18
APPENDIX A – TEST PLAN, SOILS LOGS AND SUMMARY TABLE	
APPENDIX B – DESKTOP INFORMATION	
APPENDIX C – CLIQ ASSESSMENT	

1. SUMMARY

- 1.1 Our Qualitative and quantitative geohazard assessment and site investigations infer the site can be assumed to be a **TC1** Like site and underlain by predominantly loose to medium dense granular soils which do not meet the requirement of good ground.
- 1.2 **Design or site works solutions will be required to mitigate** the loose granular soils (refer Section 7 - Foundations Recommendations and Appendix A – Site Specific Summary Table). Improvement may be carried out during subdivision cut/fill earthworks, or during building consent earthworks.
- 1.3 **Specific engineering design** is also likely required to address slope stability concerns on a site-specific basis at building consent stage and earthquake fault setback zones. Building setback zones are shown in the Summary table of Appendix A and Fault Avoidance Zones in Appendix B.
- 1.4 Earthworks observation and testing at the critical stages of the earthworks process will be required by a suitably qualified and experienced engineer. Methodology for these earthworks may require engineer review prior to commencing. The extent of proposed cut/fill should be assessed to address slope stability.
- 1.5 Storm water disposal via Retention for Reuse or Detention and gradual release to in-ground soakage systems is recommended. Refer Section 6.4.
- 1.6 An 80mm diameter uPVC public service water main strike through the site and may encroach the proposed buildings within the 'Produce Lot'. Specific foundation design may be required for these lots if the water main remains in its current location, and the foundations for proposed structures are within the influence zone.

2. INTRODUCTION

It is the client's intention is to obtain resource consent for the establishment of,

- 29 x Residential Sections
- 25 x Cottage Sections
- Produce Farm
- Country Lodge including wedding/restaurant venue, parking, store and accommodation suites.

And associated private access roads at 387 Whakaroa Road. The rural section is located between Kinloch and Taupo.

CORE 50 Engineers has been engaged to carry out,

- Desktop assessment
- Subsoil investigations
- Qualitative/Quantitative geohazard assessment

for the purpose of evaluating site suitability for the proposed development and provide a geotechnical report to support resource consent application.

3. BACKGROUND INFORMATION

The following relevant information was identified during our Desktop Assessment and is referenced where applicable within the following report with applicable documents attached within Appendix B.

Geotechnical Reporting

- An existing preliminary geotechnical report for the subject site was identified during our desktop assessment. The report was completed by CORE50 Ltd (report Ref No: 230444-PGR) on the 19th of June 2023.
- Previous reporting relating to fault line investigations was completed by Earthtech Consulting Ltd in February 2006 and Cheal Consultants Ltd in October 2006. The conclusions of this reporting has helped refine identification of fault traces now available on Taupo District Council GIS mapping.

Geological Setting

- GNS Geological Web Maps identify the site lithology as part of the “Taupo Group” deposited during the late Pleistocene Period less than 24 - 128 thousand years ago. The formation typically consists of rhyolite lava with lesser pumice and breccia as a carapace, except near the entrance to the development which is described as non-welded ignimbrite and phreatomagmatic fall deposits, typically consisting of pumice, ash, gravel, sand, and silt (as confirmed by our shallow subsoil investigation). Based on the geological mapping the ground conditions have been categorised as Subsoil Class D.

New Zealand Geotechnical Database

- Nearby pre-existing soils assessment data (199669, 199670) has been sourced from the NZ Geotechnical Database (NZGD). Test data included,
 - 13.5m deep CPT
 - 2.0m deep Hand Auger with strength testing

Test data is referenced where applicable within the following report.

Historical Imagery

- Retrolens imagery revealed no significant changes to the landscape of the development. Some additional farm buildings have been constructed in the time covered by Retrolens from 1938 – 1990.

4. SITE ASSESSMENT AND SOIL INVESTIGATION

4.1 Site Topography

The site topography across the greater development varies greatly from less than 5° to some cliffs exceeding 70°. Slopes adjacent proposed building platforms exceed 30° in some

locations. Proposed building platforms for residential dwellings are located on the less steep portions of each section. Most building platforms are on or atop steep slopes and will be subject to minimum slope setbacks. Slope Stability is covered in Section 5.3, and slope setbacks are summarised in the Site-Specific Summary Table within Appendix A.

Contours across the site are shown in Appendix B, as are proposed building platform locations with adjacent slopes.

4.2 Subsoil Investigation

The site assessment and soil testing were carried out throughout June/July 2023 and April 2026.

The soil investigation was carried out to investigate the general suitability of the soils for the construction of foundations for the proposed timber framed dwelling. Strength testing of soils is based NZS 3604 which requires the determination of “good ground” at the base of the foundations by demonstration of ultimate soil bearing capacity by the performance of specified scala penetrometer tests and boreholes, plus the observation of site and soil conditions in the respect of site profile, buried services, fill etc. Testing is not intended to be detailed for particular building proposals, and is preliminary only for assessing the general suitability of the the building platforms.

The soil tests completed included,

- 52 x 50mm Hand Augers with associated strength testing
- 4 x 10m deep (target depth) CPTu Tests
- 4 x 70mm 4m deep Machine Augers

The soil test results and locations are shown in the attached Appendix A.

Refer to Appendix A for Test Location Plans and Hand Auger Logs, and Appendix C for CPT logs.

4.3 Soil Properties

The generally natural soils encountered typically consisted of topsoil overlying very loose to medium dense Silty SANDs, SANDs, SILTs, and GRAVELs. The depth of topsoil varied between 100mm and 500mm deep. Ground water was not located in the boreholes.

Very loose granular soils were encountered within most boreholes at a depth believed to influence typical shallow foundations.

All very loose soil should be removed under the observation of the nominated suitably qualified and experienced inspector and replaced with engineer certified fill. Actual fill depths may vary on site and additional localised undercut may be required. Alternatively, specific engineering design of foundations may be adopted at building consent stage to mitigate issues arising from very loose soils.

Scala Penetrometer tests were carried out at the locations as shown in Appendix A, to a maximum depth of 4000mm.

1. Specified scala penetrometer tests were performed, and the test results indicate;
 - a) for 0 to 2000-4000mm are less than the requirements of NZS3604:2011 Section 3.3.7, of 300kPa Ultimate bearing pressure.

Specific depths to 300kPa ultimate bearing pressure is detailed within the Site-Specific Summary Table in Appendix A.

The strength of the soil was not maintained with depth and softer soils may be encountered deeper. Site specific testing at completion/building consent stage is vital to confirm depth to 300kPa ultimate bearing pressure, and ensure appropriate foundations are prescribed on a site-to-site basis. Engineers engaged to conduct site-specific testing/reporting should be familiar with the contents of this report.

5. GEOHAZARDS

The following preliminary qualitative and quantitative assessments have been provided based on our desktop and site assessment.

5.1 Quantitative Liquefaction Assessment

Liquefaction occurs during earthquake shaking within loose non-plastic soils, typically recently deposited (<15,000 years) sands and silts below the groundwater table.

Liquefaction occurs because of increased pore water pressures which reduce the contact forces between soil particles, diminishing the strength/ stiffness of the soil causing them to float and therefore liquefy. This effect is only temporary (during the earthquake).

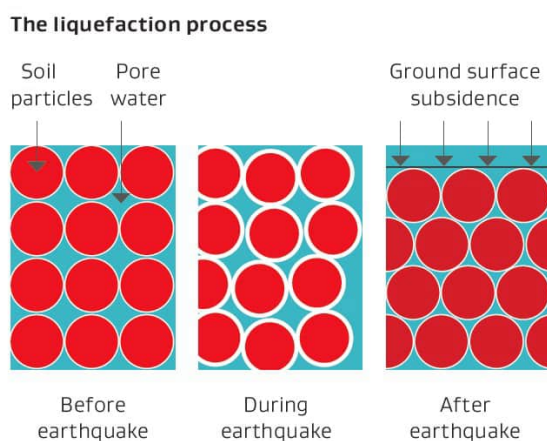


Figure 1 – “Figure 2.3: Schematic representation of the mechanism of liquefaction (from Tonkin + Taylor 2015)”

5.1.1 Design Parameters

The proposed development is considered for the construction of Importance Level 2 structures and local geology maps do not identify any **major** active faults within 20km of the subject area.

Accordingly, MBIE Module 1. Overview of the Guidelines (Nov 2021) Appendix A, indicates a basic ULS value of 0.39pga, SLS of 0.10pga and an Effective Magnitude 6.1 for a 500-year

return period. Based on the categorisation of GNS Map 4 and results obtained from our site investigation the site is assumed to be a deep soil site (Class D).

The software Cliq was used to assess the CPT data provided and quantitatively evaluate the liquefaction risk using the Boulanger & Idriss 2014 method. Groundwater was adopted on a test-specific basis based on the lack of groundwater encountered.

5.1.2 Analysis Summary

See Table 1 below for a summary of the Cliq Analysis results.

Cliq Analysis Summary Table – 387 Whakaroa Road, Taupo								
CPT #	Case	Vertical Settlement (mm)	Lateral Spread (mm)	LPI	LSN	Probability %	Performance Level	Technical Category Proposed
01	SLS	0	-	0	0	4.3 (Low)	0	TC1
01	ULS	0	-	0	0	4.3 (Low)	0	TC1
02	SLS	0	-	0	0	4.3 (Low)	0	TC1
02	ULS	0	-	0	0	4.3 (Low)	0	TC1
03	SLS	0	-	0	0	4.3 (Low)	0	TC1
03	ULS	0	-	0	0	4.3 (Low)	0	TC1
04	SLS	0	-	0	0	4.3 (Low)	0	TC1
04	ULS	0	-	0	0	4.3 (Low)	0	TC1
Parameters: Effective Magnitude = 6.1, Pga ULS = 0.39g, Pga SLS = 0.10g no Ageing Factor Adopted.								

Table 2 - Cliq Analysis Summary Table

5.1.3 Liquefaction Potential

LPI (Liquefaction Potential Index) is a combination of the thickness of liquefying layers and the depth below the ground surface at which the layers are. An LPI of 0 in conjunction with an LSN (liquefaction severity number) <10 indicates a performance Level 0 i.e. an insignificant risk of pore water pressure build-up resulting in a negligible risk of liquefaction and deformation of the ground.

On the basis of the above findings and qualitative desktop assessment it can be assumed that categorizing the site as a **TC1 like site** as per Ministry of Business, Innovation and Employment

(MBIE) and New Zealand Geotechnical Society (NZGS) Part A: Technical Guidance, in regard to liquefaction will be appropriate.

Refer Section 7 for Foundation Recommendations.

In our opinion, Section 106 of the RMA in regard to liquefaction risk can be addressed for the subject site with a specifically designed system for the inherent soils.

5.2 Expansive Soils

NZS 3604:2011, Section 17: Expansive Soils, excludes from the definition of ‘good ground’, soils with a liquid limit of more than 50% and a linear shrinkage of more than 15%. NZS 3604 requires the site be classified into the appropriate Ys category.

For site classification purposes, the “characteristic surface movement” (Ys) is the vertical movement range expected during the life of a building caused by moisture changes from a reasonable estimate of dry and wet conditions without considering the moderating effect of the buildings or other load effects.

Surficial soils testing and desktop investigation revealed the site lithology as part of the “Taupo Group” consisting of surficial Silty SANDs, SANDs, and GRAVELs with deeper SILTs.

Based on our tactile – visual evaluation of the soils the Expansivity Class is assessed as non-expansive (A Class) as defined by AS2870:2011. Risk of ground surface movement (Ys) due to seasonal shrink and swell (as a result of seasonal moisture fluctuations) is not expected and foundations will not require engineer design to mitigate expansive soils.

5.3 Slope Stability

The slope of the sites vary, with zones of steeper ground bordering on cliff areas, and also flatter contours. The contour of the site is expected to be a result of the airfall volcanic deposits settling over older contoured surfaces, including rock outcrops and erosional features. The current landform as a result is relatively young and does not have significant erosional features giving rise to steeper slopes others than those linked to preexisting rock cliff features. As a result, slope instability is expected to be linked to the proximity to exposed rock faces below slopes. The second link to instability includes any zones that have been undercut with support removed below a slope. The main road cutting is the clear example of this.

There is some evidence of slope movement observed throughout the site, mostly caused by cutting completed for the vehicle accessways. There does not appear to appear to be recent slope movement except where some movements have occurred from the vehicle accessway.

Based on the competency of the underlying soils, angle of the slopes identified, observations made during our site walkover and in the absence of site-specific slope analysis, Building Setback Lines (BSL) from the crest of the slope are proposed to achieve suitable building platforms. This is typically taken as 15m back from the crest of a larger slope, reducing to 10m for smaller slopes and 5m for very small slopes. These minimum setbacks should be followed unless specific testing and engineering advice is sought.

5.4 Flood Hazard

Taupo District Council GIS MAPs do not indicate a flood hazard for the subject site. Therefore, compliance with nominal floor level clearances as per NZS3604: 2011 in relation to the proposed foundations will be required.

5.5 Fault Lines

The subject site is located over 2 major fault lines. The Ngangiho Fault toward the north-western boundary is described as a well-defined active fault with a primary rupture recurrence interval of ≤ 2000 years and a low ($0.2 < \text{slip rate in mm/yr} < 1.0$) slip rate. Earthtech Consulting Ltd has investigated this fault in 2006 and resulted in four fault traces being identified. These fault traces (LnA to LnD) have been transcribed onto the preliminary subdivision layout plans and building platforms are located outside of the associated fault avoidance zones (FAZs).

Earthtech Consulting also commented on a fault trace of the Ngangautu Fault within 'Trig J', an area toward the eastern boundary of the site, and concluded that as no clear evidence of a fault trace was identified in this area no fault related building restrictions should be applied. A GNS Science consultancy report (Active fault hazards in the Taupo District, 2020/31, 144p.) has since been published providing more insight into the active faults in Taupo region. The GNS report classifies the Ngangautu Fault as having a conservative minimum recurrence interval of ≤ 2000 years. Table 5.2 of the GNS report states that buildings with an importance level of 2a or 2b (the importance level of the buildings proposed for this development) should be categorised as being a non-complying activity.

As a result, the Ngangautu Fault and its associated fault traces should have a minimum setback to be located outside of the fault avoidance zone. Taupo District Council fault line mapping 'Taupo District Active Faults' provides an up-to-date mapping of the investigated Fault Lines and Traces and may be utilised to better locate building platforms outside of fault avoidance zones. Lot layout plans dated 22/04/2026 indicate lots 4, 5, 7, 8, 15, 17, 19, 21, 22, and 25 encroach the Fault Avoidance Zones.

Notably, lots 7, 8, 17, 21, and 25 have greatly restricted building platform areas outside of the FAZ. Further assessment of the fault lines is recommended to provide greater certainty on the fault line location and therefore the appropriate fault avoidance zones.

5.6 Further Geohazards

A geohazard risk matrix is provided below covering the remaining geohazards considered for this area. Based on the risk matrix assessment, a S106 notice does not need to be applied to the proposed development for the remaining geohazards.

Likelihood (Annual)	Almost certain (>0.9)	Medium	High	High	Very High	Very High
	Likely (0.3-0.9)	Low	Medium	High	Very High	Very High

Possible (0.1-0.3)	Low	Medium	Medium	High	Very High
Unlikely (0.03-0.1)	Low	Low	Medium	High	Very High
Very Unlikely (.01-0.03)	Very Low	Low	Medium	Medium	High
Extremely Unlikely (.001-0.01)	Very Low	Very Low	Low	Medium	Medium
	1 Negligible	2 Minor	3 Moderate	4 Severe	5 Catastrophic
	Consequence				
Rating	Discussion				
Very High	A high probability of severe damage resulting in loss of use of structure and/or risk to life				
High	Likely to result in unacceptable damage or loss if not properly designed for				
Medium	Increased risk of significant damage or loss affecting inappropriate designs or sensitive structures				
Low	Limited risk of damage with any consequences				
Very Low	Unlikely to provide any observable damage beyond standard annual aging				

Table 3 - Geohazard Risk Matrix Key

Hazard	Consequence	Likelihood	Risk Classification	Comment	Mitigation
Tsunami/Dam Burst	Severe	Extremely Unlikely	Medium	Limited information, far from coastline and nearest Dam, Elevated site.	Adopt Council Policy for Civil Defense
Volcanic Eruption	Catastrophic	Incredibly Rare	Medium	Refer GNS Science Volcano Map and Alert Level Summary	Adopt Council Policy for Civil Defense
Volcanic Airfall	Minor	Possible	Medium	Limited Information	Adopt Council Policy for Civil Defense
Geothermal	Minor	Very Unlikely	Low	Limited Information	Not required
Aggressive Soils	Minor	Very Unlikely	Low	Limited Information	Not required

Table 4 - Geohazard Risk Matrix

All remaining risks identified can be addressed by following standard good practice or recommendations within this report.

6. DEVELOPMENT CONSIDERATIONS

6.1 Earthworks

Concept plans and subsoil investigations indicate earthworks will comprise of both cut and fill earthworks. Anticipated cut and fill heights are shown in Table 4 within Section 7.

Any proposed fill earthworks should be monitored by a suitably qualified and experienced geotechnical engineer. Fill testing should follow the guidance of NZS 4431:2022 “Earth Fill for Residential Development” to ensure continued compliance of the product and necessary degree of compaction and quality control is being achieved.

Fill Material should be either nominated or accepted by the inspecting engineer ahead of the site works. Testing of the nominated fill material should be undertaken or sourced to classify the material and prove it is fit for the design purpose.

This testing may consist of, but not be limited to:

- NZ Standard Compaction Testing
- Vibrating Hammer Compaction Testing (recommended)
- Shear Vane Testing
- Moisture Content Determination
- Plasticity Index Testing
- Particle Size Distribution
- California Bearing Ratio (CBR) Tests

During the earthworks, intermediate testing may be undertaken on the fill to ensure continued compliance of the product and necessary degree of compaction and quality control is being achieved.

An acceptance criterion based on a combination of the following techniques should be adopted:

- A target % of the Maximum Dry Density of the compacted material
- A range of suitable moisture contents of the material
- A Maximum Air Voids of the material
- A Maximum and minimum Shear Strength of the material

Observation and testing at the critical stages of the earthworks process will be required by a suitably qualified and experienced engineer. Typical observation hold points include,

- Visual inspection at the completion of cut earthworks/ at formation level to ensure all topsoil or unsuitable material has been removed.

- Representative testing at predetermined lift heights and frequencies during and until completion of the earthworks.

to ensure continued compliance of the product and necessary degree of compaction and quality control is being achieved. Concept plans and client communication indicate cuts of up to 4.0m and fills up to 7.0m are proposed to create level building platforms at the resource consent stage. Methodology for these earthworks specifically may require engineering review prior to commencement. The extent of proposed cut/fill should be assessed at earthwork design stage to address slope stability.

Other constraints on earthworks include;

- Vegetation cover
- Sediment control
- Proximity to proposed building foundations

6.2 Services

Council GIS utility maps identify an existing 80Ø uPVC public service water main (refer Figure 5 Below).

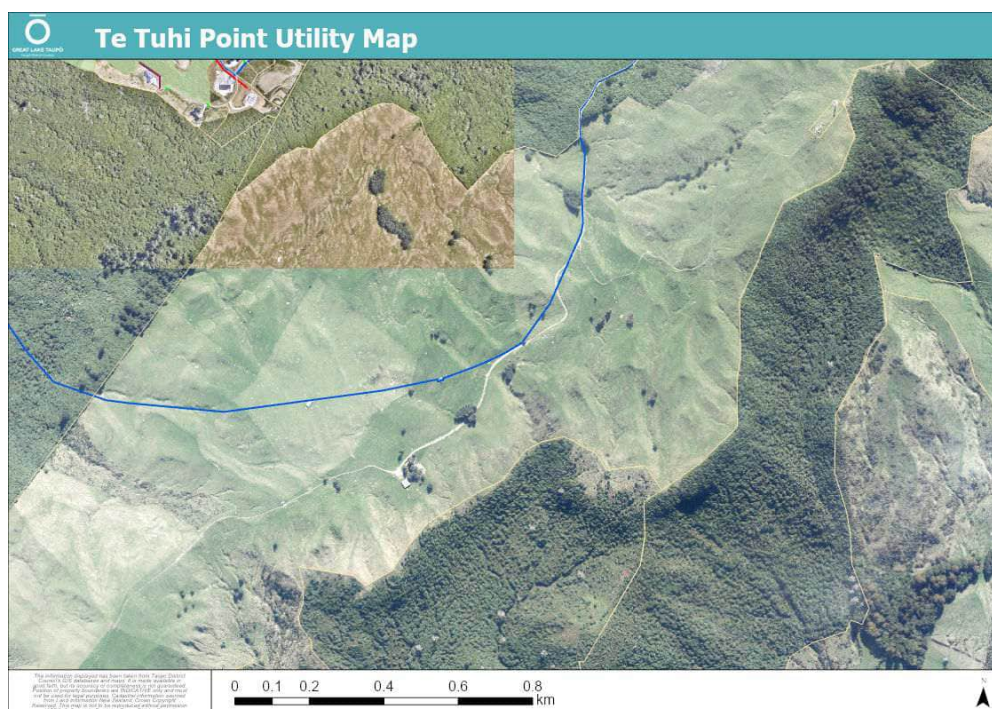


Figure 5 – Utilities from GIS Mapping

The depth of this water main is unknown at the time of this reporting, however evidence of the line is shown at ground level along the existing vehicle accessway. Development designs should consider this public service.

6.3 Retention Structures

Concept plans indicate engineer designed retention structures are not proposed for subdivision development stage but may be required at building consent stage.

Shallow site testing generally encountered loose to medium dense SILTs, SANDs, and GRAVELs. Without site-specific testing, the following parameters may be adopted for structural design based on,

	Long Term	Short Term
Ka	$((1-\sin\phi)/(1+\sin\phi)) = 0.25$	
Ko	$Ko = (1-\sin\phi) = 0.40$	
Kp	$Kp = ((1+\sin\phi)/(1-\sin\phi)) = 4$	
ϕ'	36°	
Density	15kN/m ³	
Su' (Peak)	1kPa	
Su (Peak)		60kPa

Surcharges, soil coefficients, minimum embedments, pile sizes and centers will be subject to engineer's design.

Foundations for the proposed dwellings above the walls should not bear upon poorly compacted drainage backfill immediately adjacent to the wall, therefore the following Building Restriction Zone (BRZ) and Excavation Restriction Zones (ERZ) recommendations for building and earthworks within the vicinity of these walls are provided as follows,

BRZ:

- No **Two Storey** buildings should be constructed within a minimum distance to the top of the wall equal to 1.0 x the walls retained or 500mm from the wall drainage system (whichever is the greater) without engineering review of surcharge loading and specific foundation design.
- No **Single Storey** building should be constructed within a minimum distance to the top of the wall such that it would encroach on the wall drainage system i.e. ≤500mm. Design Boundary Surcharge Loads have allowed for surcharge loading from single storey articulated masonry veneer buildings - as proposed.

Similarly,

ERZ:

No temporary service trench, foundation or excavation ≥300mm should be carried out within a minimum distance to the toe of the wall = 1.5m and/or = to the walls retained height (whichever is the greater) without engineering review.

6.4 Stormwater Management

On-site permeability testing was not carried out at the time of our on-site investigations. The predominately pumiceous soils with no identified groundwater table present good conditions for shallow soak pits/trenches.

Therefore, stormwater attenuation design in accordance with the current Regional Infrastructure Technical Specification (RITS) - Section 4 Stormwater and Local Authority on an on-site inground soakage basis is recommended.

Efforts should be undertaken to reduce the amount of uncontrolled flow reaching soakage devices by utilising retention/detention tanks. Similarly, soakage devices should not be located across/within 10m of a moderate or steeper slope.

Stormwater design is not covered in this report. Any such design should consider the stability of any cuts or retention structures below any soakage device. We strongly recommend against high discharge rates into underlying strata as this can cause tunneling and induce instability in down-slope areas.

6.6 Wastewater Management

The subject site is 3,445,643.46m² and lies within the Lake Taupo Catchment area.

The proposed sections generally range from 5000m² to 4Ha in size. Therefore, land disposal post primary treatment via a traditional septic tank is not a permitted activity under Waikato Regional Council (WRC) rules.

Land disposal post-secondary treatment is a permitted activity under WRC rules 3.5.7.6 and 3.10.6.3 (Discharge of Domestic Sewage from Improved On-site Systems).

- Pre-treatment of effluent to achieve $\leq 20\text{g/m}^3$ of Biological Oxygen Demand and $\leq 30\text{g/m}^3$ of suspended solids.
- Total Nitrogen Concentration must not exceed 25g/m^3 or 25mg/L.
- Increased volume of treated effluent discharged per day is $\leq 3\text{m}^3$.
- Septic tank greater than 3,000L.
- More than 600mm separation distance from base of conventional disposal systems to ground water and reduced 300mm separation distance for drip irrigation systems.
- Compliance with further setback distances.

Refer to WRC On-Site Wastewater Discharge Rules for full breakdown.

Specific Design and supporting PS1 shall be provided at Building Consent application stage which determines the discharge volume, effluent treatment, setback distances, locations and sizing of the On-Site Domestic Sewage Treatment System and Disposal Area.

Alternatively, a community wastewater treatment system may provide a more regulated and measurable treatment and disposal options for the proposed sections.

6.7 Private Way Construction

Scala penetrometer testing has not been undertaken along the proposed Private Way, though the testing carried out to date provides a fair understanding of general site conditions, which are assumed to carry through the proposed roadway.

Results indicate a CBR range of under 10 is likely, which does not achieve the target CBR. Therefore, the following solutions are recommended,

- Engineer designed rigid pavement design (based on a lower bound subgrade CBR value ≥ 3)
- Engineer designed flexible pavement design (based on a lower bound subgrade CBR value ≥ 3)
- Undercut 600mm and replace with engineer certified granular fill i.e. GAP65, Pit Sand or alternative approved product. Proceed with R.I.T.S. Default design.

Private Way construction is not certified as part of this report. CORE50 has been engaged to undertake construction monitoring of the Private Way to ensure appropriate CBR is achieved or ground improvement is undertaken.

Pavement construction should be monitored during critical stages (i.e. post completion of each individual pavement layer) by a suitably qualified and experienced engineer to ensure compliance. Hold points to enable Council observation and approval may also be required.

Chainage 1700 – 2300m shows the proposed access way near the top of a potentially unstable slope, as evidenced during our walkover showing a 2m deep slip below the accessway. Filling in this area should be minimised as much as practical and fill over 0.5m should be subject to engineering review. Proper stormwater management flow of the accessway will be critical to the longevity of the road. Detailed assessment and design of the slope stability around the accessway will be required for developing addition building sites on this property.

7. PRELIMINARY FOUNDATION RECOMMENDATIONS

- 7.1 Based on our quantitative Liquefaction Assessment and site testing completed the site can be assumed to be a **TC1 Like Site** and underlain by predominantly loose to medium dense granular soils which do not meet the requirement of good ground.
- 7.2 **Design or site work solutions will be required to mitigate the low-density unsuitable soils and slope stability considerations.**
- 7.3 **Specific foundation design is likely to be required** if site works do not rectify the geotechnical issues including slopes near building platforms. Specific foundation design may include undercutting, granular raft improvement layers, piled foundations, enhanced waffle foundations, in ground slope stabilisation or a combination of the above.
- 7.4 Concept plans and subsoil investigations indicate Cut/Fill earthworks will primarily comprise of cut to fill earthworks at subdivision resource consent stage. Observation and testing at the critical stages of the earthworks process will be required by a suitably qualified and experienced engineer. Typical observation hold points include,
- Visual inspection at the completion of cut earthworks/ at formation level to ensure all topsoil or unsuitable material has been removed. Actual soil conditions may vary on site and additional localised undercut of soft areas may be required.
 - Representative testing at predetermined lift heights and frequencies during and until completion of the earthworks.
- to ensure continued compliance of the product and necessary degree of compaction (geotechnical ultimate bearing capacity of 300kPa) and quality control is being achieved. Cuts up to 4.0m deep and fill up to 7.0m are proposed to create level building platforms. **Methodology for these earthworks will require engineering review prior to commencement.** The extent of proposed earthworks should be assessed at earthworks design stage to address slope stability.
- 7.5 Building platforms should not be raised or lowered from the proposed level once earthworks design has been completed without further engineering advice.
- 7.6 The product lot buildings may require specific foundation design if building platforms encroach the influence zone of the 80mm diameter water main.
- 7.7 Lots 4, 5, 7, 8, 15, 17, 19, 21, 22, and 25 are encroached by the Ngangautu Fault and it's Fault Avoidance Zone and the building platform must be located outside of this zone. Further evaluation is recommended to better classify the avoidance zones.
- 7.8 Storm water disposal via Retention for Reuse or Detention and gradual release to in-ground soakage systems is recommended. Soakage devices should not be located across or within 10m of a crest of a moderate or steeper slope.

8. LIMITATIONS

This report was carried out for the client based on the brief, proposed development at the time and on the terms and conditions agreed with our client. Recommendations given in this report are specific to that brief and are not to be used or relied in (in whole or part) by anyone else, or for any other purpose or in any other context, without our prior written agreement.

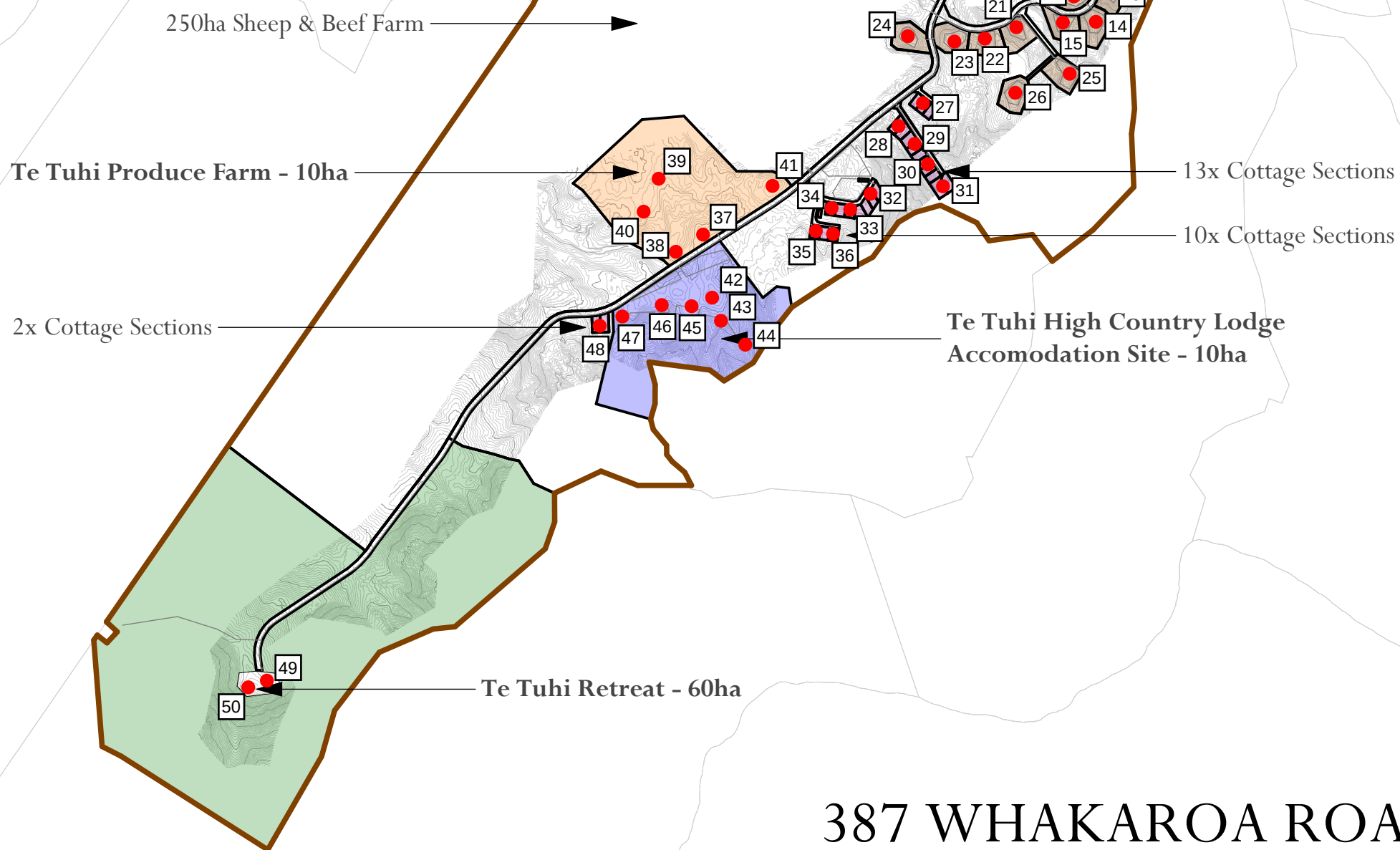
Site investigations represent a small proportion of the ground conditions on the site and may not be completely representative of the soils present. Due to seasonal variations, the water table depth and therefore moisture content may differ from that noted and may affect construction techniques. Any prices sought for the construction will have to cater for the ground conditions at the time of construction or the proposed foundations modified to suit.

APPENDIX A – TEST PLAN, SOILS LOGS AND SUMMARY TABLE



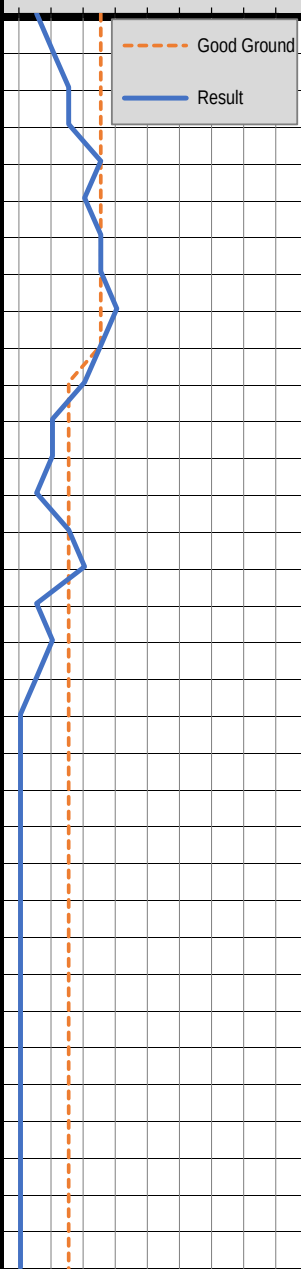
APPENDIX A

- 250 Ha working Sheep and Beef farm with panoramic views across Lake Taupo, New Zealand
- Self-sufficient gated farm community with its own deep spring water bore, solar and wind power generation with national grid back up.
 - Onsite Permaculture produce farm providing residents with fresh organic fruit and vegetables, eggs, honey, herbs and cut flowers.
 - Residents own a share in the managed farm and have access to home grown lamb and beef cuts to live a self-sufficient healthy lifestyle.
 - 25 high-end Residences built with the finest quality finishings and breathtaking views over Lake Taupo and the surrounding vistas.
 - 25 2-3-bedroom Cottages aimed at senior residents who want to downsize in a country environment with grassy 'common' spaces and park-like planted surroundings.
 - Farm Shop community centre with coffee shop, organic produce, cooking and preserving classes, cut flower arranging and opportunity for residents to help with farm and produce tasks.
 - Community Horse stables and recreation barn with pickle ball court and Hobby room
 - Te Tuhi High Country Lodge offers a wedding and conference Venue for up to 200-day guests
 - 29 Luxury accommodation units offering one-bedroom suites and units, two-bedroom family units and a honeymoon suite.
- Accommodation for up to 64 guests
- 40 Seat Degustation restaurant serving organic master chef style menu with meat and produce from the farm.
 - Private, 7-bedroom retreat at the end of the peninsula with a private deer farm



Sheet 01 - Site Overview Plan
Sheet 02 - Development Overview Plan
Sheet 03 - High Country Lodge Site Plan
Sheet 04 - Farm Site Plan
Sheet 05 - Cottage Site Plan
Sheet 06 - Residence Site Plan
Sheet 07 - Retreat Floor Plans
Sheet 08 - Retreat Elevations
Sheet 09 - Wedding Venue Floor Plans
Sheet 10 - Wedding Venue Elevations
Sheet 11 - Restaurant Floor Plans
Sheet 12 - Restaurant Elevations
Sheet 13 - Single Guest Chalet Floor Plans
Sheet 14 - Single Guest Chalet Elevations
Sheet 15 - Quad & Family Guest Chalet Floor Plans
Sheet 16 - Quad Guest Chalet Elevations
Sheet 17 - Family Guest Chalet Elevations
Sheet 18 - Honeymoon Chalet Floor Plan & Elevations
Sheet 19 - Farm Building Floor Plans
Sheet 20 - Farm Building 01 Elevations
Sheet 21 - Farm Building 02 Elevations
Sheet 22 - Greenhouse Floor Plan & Elevations
Sheet 23 - Horse Stables Floor Plan & Elevations

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	1	HA01

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table	
			0 2 4 6 8 10 12 14 16				
100		1			TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.		
200	2						
300	3						Fine to coarse pumice SAND, minor silt, trace fine pumice gravel; brown; medium dense; low moisture; well graded.
400	3						
500	5						500mm: Becoming trace silt; pale light brown.
600	4						
700	5						700mm: Becoming pale light grey brown.
800	5						
900	6						900mm: Becoming some fine to medium pumice gravel.
1000	5						
1100	4						
1200	2						1200mm: Becoming grey brown; loose.
1300	2						
1400	1						1400mm: Becoming dark grey brown.
1500	3						
1600	4						
1700	1						1700mm: Becoming silty; moist.
1800	2						
1900	1						1900mm: Becoming pale light brown.
2000							
2100					EOB at 2.0m, Target Borehole Depth.		
2200							
2300							
2400							
2500							
2600							
2700							
2800							
2900							
3000							
3100							
3200							
3300							
3400							
3500							

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	1	HA02

Graph Legend:				Test/Surface Description	
Water Table Depth Anticipated Cut Depth (if known)				Test completed at location shown on test plan marked 'HA02'.	
Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	
100		1		TOPSOIL	
200		2		SAND, fine to medium, some silt, light brown, loose	
300		3		Silty SAND, fine to medium, brown, some fine gravel, loose to medium dense	
400		2			
500		4		SAND, medium to coarse, some silt, light brown, minor fine gravel, loose	
600		3			
700		1		Silty SAND, fine to medium, light brown, trace fine gravel, loose to medium dense	
800		1			
900		1			
1000		1			
1100		1		SAND, coarse, light brown, minor fine gravel, damp, medium dense	
1200		1			
1300		2		END OF BOREHOLE	
1400		2			
1500		4			
1600		3			
1700		4			
1800		4			
1900		4			
2000		4			

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	12/06/2023	25	MA03

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100				TOPSOIL, silt loam, some sand													
200																	
300																	
400		Silty pumice SAND, some coarse pumice to 5mm															
500		minor rhyolite sand/fine gravels, brown, moist															
600																	
700																	
800		Pumice GRAVELS, 3-20mm, some pumice sand															
900		minor silt, minor rhyolite sand/fine gravels															
1000		dark grey-brown, moist															
1100																	
1200																	
1300		becoming some rhyolite sand/fine gravels, grey-brown, very moist															
1400																	
1500																	
1600																	
1700																	
1800																	
1900																	
2000																	
2100		SILT, some pumiceous sand, minor pumice gravels															
2200		some sand, brown, wet															
2300		orange-brown, very moist															
2400																	
2500																	
2600		Pumice GRAVELS, minor pumice sand, minor silt															
2700		brown, very moist															
2800																	
2900																	
3000																	
3100																	
		3200mm;															
3500		SILT, some pumice gravels 3-15mm, dark orange-brown															
		very moist, becoming moist 3600m															
4000		EOB @ 4.0m, Target Depth															

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- 1 Weather leading up to test was fine and cool for the week leading up to testing. Fine during testing.
- 2 Ground water was not encountered during testing
- 3 Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- 4 Shear Vane records include Re-moulded values where possible
- 5 Shear Vane Serial No.: 2086 Exp. Date: 21/06/2023 Cert: 718861

Rev3.3

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	2	HA04

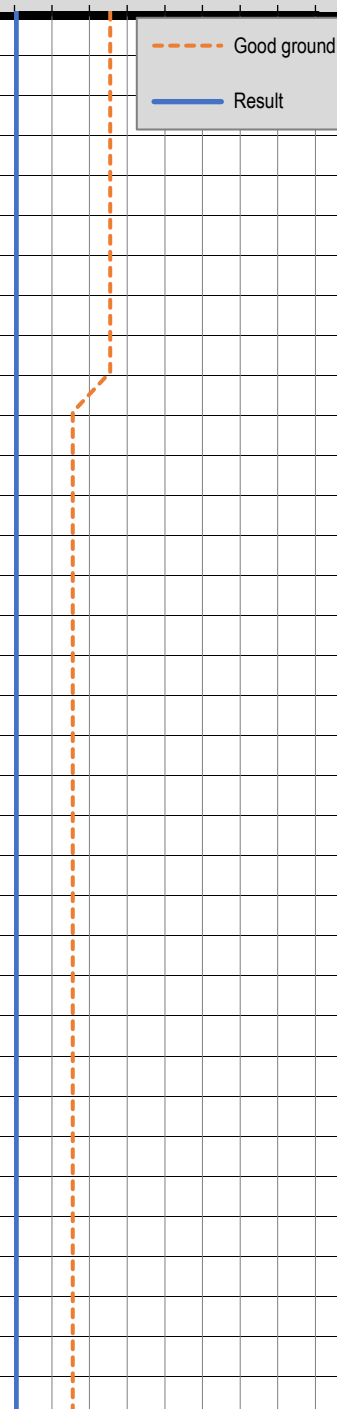
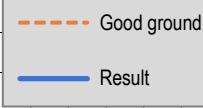
Graph Legend:				Test/SurfaceDescription	
Water Table Depth Anticipated Cut Depth (if known)				Test completed at location shown on test plan marked 'HA04'	
Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	
			0 2 4 6 8 10 12 14 16 Good Ground Results	TOPSOIL	
100		1		SILT, some sand, light reddish brown, loose	
200		1		Sandy SILT, light reddish brown, minor fine gravel, loose	
300		1		SAND, coarse, minor silt, minor fine gravel, light reddish brown, damp, medium dense	
400		1		SAND, coarse, minor silt, some fine gravel, light brown, damp, medium dense	
500		1		SILT, some sand, minor fine gravel, light reddish brown, damp, very loose to loose	
600		3			
700		4			
800		6		SILT, minor sand, light reddish brown, loose	
900		4		SILT, trace sand, light reddish brown, loose	
1000		3		END OF BOREHOLE	
1100		2			
1200		1			
1300		1			
1400	0.5	0.5			
1500	0.5	0.5			
1600	1	1			
1700	1	1			
1800	1	1			
1900	1	1			
2000					

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	12/06/2023	26	MA05

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100														TOPSOIL, silt loam, some sand			
200		SILT, some sand, minor coarse pumice 3-15mm															
300		dark-brown, dry															
400		Pumice SAND, silt, minor fine pumice gravels 3-8mm trace rhyolite sand/fine gravels, light yellow-brown, moist 700-800mm; interbedded pumice Gravels minor sand															
500																	
600																	
700																	
800																	
900																	
1000																	
1100												1100-1200mm; Silt, dark grey-brown, very moist					
1200																	
1300																	
1400																	
1500																	
1600																	
1700																	
1800		SAND, minor fine pumiceous materials, minor silt dark orange-brown, very moist															
1900																	
2000		Pumice SAND, yellow grey-brown, moist 2100-2200mm; interbedded Silt, dark brown, very moist Pumice Sand, silt, dark grey-brown, moist															
2100																	
2200																	
2300																	
2400		Pumice GRAVELS, some sand, minor silt, orange-brown, moist															
2500																	
2600		SILT, some pumiceous sand, some rhyolite sand some fine pumice gravels, dark orange-brown, moist															
2700																	
2800																	
2900																	
3000		3400mm; Pumice GRAVELS, some pumice sand, some silt minor rhyolite sand/fine gravels, light-brown, very moist															
3100																	
3500		EOB @ 4.0m, Target Depth															
4000																	

Notes:

EOB = End Of Borehole

UTP = Unable To Penetrate

UTE = Unable To Extract

- 1 Weather leading up to test was fine and cool for the week leading up to testing. Fine during testing.
- 2 Ground water was not encountered during testing
- 3 Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- 4 Shear Vane records include Re-moulded values where possible
- 5 Shear Vane Serial No.: 2086 Exp. Date: 21/06/2023 Cert: 718861

Rev3.3



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	14/06/2023	27	HA06

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		1			TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.	
200		1				
300		2			Fine pumiceous sandy SILT, trace fine pumice gravel; brown; medium dense; low moisture; low plasticity.	
400		4				
500		3			500mm: Becoming fine to medium silty SAND, trace fine pumice gravel; pale light brown.	
600		3				
700		3			700mm: Becoming fine to coarse pumice sand, minor fine to medium pumice gravel; pale light grey.	
800		3				
900		3				
1000		3				
1100		3				
1200		4				
1300		2			1300mm: Becoming silty; loose; moist.	
1400		1			1400mm: Becoming grey brown.	
1500		0.5			1500mm: Becoming very loose.	
1600		0.5				
1700		0.5				
1800		0.5				
1900		1				
2000						
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

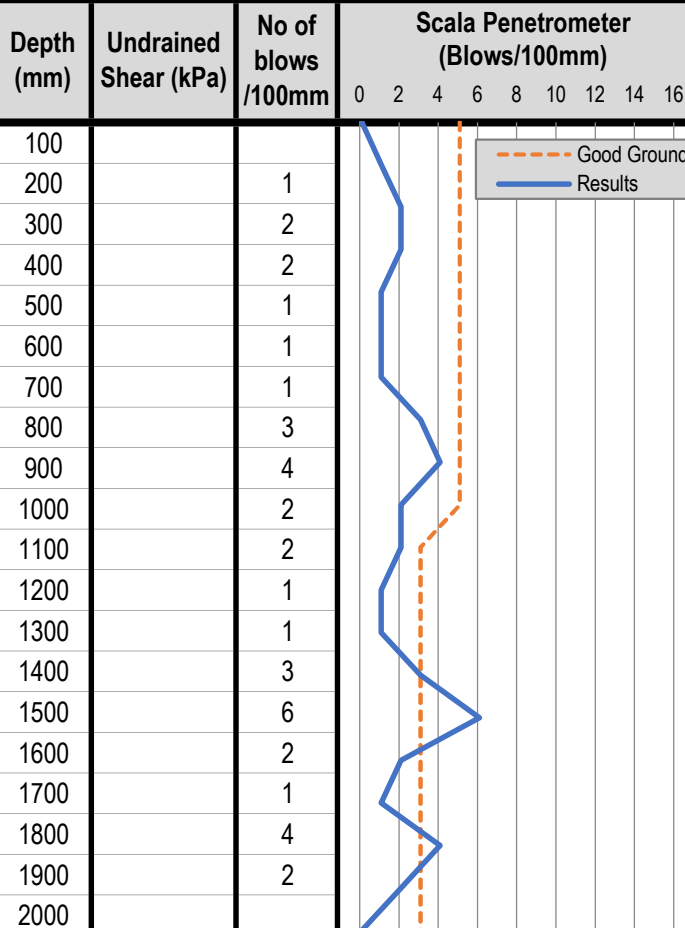
Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7

Graph Legend:

Water Table Depth

Anticipated Cut Depth (if known)



Test/SurfaceDescription

Test completed at location shown on test plan marked 'HA07'

Soil Description

TOPSOIL

Silty SAND, fine to medium, light reddish brown, loose

SAND, fine to medium, some silt, light brown, loose

SAND, fine to medium, some silt, creamy light brown, loose

SAND, fine to medium, minor fine gravel, minor silt, creamy light brown, loose to medium dense

SAND, medium to coarse, some fine gravel, minor silt, light brown, loose to medium dense

Silty SAND, fine to medium, minor fine to coarse gravel, greyish brown, loose to medium dense

END OF BOREHOLE

Key:

EOB = End Of Borehole

UTP = Unable To Penetrate

UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	4	HA08

Graph Legend:				Test/Surface Description	
Water Table Depth ↓ Anticipated Cut Depth (if known)				Test completed at location shown on test plan marked 'HA08'	
Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	
			0 2 4 6 8 10 12 14 16 Good Ground Results	TOPSOIL	
100				Silty SAND, coarse, minor fine gravel, brown, very loose to loose	
200					
300					
400					
500					
600					
700					
800		1		Silty SAND, fine, trace fine gravel, light brown, medium dense	
900		2			
1000		2			
1100		3			
1200		3			
1300		3		SAND, fine, minor silt, trace fine gravel, light brown, medium dense to very dense	
1400		4			
1500		4			
1600		4			
1700		5			
1800		9			
1900		18			
2000					
Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract				END OF BOREHOLE	

Borehole Profile



Graph Legend:

Water Table Depth

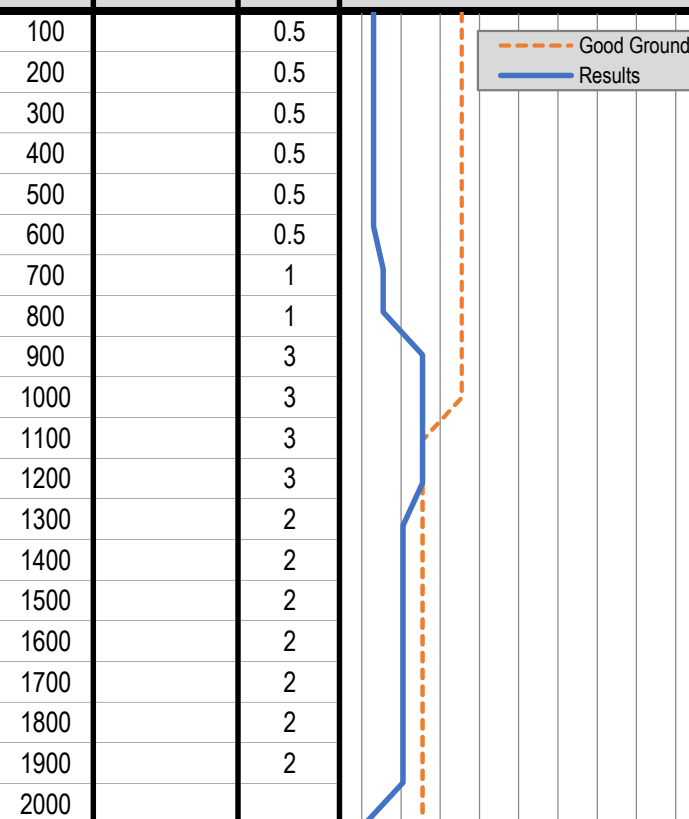


Anticipated Cut Depth (if known)

Test/Surface Description

Test completed at location shown on test plan marked 'HA09'

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)
			0 2 4 6 8 10 12 14 16



Soil Description

TOPSOIL

SAND, fine to medium, some silt, minor fine gravel, brown, very loose

SAND, fine to medium, some fine gravel, trace silt, light brown, loose to medium dense

SAND, coarse, some fine to medium gravel, light grey, loose

UNABLE TO EXTRACT - no retrieval. END OF BOREHOLE

Key:

EOB = End Of Borehole

UTP = Unable To Penetrate

UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	21	HA10

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		1													Fine to coarse pumice SAND, minor silt, minor fine pumice gravel; brown; loose; low moisture; well graded.		
400		2															
500		2													500mm: Becoming light grey brown.		
600		2													700mm: Becoming medium dense.		
700		3															
800		3													900mm: Becoming light grey.		
900		4															
1000		4													1100mm: Becoming loose.		
1100		1															
1200		1													1500mm: Becoming silty; very loose; moist.		
1300		2															
1400		1													1700mm: Becoming grey brown; loose.		
1500		0.5															
1600		0.5													EOB at 2.0m, Target Borehole Depth.		
1700		1															
1800		1															
1900		1															
2000																	
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	20	HA11

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		2													Fine to coarse silty pumice SAND, some fine to medium pumice gravel, trace silt; pale light brown; loose; low moisture; well graded.		
400		2															
500		2															
600		2															
700		2													800mm: Becoming some silt; pale light grey.		
800		2															
900		1													1000mm: Becoming fine to coarse SAND, some fine to medium pumice gravel, trace silt; grey brown.		
1000		1															
1100		2															
1200		3															
1300		3													1500mm: Becoming silty; moist; brown. 1600mm: Becoming light brown.		
1400		2															
1500		1															
1600		3															
1700		2															
1800		2															
1900		3															
2000																	
2100															EOB at 2.0m, Target Borehole Depth.		
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	6	HA12

Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)

Test/Surface Description

Test completed at location shown on test plan marked 'HA12'

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)
100			
200			
300			
400			
500			
600		2	
700		1	
800		3	
900		2	
1000		2	
1100		2	
1200		1	
1300		1	
1400		1	
1500		2	
1600		2	
1700		2	
1800		2	
1900		2	
2000			

Good Ground
Results

Soil Description

TOPSOIL

Silty SAND, brown, very loose

SAND, fine to medium, some silt, light brown, loose

SAND, fine to coarse, some fine gravel, trace silt, light brown, loose to medium dense

SAND, coarse, light brown/light grey, loose

UNABLE TO EXTRACT - no retrieval. END OF BOREHOLE

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile

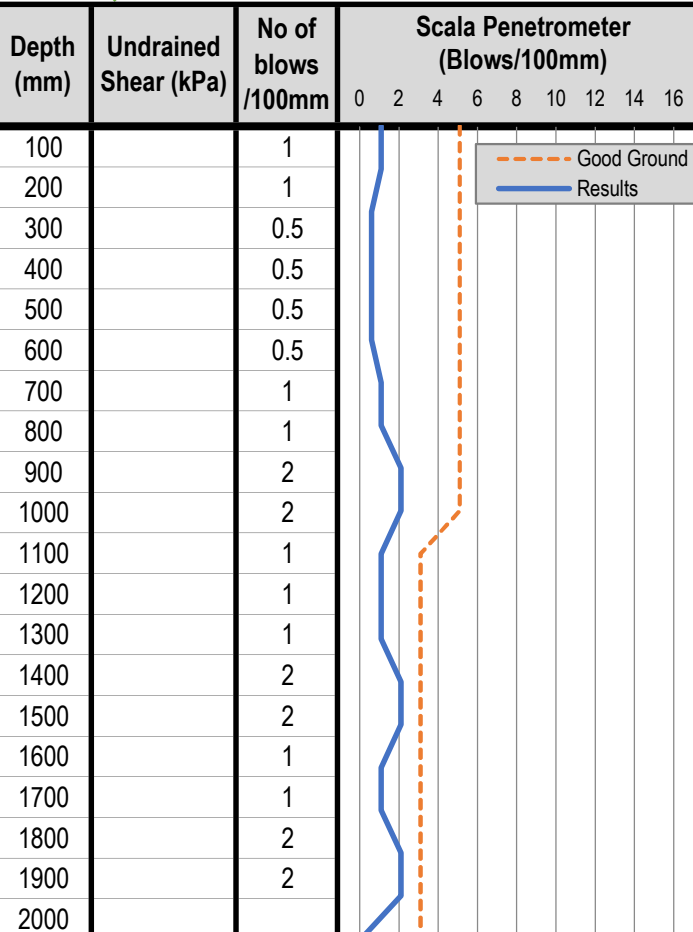


Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)



Test/Surface Description

Test completed at location shown on test plan marked 'HA13'

Soil Description

TOPSOIL

SAND, some silt, minor fine gravel, brown, very loose to loose

SAND, some silt, minor fine gravel, light brown, loose

SAND, medium to coarse, some fine gravel, light brown, loose

SAND, medium to coarse, some fine gravel, creamy light brown, loose

END OF BOREHOLE

Key:

EOB = End Of Borehole

UTP = Unable To Penetrate

UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	8	HA14

Graph Legend:				Test/Surface Description	
Water Table Depth Anticipated Cut Depth (if known)				Test completed at location shown on test plan marked 'HA14'	
Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	
100		1	Good Ground Results	TOPSOIL	
200		1		SAND, fine, trace silt, brown, loose	
300		2			
400		2			
500		1			
600		2		SAND, medium to coarse, minor fine to medium gravel, light brown, loose	
700		1			
800		2			
900		2			
1000		3			
1100		4			
1200		5			
1300		9			
1400		6		SAND, medium to coarse, some fine to medium gravel, creamy light brown, loose to medium dense	
1500		1			
1600		2			
1700		2			
1800		2			
1900		2			
2000				END OF BOREHOLE	

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract
Borehole Profile



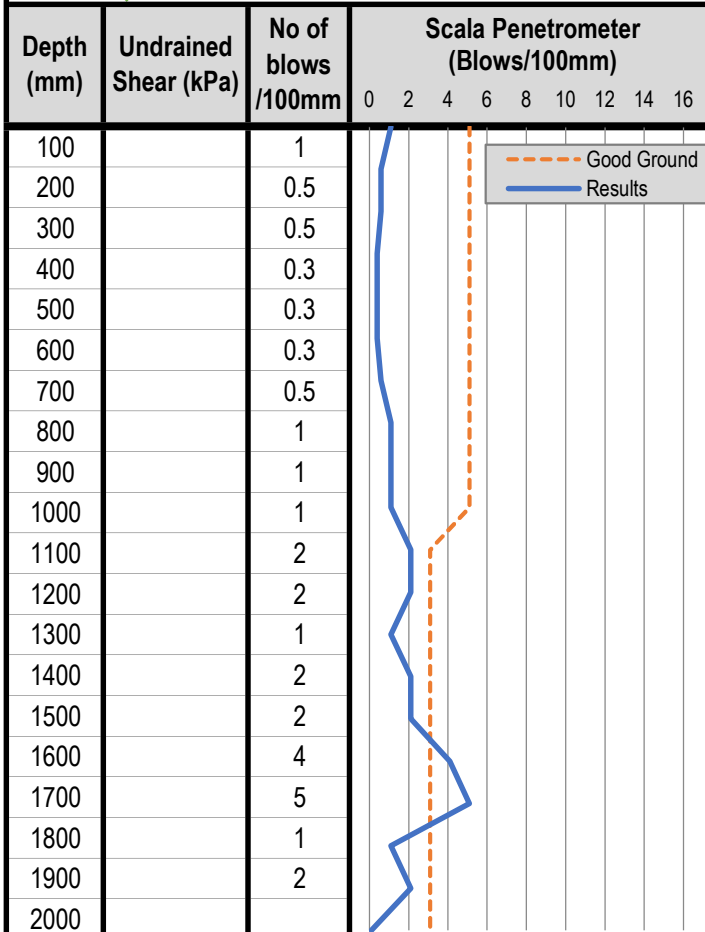
Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	9	HA15

Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)



Test/SurfaceDescription

Test completed at location shown on test plan marked 'HA15'

Soil Description

TOPSOIL

Silty SAND, brown, very loose

SAND, medium to coarse, some fine gravel, minor silt, light brown, very loose to loose

Silty SAND, minor fine gravel, light brown, loose

SAND, medium to coarse, some fine gravel, trace silt, light brown, loose to medium dense

END OF BOREHOLE

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	19	HA16

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0 2 4 6 8 10 12 14 16	Good Ground Result		
100		1			TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.	
200		1				
300		2			Fine to medium pumice SAND, some silt, minor finepumice gravel; pale brown; very loose to loose; low moisture; well graded.	
400		1				
500		0.3			500mm: Becoming fine to coarse pumice, some fine pumice; very loose; pale light grey.	
600		0.3				
700		0.3			1300mm: Becoming light grey.	
800		2				
900		3			1600mm: Silty.	
1000		3				
1100		2			1700mm: Becoming medium dense.	
1200		3				
1300		4			1900mm: Becoming dense.	
1400		3				
1500		2			EOB at 2.0m, Target Borehole Depth.	
1600		1				
1700		4				
1800		5				
1900		8				
2000						
2100						
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Project Name		Job Ref.	
Whakaroa Road, 4m testing		260139-SR01	
Tested by	Date	Sheet No.	Test Site
GetGeo	20/07/2023	3	4m16

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
100		1		TOPSOIL, silt loam	
200		1			
300		1			
400		1			
500		2		SILT, some fine pumiceous materials, brown, dry to moist becoming pumiceous Silt, minor sand, yellow-brown, moist	
600		2			
700		3			
800		3		Silty pumice SAND, fine pumice to 3mm, minor sand trace fine gravels, grey-brown, moist	
900		1			
1000		2			
1100		3		SAND, some pumiceous sand / gravels to 5mm	
1200		3		minor silt, grey, moist	
1300		3		becoming some silt, grey-brown	
1400		3			
1500		3		Sandy SILT some fine pumice, grey-brown, moist	
1600		3		becoming some pumiceous gravels	
1700		3			
1800		4		interbedded silty pumice gravels, some sand, minor gravels	
1900		2		brown, moist	
2000		1			
2100		0.3			
2200		0.3			
2300		0.3			
2400		3		Pumice GRAVELS, silt, sand, minor organics	
2500		1		mixed brown, very moist (possible paleosol)	
2600		1			
2700		1		SILT, minor sand, brown, very moist	
2800		1		(Taupo Brown Ash)	
2900		1			
3000		3		Pumice GRAVELS, some pumice sand, some silt	
3100		4		minor sand, yellow-brown, wet	
3200		2			
3300		3			
3400		3			
3500		2			
3600		1		SILT, dark brown, very moist	
3700		2		(Taupo Brown Ash)	
3800		1		becoming some sand, minor fine pumiceous materials	
3900		2		brown, moist	
4000		2		EOB @ 4.0m, Target Depth	

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- Weather leading up to testing was cool and windy with rain 4 days prior. Cold clear weather during testing.
- Ground water was not encountered during testing
-
- Adjacent slope approaching 30 degrees. Site near a prominent gully system running down from communications area
-



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	18	HA17

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1	Result Good Ground													TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.	
200		2															
300		2														Fine to medium silty pumice SAND, minor fine pumice gravels; brown; loose; low moisture.	
400		2														500mm: Becoming fine to coarse SAND, minor fine pumice gravel; trace silt; pale light brown.	
500		3															
600		2															
700		2															
800		2															
900		2														900mm: Becoming minor fine to medium pumice gravel; pale light grey brown.	
1000		2															
1100		1															
1200		1															
1300		1															
1400		2															
1500		1															
1600		2															
1700		2															
1800		2															
1900		2														EOB at 2.0m, Target Borehole Depth.	
2000																	
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	17	HA18

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		1													Fine to medium pumice SAND, minor silt, trace fine pumice gravels; brown; loose; low moisture.		
400		2															
500		2													500mm: Becoming pale light grey brown.		
600		2															
700		2													800mm: Becoming some fine to medium pumice gravel; grey brown.		
800		2															
900		3															
1000		3															
1100		2															
1200		2															
1300		2															
1400		3															
1500		2															
1600		1															
1700		1													1600mm: Becoming fine to coarse silty pumice SAND, trace fine pumice gravel; brown; moist; low plasticity; high dilatancy.		
1800		1															
1900		1															
2000																	
2100															EOB at 2.0m, Target Borehole Depth.		
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	10	HA19

Graph Legend:				Test/Surface Description	
Water Table Depth Anticipated Cut Depth (if known)				Test completed at location shown on test plan marked 'HA19'	
Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	
100				TOPSOIL	
200		1		SAND, fine to medium, some silt, light brown, loose	
300		1			
400		1			
500		1			
600		0.5		SAND, medium to coarse, some fine to medium gravel, trace silt, light brown, very loose to loose	
700		0.5			
800		1			
900		2			
1000		2			
1100		1			
1200		1		SAND, medium to coarse, some fine to medium gravel, trace silt, creamy light brown, very loose to loose	
1300		1			
1400		2			
1500		1			
1600		3		UNABLE TO EXTRACT - no retrieval. END OF BOREHOLE	
1700		2			
1800		2			
1900		4			
2000					

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile



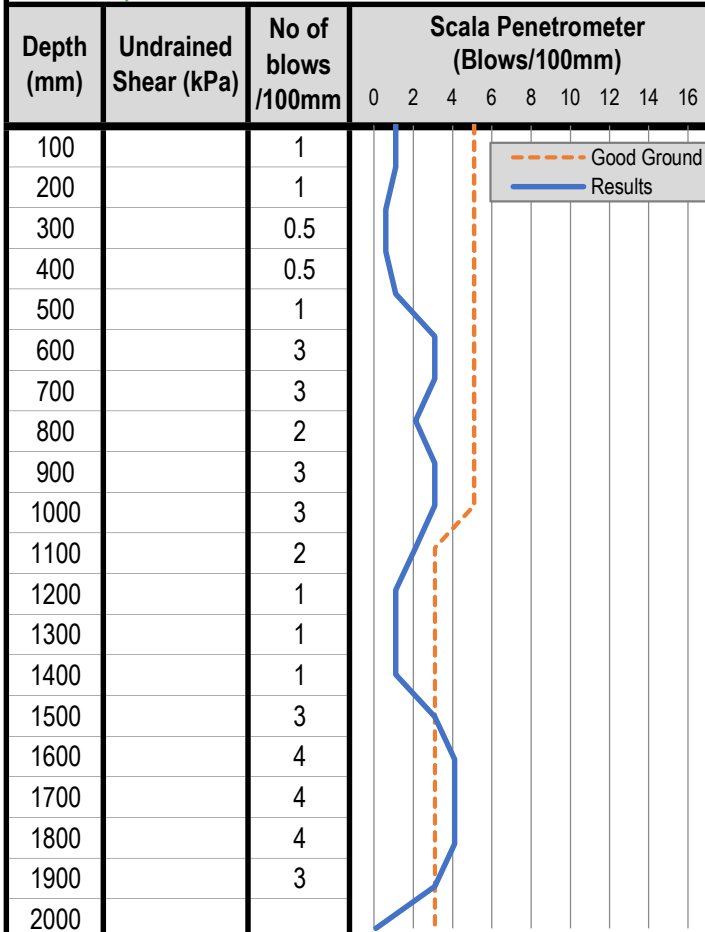
Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	11	HA20

Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)



Test/SurfaceDescription

Test completed at location shown on test plan marked 'HA20'

Soil Description

TOPSOIL

SILT, some sand, trace fine gravel, light brown, very loose

Silty SAND, fine to medium, trace fine gravel, light brown, loose to medium dense

SAND, medium to coarse, some fine to medium gravel, minor silt, light brown, loose to medium dense

Silty SAND, fine to medium, light brown, trace fine gravel, m. dense

Sandy SILT, trace fine gravel, orangey brown, m. dense

SAND/SILT, trace fine gravel, light brown, m. dense

SAND, coarse, some silt, minor fine gravel, light brown, damp, m. dense.
END OF BOREHOLE

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile





Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	9	HA21

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		0.5													TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.		
200		0.5															
300		1													Fine to coarse pumice SAND, minor silt, trace fine pumice gravel; brown; loose; low moisture; well graded.		
400		1															
500		1													Fine to medium silty pumice SAND, minor fine pumice gravels; pale light brown; loose; low moisture.		
600		2															
700		2													Fine to coarse pumice SAND, minor fine pumice gravel; grey brown; loose; moist; well graded.		
800		3															
900		2													Fine to coarse pumice SAND, minor fine pumice gravel; grey brown; loose; moist; well graded.		
1000		2															
1100		2													Fine to coarse pumiceous sandy SILT; brown; very loose to loose; very moist; low plasticity; high dilatancy.		
1200		3															
1300		2													Fine to coarse pumiceous sandy SILT; brown; very loose to loose; very moist; low plasticity; high dilatancy.		
1400		0.5															
1500		0.5													Fine to coarse pumiceous sandy SILT; brown; very loose to loose; very moist; low plasticity; high dilatancy.		
1600		1															
1700		1													Fine to coarse pumiceous sandy SILT; brown; very loose to loose; very moist; low plasticity; high dilatancy.		
1800		1															
1900		2													Fine to coarse silty pumice SAND, trace fine pumice gravel; brown; moist.; well graded.		
2000																	
2100															EOB at 2.0m, Target Borehole Depth.		
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	8	HA22

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.		
200		2															
300		2													Fine to medium silty pumice SAND, trace fine pumice gravel, brown; loose to medium dense; low moisture; well graded.		
400		3															
500		5													500m: Becoming pale light brown.		
600		4															
700		5													700mm: Becoming fine to coarse pumice SAND, minor fine to medium pumice gravel; dark grey brown mix.		
800		4															
900		2													900mm: Becoming silty; brown mix; loose; moist.		
1000		2															
1100		0.5															
1200		0.5															
1300		1															
1400		2															
1500		3															
1600		2															
1700		2													1700mm: Becoming SILT; some fine to medium pumice SAND; pale brown; moist.		
1800		1															
1900		2													1900mm: Chipped sub-rounded rhyolite gravel, fine to medium.		
2000																	
2100															EOB at 2.0m, Target Borehole Depth.		
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	12/06/2023	7	HA23

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1														TOPSOIL, silt loam, minor sand, dry	
200		2														SILT, some pumice sand/fine pumice gravels, brown, dry	
300		2															
400		1															
500		2														Pumice SAND, some silt, minor fine pumice gravels	
600		1														light-brown, low moisture	
700		1														very loose to loose	
800		2															
900		2														minor silt, creamy brown, moist	
1000		3															
1100		4														some silt, very moist	
1200		3															
1300		3															
1400		1														becoming interbedded coarse pumice Sand, some fine pumice gra	
1500		1														minor silt, dark grey, moist, loose, and;	
1600		4														pumice Sand, silt, minor coarse pumiceous materials	
1700		4														dark grey-brown, medium-dense, very moist	
1800		1															
1900		2															
2000		1														SILT, some fine to medium pumice sand	
2100		2														minor fine pumice gravels, dark-brown, very moist	
2200																some pumice Sand, brown, moist	
2300																EOB @ 2200mm	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- 1 Weather leading up to test was fine and cool for the week leading up to testing. Fine during testing.
- 2 Ground water was not encountered during testing
- 3 Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- 4 Shear Vane records include Re-moulded values where possible
- 5 Shear Vane Serial No.: 2086 Exp. Date: 21/06/2023 Cert: 718861

Rev3.3

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	12/06/2023	4	HA24

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		2														TOPSOIL, silt loam, some sand, dry	
200		4														PUMICE sands/fine gravels, minor silt, brown, dry becoming moist	
300		2															
400		2															
500		2															
600		2														becoming some silt, dark grey-brown,	
700		1															
800		2															
900		2															
1000		2														SILT, some coarse pumice sand, orange-brown, moist	
1100		3														Pumiceous GRAVELS, some rhyolitic sand minor silt, light orange-brown, moist	
1200		4															
1300		4															
1400		4															
1500		4														SILT, some fine pumiceous gravels to 3mm dark-brown, very moist	
1600		2															
1700		1															
1800		2															
1900		2														Silt, increasing pumice gravels to 3mm, dark brown	
2000		2														Silt, minor fine pumiceous materials, dark orange-brown	
2100		3															
2200		2															
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- Weather leading up to test was fine and cool for the week leading up to testing. Fine during testing.
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: 2086 Exp. Date: 21/06/2023 Cert: 718861

Rev3.3

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	12	HA25

Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)

Test/Surface Description

Test completed at location shown on test plan marked 'HA25'

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)
100		0.5	
200		0.5	
300		1	
400		1	
500		1	
600		2	
700		2	
800		2	
900		2	
1000		2	
1100		2	
1200		2	
1300		1	
1400		1	
1500		2	
1600		3	
1700		4	
1800		2	
1900		3	
2000			

Soil Description

TOPSOIL

Silty SAND, fine to medium, minor fine gravel, light brown, loose

Silty SAND, fine to medium, some fine gravel, light brown, loose

SAND, medium to coarse, some fine gravel, minor silt, light brown/light grey, loose

SAND, medium to coarse, some fine gravel, minor silt, brown, loose

SAND, medium to coarse, some fine gravel, minor silt, light brown, loose to medium dense

SAND, coarse, some fine gravel, trace silt, creamy light brown, damp, m. dense. END OF BOREHOLE

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile





Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	10	HA26

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1	Result Good Ground													TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.	
200		1															
300		1															
400		1															
500		1															
600		1															
700		1															
800		1															
900		1															
1000		1															
1100		1														SILT, some fine to medium pumice sand; pale grey; loose; low moisture; low plasticity.	
1200		1														400mm: Becoming brown.	
1300		1														600mm: Becoming grey.	
1400		2															
1500		1														900mm: Becoming grey brown mix.	
1600		2															
1700		2															
1800		2															
1900		2															
2000																	
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site.
AK	12/06/2023	15	HA27

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, trace fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		1															
400		1															
500		2													Fine to medium pumice SAND, some silt, trace rootlets, trace fine pumice gravels; pale light brown; very loose to medium dense; low moisture.		
600		2															
700		2															
800		3													700mm: Becoming light grey brown.		
900		2													Fine to coarse pumice sand, some fine to medium gravels (pumice and rhyolite), trace silt; grey; loose; low moisture; well graded.		
1000		1															
1100		2															
1200		2															
1300		1															
1400		1															
1500		1															
1600		1															
1700		2															
1800		3															
1900		3															
2000															EOB at 2.0m, Target Borehole Depth.		
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7

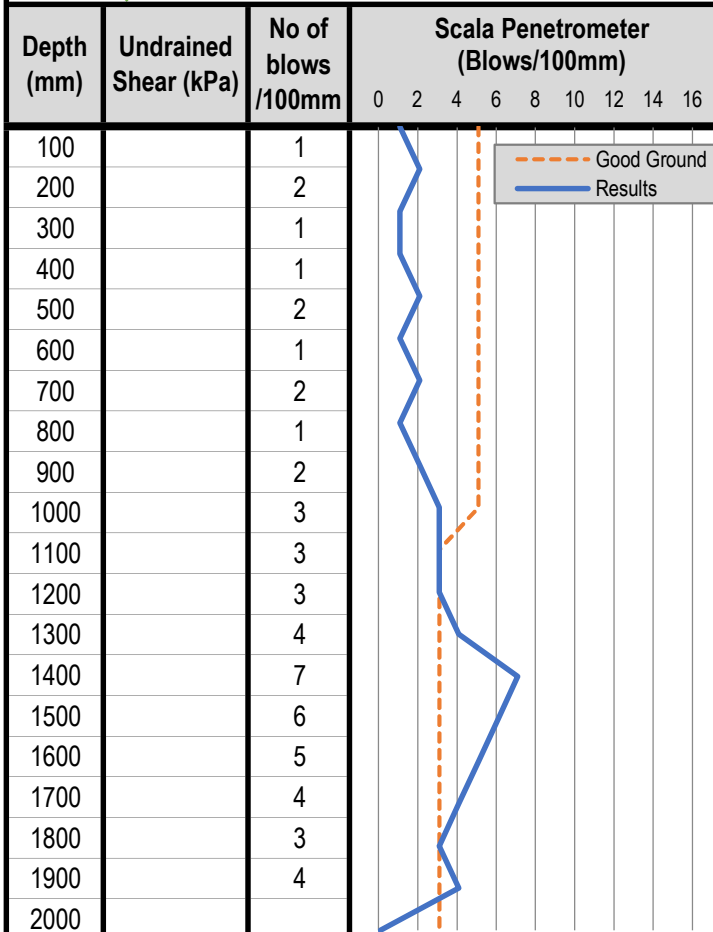
Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	13	HA28

Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)



Test/Surface Description

Test completed at location shown on test plan marked 'HA28'

Soil Description

TOPSOIL

SAND, fine, some silt, light brown, loose

SAND, fine to medium, minor silt, creamy light brown, loose

SAND, fine to coarse, some fine gravel, trace silt, creamy light brown, medium dense to dense

END OF BOREHOLE

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile





Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site.
AK	12/06/2023	16	HA29

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, trace fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		1															
400		1													Fine to medium sandy SILT, pumice sand, trace fine pumice gravel; pale light brown; loose; low moisture.		
500		2															
600		2															
700		3													Fine to coarse pumice SAND, minor silt, minor fine to medium pumice gravel; pale light grey brown; loose to medium dense; low moisture.		
800		2															
900		3															
1000		2													1000mm: Becoming brown, speckled white.		
1100		2															
1200		1															
1300		1													1200mm: Becoming silty; moist.		
1400		1															
1500		1															
1600		2													1600mm: Becoming fine to coarse pumice SAND, some fine to medium pumice gravel, minor silt.		
1700		2															
1800		2															
1900		3															
2000																	
2100															EOB at 2.0m, Target Borehole Depth.		
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	14	HA30

Graph Legend:				Test/Surface Description	
Water Table Depth Anticipated Cut Depth (if known)				Test completed at location shown on test plan marked 'HA30'	
Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	
100		1		TOPSOIL	
200		1		Silty SAND light reddish brown, loose	
300		1		SAND, fine, light brown, loose	
400		1		SAND, fine to medium, light brown, very loose	
500		1		SAND, fine to coarse, light brown, very loose	
600		0.5		Gravelly SAND, medium to coarse, light grey/creamy light brown, very loose	
700		0.5		UNABLE TO EXTRACT - no retrieval. END OF BOREHOLE	
800		0.5			
900		0.5			
1000					
1100					
1200					
1300					
1400					
1500					
1600					
1700					
1800		1			
1900		1			
2000					

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract
Borehole Profile



Graph Legend:

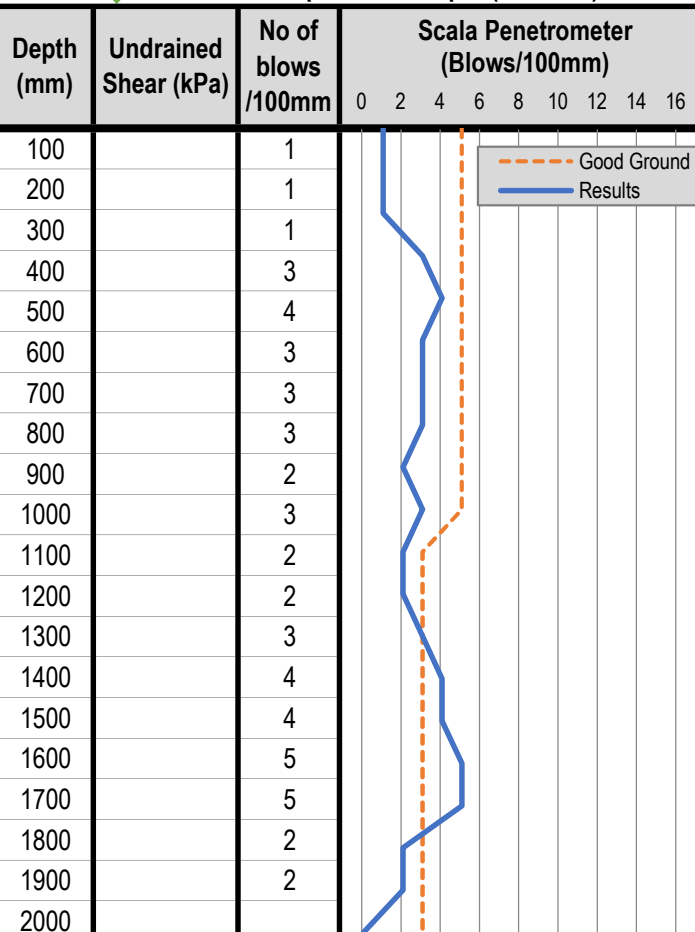
Water Table Depth



Anticipated Cut Depth (if known)

Test/Surface Description

Test completed at location shown on test plan marked 'HA31'



Soil Description

TOPSOIL

Silty SAND, some rootlets, brown, loose

SAND, coarse, some silt, brown/creamy light brown, medium dense

SAND, medium to coarse, minor fine gravel, light brown, loose to medium dense

Silty SAND, light orangey brown, loose to medium dense

SAND, coarse, some silt, some fine gravel, light orangey brown, loose to medium dense

END OF BOREHOLE

Key:

EOB = End Of Borehole

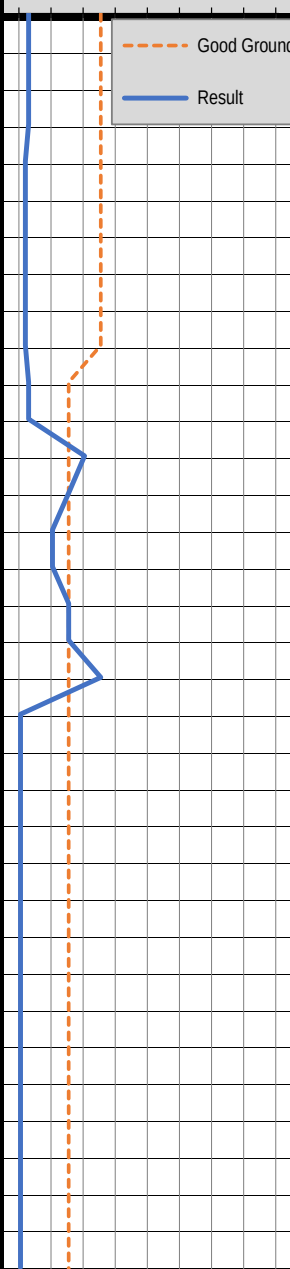
UTP = Unable To Penetrate

UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site.
AK	12/06/2023	54	HA32

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		0.5		Good Ground Result										TOPSOIL: Organic SILT, some rootlets, trace fine sand; dark brown to black; moist; low plasticity.			
200	0.5	Fine to medium silty pumice SAND, minor fine pumice gravels; pale light brown; very loose; low moisture.															
300	0.5	500mm: Becoming brown.															
400	0.5																
500	0.3																
600	0.3																
700	0.3																
800	0.3	800mm: Becoming some fine to medium pumice gravel, minor silt; grey brown.															
900	0.3																
1000	0.3																
1100	0.5																
1200	0.5																
1300	4																
1400	3																
1500	2																
1600	2																
1700	3																
1800	3																
1900	5																
2000													Fine to coarse silty pumice SAND, minor fine to medium pumice gravel, trace silt; pale light brown; moist; low plasticity; high dilatancy.				
2100													EOB at 2.0m, Target Borehole Depth.				
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			



Project Name		Job Ref.	
Whakaroa Road, 4m testing		260139-SR01	
Tested by	Date	Sheet No.	Test Site
GetGeo	20/07/2023	6	4m32

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
100		1		TOPSOIL, silt loam	
200		1		Pumiceous SILT, minor coarse pumice, orange-brown	
300		2		dry	
400		1		Pumice SAND, some silt, minor coarse pumice to 3mm	
500		2		dark yellow-brown, dry to moist	
600		1		Silty pumice GRAVELS/SAND, dark grey-brown	
700		2		very moist	
800		1		1200-1300mm some fine gravels, orange-brown, moist	
900		1		some silt, some sand, yellow-brown, moist	
1000		3			
1100		1			
1200		1			
1300		2			
1400		1			
1500		1			
1600		1			
1700		1			
1800		2			
1900		4			
2000		2			
2100		2			
2200		4			
2300		4			
2400		2			
2500		2			
2600		1			
2700		1			
2800		2			
2900		2			
3000		3			
3100		2			
3200		2			
3300		3			
3400		3			
3500		3			
3600		3			
3700		3			
3800		2			
3900		3			
4000		3		EOB @ 4.0m, Target Depth	

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- Weather leading up to testing was cool and windy with rain 4 days prior. Cold clear weather during testing.
- Ground water was not encountered during testing
-
-
-



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site.
AK	12/06/2023	56	HA33

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, trace fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		3													Fine to medium silty pumice SAND, minor fine pumice gravels; pale brown; medium dense; low moisture; low plasticity.		
400		3															
500		3													600mm: Becoming pale light brown.		
600		3															
700		3													800mm: Becoming fine to coarse pumice sand, minor silt and fine pumice gravels; light grey brown.		
800		5															
900		5													1000mm: Becoming some fine to medium pumice gravels.		
1000		5															
1100		5													1300mm: Becoming grey.		
1200		6															
1300		5													1700mm: Becoming silty. 1800mm: Becoming dark grey brown; loose; moist.		
1400		5															
1500		5													EOB at 2.0m, Target Borehole Depth.		
1600		5															
1700		2															
1800		2															
1900		2															
2000																	
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site.
AK	12/06/2023	57	HA34

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, trace fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		1													Fine to coarse silty pumice SAND, trace fine to medium pumice gravel, trace silt; pale orange brown; loose; low moisture; low plasticity.		
400		1															
500		2													600mm: Becoming minor silt, pale light grey.		
600		2															
700		3													800mm: Becoming grey brown mix; silty SAND.		
800		2															
900		2													1000mm: Becoming moist. 1100mm: Becoming very loose.		
1000		1															
1100		0.5													1300mm: Becoming loose. 1400mm: Becoming light grey brown.		
1200		0.5															
1300		2													1600mm: Becoming some fine to medium pumice gravel.		
1400		3															
1500		2													EOB at 2.0m, Target Borehole Depth.		
1600		3															
1700		2															
1800		2															
1900		2															
2000																	
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7

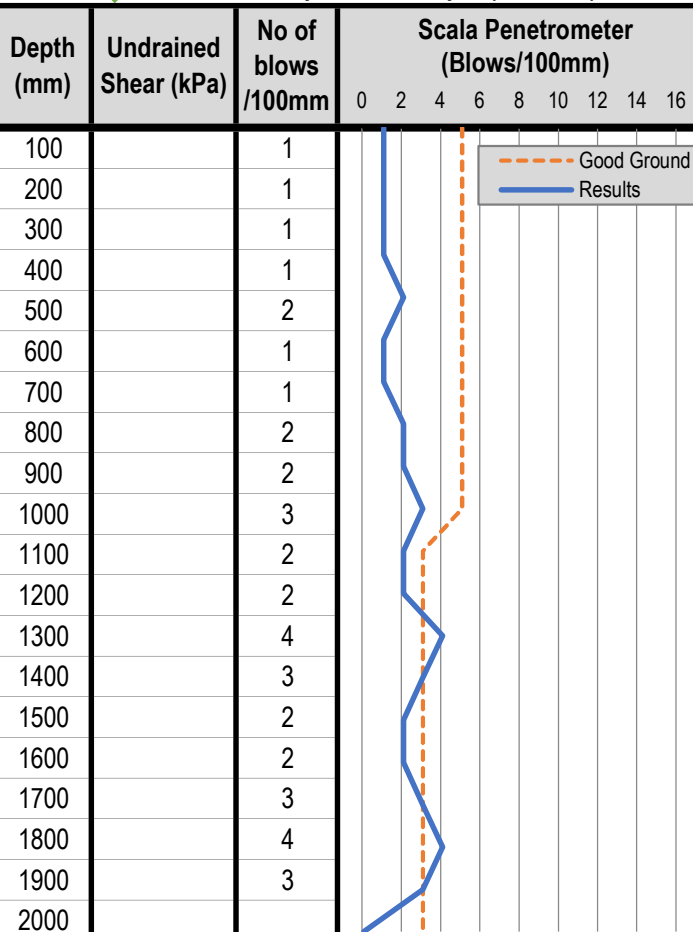
Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	16	HA35

Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)



Test/Surface Description

Test completed at location shown on test plan marked 'HA35'

Soil Description

TOPSOIL

Silty SAND, medium, light orangey brown, loose

SAND, fine, some silt, light orangey brown, loose to medium dense

SAND, fine, minor silt, light brown, loose to medium dense

SAND, fine, trace silt, trace fine gravel, light brown, medium dense

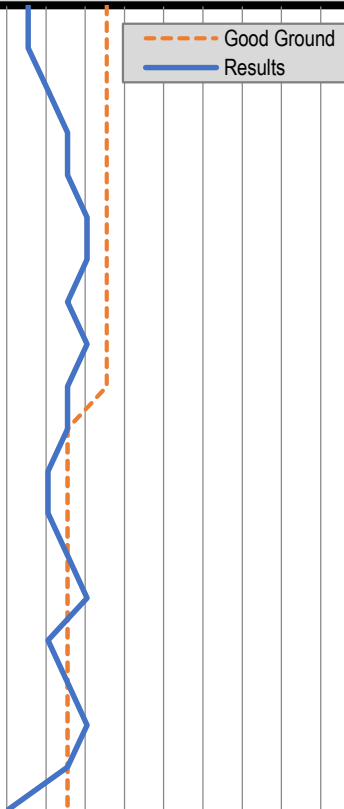
END OF BOREHOLE

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	17	HA36

Graph Legend:				Test/Surface Description	
Water Table Depth  Anticipated Cut Depth (if known)				Test completed at location shown on test plan marked 'HA36'	
Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	
100		1		TOPSOIL	
200		1			
300		2			
400		3		SAND, some silt, trace fine gravel, brown, medium dense	
500		3			
600		4			
700		4			
800		3			
900		4			
1000		3		SAND, some silt, trace fine gravel, creamy light brown, loose to medium dense	
1100		3			
1200		2			
1300		2			
1400		3			
1500		4			
1600		2			
1700		3		Silty SAND, fine to medium, light orangey brown, loose to medium dense	
1800		4			
1900		3			
2000				END OF BOREHOLE	

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	11/07/2023	62	HA37

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1														TOPSOIL	
200		1															
300		1														Pumiceous SILT, orange-brown, moist	
400		1															
500		2															
600		2															
700		2														Silty pumiceous SAND, creamy brown, very moist	
800		3															
900		4														becoming minor pumiceous gravels 3-5mm	
1000		3															
1100		3															
1200		2														very moist	
1300																	
1400																pumice fragments recovered	
1500																Poor quality of sample	
1600																some sand	
1700																minor silt	
1800																creamy light grey	
1900		1															
2000		2															
2100																EOB @ 2.0m	
2200																Target Depth	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- 1 Weather leading up to test was fwet over previous four days. Fine during testing.
- 2 Ground water was not encountered during testing
- 3
- 4
- 5

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	11/07/2023	67	HA38

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)														Soil Description	Water Table
			0	2	4	6	8	10	12	14	16							
100		3															TOPSOIL	
200		3															Silty pumice SAND, minor fine pumice gravels light orange-brown, moist becoming brown	
300		2																
400		2																
500		4																
600		2																
700		1														PUMICE, light grey, moist Poor recovery, easily augered through likely large pumice gravels, small boulders broken by augering		
800		1																
900		1																
1000		1																
1100		1																
1200		2																
1300		2																
1400		1																
1500		1																
1600		1																
1700		3																
1800		2																
1900		3																
2000		4																
2100																	EOB @ 2.0m Target Depth	
2200																		
2300																		
2400																		
2500																		
2600																		
2700																		
2800																		
2900																		
3000																		
3100																		
3200																		
3300																		
3400																		
3500																		

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- Weather leading up to test was wet over previous four days. Fine during testing.
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: 2086 Exp. Date: 21/06/2023 Cert: 718861

Rev3.3

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	12/06/2023	78	MA39

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)														Soil Description	Water Table
			0	2	4	6	8	10	12	14	16							
100		1															TOPSOIL, silt loam, some sand, low moisture	
200		1																
300		2															Silty pumice SAND, minor coarse pumice to 3mm brown, dry	
400		3																
500		3																
600		3															Pumice SAND, silt, some coarse pumice 3-6mm minor fine rhyolite gravels, light brown, low moisture	
700		2																
800		2																
900		3															becoming interbedded;	
1000		2															coarse pumice 3-8mm, some pumice sand, minor silt, grey	
1100		4															and;	
1200		2															pumice Sand, some silt, minor coarse pumice light grey-brown	
1300		5																
1400		5															trace rhyolite sand/fine gravels	
1500		5															grey, moist	
1600		3																
1700		4																
1800		3																
1900		2																
2000		2																
2100																	EOB @ 2.0m	
2200																	Target Depth	
2300																		
2400																		
2500																		
2600																		
2700																		
2800																		
2900																		
3000																		
3100																		
3200																		
3300																		
3400																		
3500																		

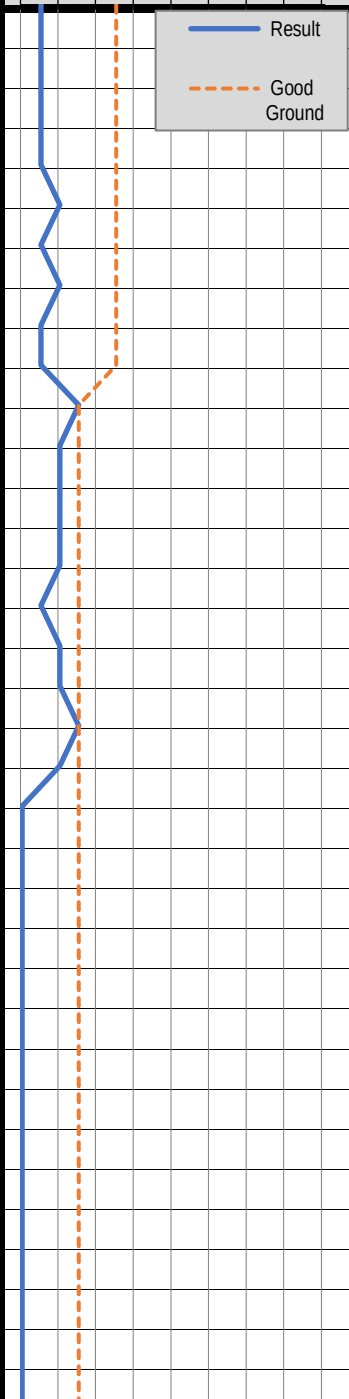
Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- 1 Weather leading up to test was fine and cool for the week leading up to testing. Fine during testing.
- 2 Ground water was not encountered during testing
- 3 Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- 4 Shear Vane records include Re-moulded values where possible
- 5 Shear Vane Serial No.: 2086 Exp. Date: 21/06/2023 Cert: 718861

Rev3.3



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	11/07/2023	68	MA40

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)														Soil Description	Water Table
			0	2	4	6	8	10	12	14	16							
100		1		TOPSOIL														
200	1																	
300	1																	
400	1	Silty pumice SAND, light yellow-brown, moist																
500	1																	
600	2	some coarse pumice 3-5mm																
700	1																	
800	2																	
900	1																	
1000	1																	
1100	3	becoming minor sand, trace fine gravels																
1200	2	light grey-brown																
1300	2																	
1400	2																	
1500	2																	
1600	1																	
1700	2																	
1800	2	Gravelly SAND, some coarse pumice to 20mm																
1900	3	grey, moist																
2000	2																	
2100			EOB @ 2.0m															
2200			Target Depth															
2300																		
2400																		
2500																		
2600																		
2700																		
2800																		
2900																		
3000																		
3100																		
3200																		
3300																		
3400																		
3500																		

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- 1 Weather leading up to test was fwet over previous four days. Fine during testing.
- 2 Ground water was not encountered during testing
- 3 Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- 4 Shear Vane records include Re-moulded values where possible
- 5 Shear Vane Serial No.: 2086 Exp. Date: 21/06/2023 Cert: 718861

Rev3.3



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site.
AK	12/06/2023	59	HA41

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, trace fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		1															
400		1													Fine to medium sandy SILT, pumice sand, trace fine pumice gravel; pale light brown; loose to medium dense; low moisture.		
500		3															
600		3													500mm: Becoming light grey brown.		
700		3													600mm: Brown mix.		
800		4													800mm: Becoming light grey.		
900		2															
1000		2													1000mm: Becoming fine to coarse pumice sand, minor fine pumice gravel.		
1100		3															
1200		3															
1300		2															
1400		1													1400mm: Becoming silty; grey brown; loose; moist; high dilatancy.		
1500		1															
1600		1															
1700		1															
1800		1															
1900		2													1900mm: Becoming fine to coarse pumice sand; some pumice gravel; orange brown.		
2000															EOB at 2.0m, Target Borehole Depth.		
2100																	
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	11/07/2023	66	MA42

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL, sand loam		
200		1															
300		1															
400		1															
500		2													Silty pumiceous SAND, minor coarse pumice to 2mm trace fine sand, brown, moist some silt, light-brown		
600		2															
700		2															
800		3															
900		2															
1000		1															
1100		1															
1200																	
1300																	
1400																	
1500																	
1600																	
1700															GRAVEL, some pumice gravels,some sand, minor silt		
1800															brown, very moist		
1900															Sandy SILT, minor coarse pumice 3-5mm		
2000															dark brown, very moist		
2100															Pumice GRAVELS, some silt, minor sand, yellow-brown		
2200															moist		
2300															Silty pumice SAND, minor fine pumice 3-5mm light grey-brown, moist		
2400																	
2500																	
2600																	
2700																	
2800																	
2900															Pumice GRAVEL/SAND, 1-5mm,some silt, light yellow-brown		
3000															moist		
															3400-3600mm Silty SAND, grey, moist		
															3600mm - SILT, dark orange-brown, very moist		
															3800mm - some sand, yellow-brown, moist		
4000															EOB @ 4.0m, Target Depth		

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

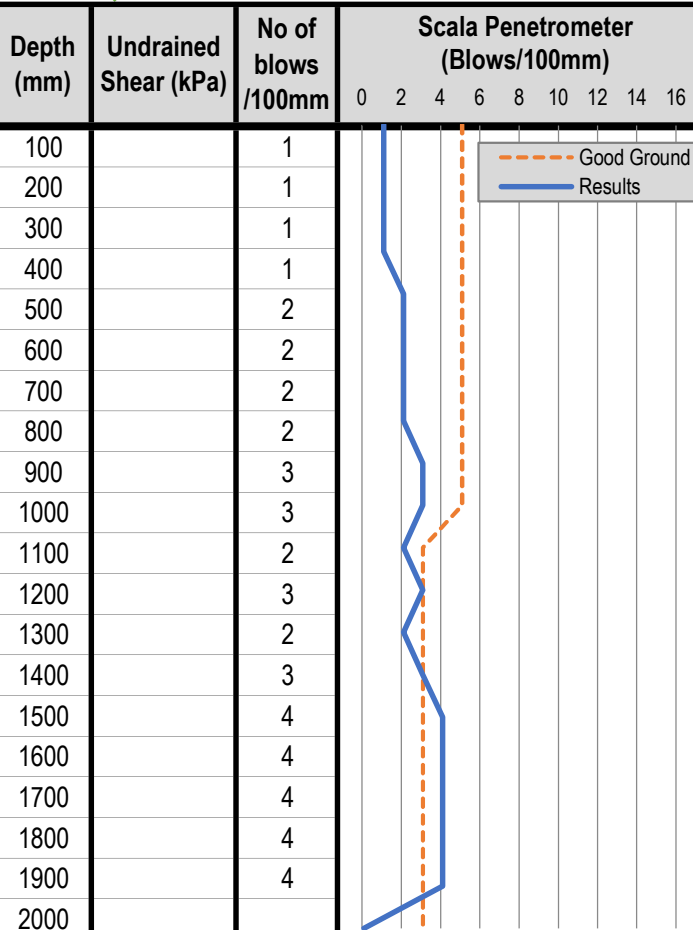
- 1 Weather leading up to test was fwet over previous four days. Fine during testing.
- 2 Ground water was not encountered during testing
- 3
- 4
- 5

Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)



Test/SurfaceDescription

Test completed at location shown on test plan marked 'HA43'

Soil Description

TOPSOIL

SAND, fine, trace silt, light brown, loose

SAND, fine to medium, trace fine gravel, creamy light brown, loose

SAND, medium to coarse, minor fine gravel, creamy light brown, loose to medium dense

SAND, medium to coarse, some fine to medium gravel, creamy light brown, medium dense

END OF BOREHOLE

Key:

EOB = End Of Borehole

UTP = Unable To Penetrate

UTE = Unable To Extract

Borehole Profile

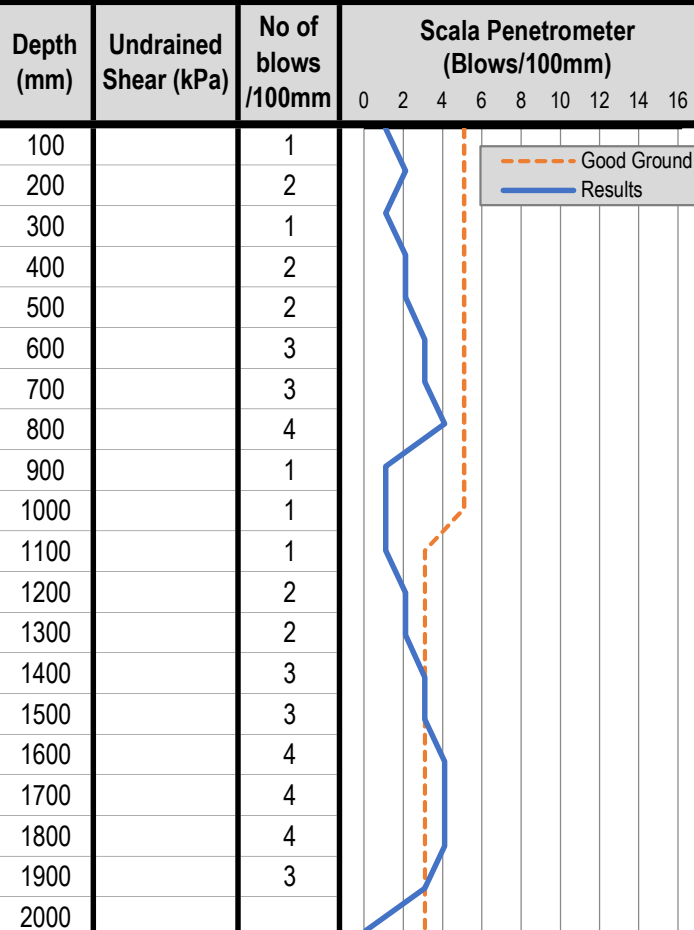


Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)



Test/Surface Description

Test completed at location shown on test plan marked 'HA44'

Soil Description

TOPSOIL

TOPSOIL/SILT/SAND

SAND, fine, light brown, medium dense

SAND, fine to medium, trace fine gravel, light brown, loose to medium dense

SILT/Coarse SAND, brown, loose

SAND, fine to medium, some silt, minor fine gravel, light brown, loose to medium dense

SAND, medium to coarse, some fine gravel, creamy light brown, medium dense

END OF BOREHOLE

Key:

EOB = End Of Borehole

UTP = Unable To Penetrate

UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
Get Geo	11/07/2023	69	MA45

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)														Soil Description	Water Table
			0	2	4	6	8	10	12	14	16							
100		2															TOPSOIL	
200		3																
300		2																
400		2															Silty pumice SAND, minor coarse pumice, grey-brown moist	
500		3																
600		1																
700		1																
800																		
900	scala fell																Pumice GRAVELS, sand, silt	
1000																	some pumice sand, grey and grey-brown, moist	
1100																	possibly disturbed/tree roots remnant	
1200																	some coarse pumice, some topsoil/organics	
1300																		
1400																	Pumice SAND, minor coarse pumice to 5mm, minor sand	
1500																	light brown, moist	
1600																		
1700																		
1800																	Pumice GRAVELS, some pumice sand, minor silt	
1900																	light yellow-brown, moist	
2000																		
2100																	Silty pumice SAND, minor coarse pumice, yellow-brown moist	
2200																		
2300																		
2400																		
2500																	Pumice GRAVELS, some pumice sand, some fine gravels	
2600																	minor silt, yellow-brown, moist	
2700																		
2800																	creamy brown	
2900																		
3000																	Silty SAND, dark grey, moist	
																	3200mm SILT, dark orange-brown, wet	
																	Taupo brown ash	
																	3700mm some sand, yellow-brown, moist	
4000																	EOB @ 4.0m, Target Depth	

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- 1 Weather leading up to test was wet over previous 4 days. Fine during testing.
- 2 Ground water was not encountered during testing
- 3
- 4
- 5



Project Name		Job Ref.	
Whakaroa Road, 4m testing		260139-SR01	
Tested by	Date	Sheet No.	Test Site
GetGeo	20/07/2023	7	4m45

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		1	Good Ground Result	TOPSOIL	
200		1			
300		1		SILT, some pumiceous materials	
400		2		light orange-brown, moist	
500		2		becoming some coarse pumice, yellow-brown, moist	
600		3		Pumiceous SAND, minor coarse pumice, minor sand	
700		2			
800		3			
900		5			
1000		3		some pumice gravels,sand, grey, moist	
1100		2			
1200		1			
1300		3			
1400		3			
1500		3			
1600		3		SILT, sand, pumice, some organics, mixed brown	
1700		5		very moist (possible paleosol layer)	
1800		2			
1900		1		SILT, sand, some pumice gravels 2-5mm	
2000		2		brown, moist	
2100		1		Pumice GRAVELS, some pumice sand, some sand	
2200		2			
2300		3			
2400		4			
2500		6		some silt, grey-brown, moist	
2600		4		becoming silty pumice Gravels/Sands orange-brown, moist	
2700		3		SILT, some coarse pumice 3-5mm	
2800		4			
2900		2			
3000		3			
3100		2		some sand, dark grey-brown, moist	
3200		2			
3300		2			
3400		4			
3500		8		Pumice GRAVELS, some pumice sand, some sand	
3600		3			
3700		4			
3800		5			
3900		3		some silt, brown, moist	
4000		2		creamy brown, moist	
				EOB @ 4.0m, Target Depth	

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- 1 Weather leading up to testing was cool and windy with rain 4 days prior. Cold clear weather during testing.
- 2 Ground water was not encountered during testing
- 3
- 4
- 5



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	12/07/2023	89	HA46

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)													Soil Description	Water Table
			0	2	4	6	8	10	12	14	16						
100		1													TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.		
200		1															
300		0.5													Fine to medium silty pumice SAND, trace fine pumice gravel; pale brown; very loose; low moisture; low plasticity.		
400		0.5															
500		1													500mm: Becoming some silt, pale light grey brown.		
600		1															
700		3													700mm: Becoming fine to coarse SAND, minor silt; loose to medium dense.		
800		3															
900		3													800mm: Becoming light grey, speckled white.		
1000		3															
1100		2													1000mm: Becoming some silt; moist.		
1200		2															
1300		2															
1400		3															
1500		2															
1600		3															
1700		2															
1800		3															
1900		4															
2000																	
2100															EOB at 2.0m, Target Borehole Depth.		
2200																	
2300																	
2400																	
2500																	
2600																	
2700																	
2800																	
2900																	
3000																	
3100																	
3200																	
3300																	
3400																	
3500																	

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Rev3.7

Graph Legend:

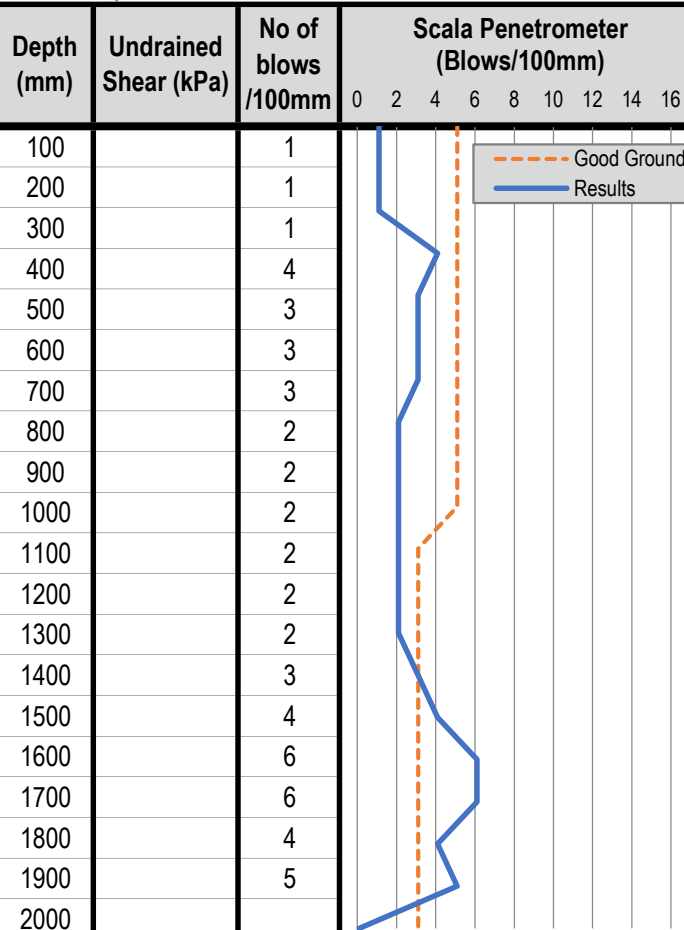
Water Table Depth



Anticipated Cut Depth (if known)

Test/Surface Description

Test completed at location shown on test plan marked 'HA47'



Soil Description

TOPSOIL

Silty SAND, fine, brown, loose

Silty SAND, fine, light brown, loose

SAND, fine to medium, minor fine gravel, creamy light brown, loose to medium dense

Gravelly SAND, medium to coarse, creamy light brown, medium dense

END OF BOREHOLE

Key:

EOB = End Of Borehole

UTP = Unable To Penetrate

UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	12/07/2023	92	HA48

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)		Soil Description	Water Table
			0	2 4 6 8 10 12 14 16		
100		1			50mm TOPSOIL: Organic SILT; dark brown; moist.	
200		2			Fine to medium silty pumice SAND, minor fine to medium pumice gravel; brown to light brown; loose to medium dense; low moisture; low plasticity; high dilatancy.	
300		4			500mm: Becoming pale light grey speckled white.	
400		3			600mm: Becoming very loose.	
500		2				
600		0.3				
700		0.3				
800		0.3				
900		1			Fine to coarse pumice SAND, some fine to medium pumice and rhyolite gravel; dark grey brown; very loose to loose; low moisture; poorly graded.	
1000		2				
1100		2				
1200		1				
1300		0.3			Fine to coarse pumiceous sandy SILT, trace fine pumice gravel; grey brown; very loose; moist; low plasticity; high dilatancy.	
1400		0.3				
1500		0.3				
1600		1				
1700		0.3			1700mm: Scala dropped suddenly to 1900mm.	
1800		0.3			Fine to coarse pumice SAND, some fine to medium pumice gravel; orange brown mix; very loose; moist; poorly graded.	
1900		0.3				
2000						
2100					EOB at 2.0m, Target Borehole Depth.	
2200						
2300						
2400						
2500						
2600						
2700						
2800						
2900						
3000						
3100						
3200						
3300						
3400						
3500						

Notes:		EOB = End Of Borehole	UTP = Unable To Penetrate	UTE = Unable To Extract
1	Weather leading up to testing was: Fine for the previous 3 days.			
2	Ground water was not encountered during testing			
3	Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)			
4	Shear Vane records include Re-moulded values where possible			
5	Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023			

Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	21	HA49

Graph Legend:

Water Table Depth



Anticipated Cut Depth (if known)

Test/Surface Description

Test completed at location shown on test plan marked 'HA49'.

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)												
			0	2	4	6	8	10	12	14	16				
100		1													
200		1													
300		1													
400		1													
500		1													
600		2													
700		1													
800		3													
900		2													
1000		1													
1100		1													
1200		2													
1300		2													
1400		3													
1500		4													
1600		4													
1700		4													
1800		5													
1900		9													
2000															

Good Ground
Results

Soil Description

TOPSOIL

SAND, fine to medium, minor fine gravel, minor silt, light brown, loose

SAND, coarse, some fine gravel, light grey/creamy light brown, loose to medium dense

UNABLE TO EXTRACT - no retrieval. END OF BOREHOLE

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
JJS	20/04/2026	22	HA50

Graph Legend:				Test/SurfaceDescription	
Water Table Depth Anticipated Cut Depth (if known)				Test completed at location shown on test plan marked 'HA50'	
Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	
100		2	Good Ground Results	TOPSOIL	
200		2			
300		1			
400		2			
500		2		SAND, fine to medium, some fine gravel, minor silt, light brown, loose	
600		2			
700		2			
800		2			
900		4		Silty SAND, fine to medium, light brown, loose to medium dense	
1000		3			
1100		2			
1200		2			
1300		1		Silty SAND, medium to coarse, light brown/creamy light brown, loose to medium dense	
1400		1			
1500		1			
1600		2			
1700		2			
1800		4		Silty SAND, fine, light orangey brown, medium dense to dense	
1900		9			
2000				END OF BOREHOLE	

Key: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

Borehole Profile



Project Name		Job Ref.	
387 Whakaroa Road, Taupo		260139-SR01	
Tested by	Date	Sheet No.	Test Site
AK	13/06/2023	2	MA51

Depth (mm)	Undrained Shear (kPa)	No of blows /100mm	Scala Penetrometer (Blows/100mm)	Soil Description	Water Table
			0 2 4 6 8 10 12 14 16		
100		1		TOPSOIL: Organic SILT, some rootlets, minor fine sand; dark brown to black; moist; low plasticity.	
200		1		FILL: Fine to coarse pumice SAND, some silt, minor fine sub-rounded gravel (pumice and welded ignimbrite), dark brown mix; loose; low moisture.	
300		2			
400		2			
500		2			
600		2			
700		2			
800		6		Fine to coarse pumice SAND, some silt, minor fine to medium pumice gravel; pale light cream brown; medium dense; low moisture; well graded.	
900		5			
1000		5			
1100		6			
1200		5			
1300		7			
1400		7			
1500		6		1500mm: Some fine pumice gravels.	
1600		5			
1700		2		1700mm: Becoming silty; loose; moist.	
1800		3			
1900		2			
2000					
2100					
2200				Fine to coarse pumice SAND, minor fine to medium pumice gravel; orange brown; moist; well graded.	
2300					
2400					
2500					
2600					
2700					
2800					
2900				SILT, some fine to medium pumice sand, trace fine pumice gravel brown; low moisture to moist; low plasticity; high dilatancy.	
3000					
3100					
3200					
3300					
3400					
3500					
3600					
3700					
3800					
3900					
4000				EOB at 4.0m, Target Borehole Depth.	

Notes: EOB = End Of Borehole UTP = Unable To Penetrate UTE = Unable To Extract

- Weather leading up to testing was: Fine for the previous 3 days.
- Ground water was not encountered during testing
- Shear Vane readings are converted readings, as per calibration Certificate. (Values are undrained shear strength)
- Shear Vane records include Re-moulded values where possible
- Shear Vane Serial No.: 1471 Exp. Date: 28/11/2023

CORE50 SOLUTIONS ENGINEERED		Site Specific Geotechnical Summary and Foundation Recommendations Table														
		Job Ref		260139-SR01		Date		23/04/2026		Client		Big Ball Holdings Ltd		Project Address		387 Whakaroa Road, Taupo
Lot	Test ID #	Site Soils Characteristics							Preliminary Foundation Recommendations ^a							
		Topsoil Depth (mm)	Encountered Soils ₁	GWT (mm)	Design Cut/Fill Depths (m) ₂		Expansivity Class (AS2870) ₃	Depth to 100kpa allowable bearing capacity (mm) i.e. 3blows/100mm or SU ¹ >60kpa	Conventional NZS3604:2011 Foundations	Codemark Ribraft	Specific Engineer Design	Liquefaction Technical Category ₆	Slope Stability Setback Zones (A = 5m/B = 10m/C = 15m) ₇	Fault Line Proximity		
					Cut	Fill									(Y/N) ₄	(Y/N) ₄
Farm	01	200	Loose to medium dense SAND, becoming loose with depth	NE	-	-	A	NE	N	4	5	TC1 Like	B	N	Moist from 1700mm, proposed as Farm Managers residence	
1	02	100	Loose to medium dense SAND	NE	-	-	A	1500	N	N	5	TC1 Like	B	N	Very loose from 0.7 - 1.2m. Damp from 1700mm	
2	03	200	Silty SAND overlying GRAVELs, and SILTs	NE	-	-	A	-	N	N	5	TC1 Like	C	N	Density testing not carried out. Likely to encounter very loose material between 1000 and 3000mm	
3	04	100	Generally loose SANDs and SILTs. Very loose at 1.4m	NE	-	-	A	NE	N	4	5	TC1 Like	B	N	Very loose from 1.2 - 1.9m+. Deeper SILT may show competent shear strength.	
4	05	100	SANDs and GRAVELs with deeper SILTs	NE	-	-	A	-	N	N	5	TC1 Like	C	N	Density testing not carried out. Likely to encounter very loose materia between 1000 and 3000mm. Site encroached by Ngangautu Fault FAZ	
5	06	200	Medium dense Sandy SILT/Silty SAND becoming very loose	NE	-	-	A	NE	N	4	5	TC1 Like	C	N	Very loose from 1.4 - 1.9m+. Moist from 1.3m. Site encroached by Ngangautu Fault FAZ	
6	07	100	Loose Silty SANDs and SANDs	NE	-	-	A	NE	N	N	5	TC1 Like	C	N	Alternating very loose to loose.	
7	08	100	Very Loose Silty SANDs overlying dense SAND	NE	-	-	A	1200	N	N	5	TC1 Like	B	Y	Very loose 0.0 - 0.8m becoming very dense by 1.9m. Site encroached by Ngangautu Fault FAZ	
8	09	100	Very Loose SAND becoming loose	NE	-	-	A	NE	N	4	5	TC1 Like	B	Y	Very loose 0.0 - 0.8m becoming very dense by 1.9m. Site encroached by Ngangautu Fault FAZ	
9	10	200	Loose SANDs becoming very loose to loose	NE	-	-	A	NE	N	N	5	TC1 Like	B	Y	Very loose 1.1 - 1.9m+. Moist from 1500mm	
11	11	200	Loose Silty SAND and SAND	NE	-	-	A	NE	N	N	5	TC1 Like	C	N	Loose through depth of borehole. Moist from 1500mm	
14	12	100	Very loose Silty SANDs overlying loose SANDs	NE	-	-	A	NE	N	N	5	TC1 Like	C	N	Very loose 0.0 - 0.5m withv. Loose to loose material below. No extraction indicates potential of instability during works	
16	13	100	Very loose SANDs becoming loose with depth	NE	-	-	A	NE	N	N	5	TC1 Like	B	N	Very loose 0.0 - 0.8m. V. loose to loose through borehole profile.	
18	14	100	Loose SANDs becoming medium dense then loose again	NE	-	-	A	NE	N	4	5	TC1 Like	C	N	Loose through depth of borehole. Dense at 1.3m may show larger gravel being pushed through.	
19	15	100	Very loose Silty SAND/SANDs overlying loose to m. dense SANDs	NE	-	-	A	NE	N	N	5	TC1 Like	C	Y	Very loose 0.0 - 1.0m. Site encroached by Ngangautu Fault FAZ	
10	16	200	Very loose SANDs becoming loose to dense with depth	NE	-	-	A	1700	N	4	5	TC1 Like	B	Y	Very loose 0.0 - 0.7m. V. loose to loose zone found 2.0 - 2.9m. Moist from 1500mm. Paleosol at 2.3m	
12	17	200	Loose Silty SANDs becoming SANDs	NE	-	-	A	NE	N	N	5	TC1 Like	C	N	Loose through depth of borehole.	
13	18	200	Loose SANDs becoming Silty	NE	-	-	A	NE	N	N	5	TC1 Like	B	N	Loose through depth of borehole. Potential of very loose soil below 2m.	
15	19	100	Very loose to loose SANDs	NE	-	-	A	NE	N	N	5	TC1 Like	C	Y	Very loose 0.0 - 0.8m. Site encroached by Ngangautu Fault FAZ	
17	20	100	Very loose SILT becoming loose to m. dense SAND/SILTs	NE	-	-	A	1500	N	4	5	TC1 Like	C	Y	Very loose 0.0 - 0.5m and loose below. Site encroached by Ngangautu Fault FAZ	
22	21	200	Loose SAND/Silty SANDs/Sandy SILT	NE	-	-	A	NE	N	N	5	TC1 Like	B	Y	Very loose 0.0 - 0.5 and 1.4 - 1.9m. Loose between these depths. Site encroached by Ngangautu Fault FAZ	
23	22	200	M. Dense Silty SAND becoming very loose and loose SILTs	NE	-	-	A	NE	N	N	5	TC1 Like	B	N	Very loose 1.1 - 1.3m. Sub-rounded gravel encountered at base of borheole.	
24	23	100	Loose SANDs becoming loose to m. dense with deeper SILTs	NE	-	-	A	NE	N	4	5	TC1 Like	B	N	Very loose to loose through depth of borehole. Moist from 0.9m	
25	24	100	Loose SANDs/SILTs becoming loose to m. dense SILTs/GRAVELs	NE	-	-	A	NE	N	4	5	TC1 Like	B	Y	Loose through depth of borehole. Moist from 0.9m. Site encroached by Ngangautu Fault FAZ	
20	25	200	Loose Silty SAND with slightly increasing density with depth	NE	-	-	A	1600	N	N	5	TC1 Like	B	N	Very loose 0.0 - 0.5m, Loose below this. Damp from 1.9m.	
21	26	200	Loose SILT overlying loose SAND/Sandy SILT	NE	-	-	A	NE	N	N	5	TC1 Like	C	Y	Very loose 0.0 - 1.3m and loose below. Site encroached by Ngangautu Fault FAZ	
26-28	27	400	Loose SANDs w/rootlets overlying Loose SANDs with gravels	NE	-	-	A	1800	N	N	5	TC1 Like	B	N	Loose through depth of borehole.	
29/30	28	100	Loose SANDs becoming m. dense to dense with depth	NE	-	-	A	1100	N	4	5	TC1 Like	B	N	Loose 0.0 - 1.0 and Medium Dense becoming denser with depth below this.	
31/32	29	200	Loose Sandy SILT overlying loose SANDs/Silty SANDs	NE	-	-	A	NE	N	N	5	TC1 Like	C	N	Loose through depth of borehole, moist from 1.2m.	
33-35	30	100	V. loose to loose Silty SAND/SAND/Gravelly SANDs	NE	-	-	A	NE	N	N	5	TC1 Like	C	N	Very loose through depth of borehole. Potential tunnelling (tomo) present 1.0 - 1.7m.	
36-38	31	100	Loose to m. dense SANDs/Silty SANDs	NE	-	-	A	NE	N	4	5	TC1 Like	C	N	Loose to medium dense through depth of borehole.	

43-45	32	200	Very loose Silty SANDs becoming loose to m. dense	NE	-	-	A	1700	N	N	5	TC1 Like	B	N	Very loose 0.0 - 1.2m and loose to medium dense below. Moist from 1.3m.
41/42	33	200	M. Dense Silty SAND with gravels becoming loose with depth	NE	-	-	A	NE	N	4	5	TC1 Like	C	N	Medium dense below topsoil becoming loose from 1.7m.
39/40	34	200	Loose Silty SAND becoming very loose to loose	NE	-	-	A	NE	N	N	5	TC1 Like	C	N	Generally loose with very loose soils at 1.0 - 1.2m. Moist form 1.0m
46/47	35	200	Loose Silty SAND becoming loose to m. dense	NE	-	-	A	1700	N	N	5	TC1 Like	C	N	Loose to medium dense through depth of borehole.
47/48	36	200	M. Dense SAND becoming loose to m. dense with depth	NE	-	-	A	1700	N	4	5	TC1 Like	C	N	Loose to medium dense through depth of borehole.
51 - Produce	37	100	Loose SILT overlying v. loose to loose Silty SANDs	NE	1.0	0.0	A	NE	N	N	5	TC1 Like	B	N	Very loose (possibly tunnelling) 1.3 - 1.9m. Moist from surface and very moist from 0.5m.
51 - Produce	38	100	Loose Silty SAND overlying v. loose to loose GRAVELs	NE	Batter Only		A	NE	N	N	5	TC1 Like	A	N	Loose to medium dense moist through depth of borehole. Moist from ground level.
51 - Produce	39	100	Loose Silty SAND becoming loose to m. dense SANDs	NE	Batter Only		A	NE	N	N	5	TC1 Like	A	N	Loose to medium dense through depth of borehole. Moist from 1.5m.
51 - Produce	40	200	Loose Silty SAND becoming loose Gravelly SAND	NE	0.0	1.0	A	NE	N	N	5	TC1 Like	B	N	Generally loose through borehole, moist from 1.9m.
51 - Produce	41	200	Loose Sandy SILT becoming loose to m. dense over loose SAND	NE	-	-	A	NE	N	N	5	TC1 Like	B	Y	Loose to medium dense through depth of borehole. Becoming looser with depth. Moist from 1.4m.
51 - Lodge	42	300	Loose Silty SAND over GRAVELs, SILTs and SANDs	NE	4.0	1.0	A	NE	N	N	5	TC1 Like	A	N	1m strength testing indicates soil becoming looser near 1m. Moist from ground level.
51 - Lodge	43	100	Loose SANDs becoming m. dense with depth	NE	NA	NA	A	1400	N	4	5	TC1 Like	C	N	Loose 0.0 - 0.8m generally increasing density to medium dense by 1.4m.
51 - Lodge	44	500	M. dense SANDs becoming loose to m. dense	NE	NA	NA	A	1400	N	N	5	TC1 Like	C	N	0.5m topsoil - possibly fill. Loose 0.0 - 0.5 and 0.9 - 1.3m. Generally increasing in density with depth
51 - Lodge	45	100-200	Loose Silty SANDs overlying GRAVELs, SANDs and deeper SILTs	NE	1.0	5.0	A	NE	N	N	5	TC1 Like	B	N	1m strength testing with scala falling from 0.8m. Gravel may indicate tunnelling at this depth. Moist from ground level
51 - Lodge	46	200	Loose Silty SAND with deeper SILTs and SANDs	NE	2.0	1.0	A	NE	N	4	5	TC1 Like	C	N	Very loose 0.0 - 0.6m and generally loose below. Moist from ground level with some low moisture throughout
51 - Lodge	47	100	Loose Silty SAND overlying loose to m. dense SAND/Gravelly SAND	NE	1.0	0.0	A	1400	N	4	5	TC1 Like	C	N	Consistent shallow material, loose 0.8 - 1.3m and medium dense elsewhere.
49/50	48	100	Very loose to loose Silty SANDs with deeper v. loose to loose SILTs/SANDs	NE	-	-	A	NE	N	N	5	TC1 Like	C	N	Interbedded very loose to loose throughout depth. Deeper very loose material likely. Moist from 1.3m.
52 - Retreat	49	100	Loose SANDs becoming m. dense to dense with depth	NE	4.7	4.4	A	1400	N	N	5	TC1 Like	B	N	Generally loose material to be cut from top of hill. Deeper soils becoming medium dense to dense likely to be exposed by cut.
52 - Retreat	50	200	Loose SAND/Silty SAND becoming m. dense to dense with depth	NE			A	1800	N	N	6	TC1 Like	C	N	
Farm/Res	51	200	Loose FILL overlying medium dense SAND becoming loose Silty SAND	NE	-	-	A	800	N	4	5	TC1 Like	B	N	Loose fill 0.0 - 0.6m and medium dense below, becoming loose again deeper. Moist from 1700mm.

Notes:															
Preliminary site testing was located evenly within the proposed Lots - Refer Appendix A for Test Location Plan and Soils Logs.									Few Cut-Fill concept plans have been provided for the proposed development, refer Appendix B for Concept Plans. 1.5m mac cut/fill depth/height is assumed where no plan is provided						
Expansivity Class is inferred to be Non Reactive (AClass) as defined by AS2870 i.e. non expansive (within NZS3604:2011 limitations <25mm differential settlement).									Preliminary assessment generally indicates the shallow soils do not meet the defintion of "good ground". However Codemark RibRaft slabs are suitable for some sites following unsuitable shallow ground replacement with certified engineered fill.						
Refer Section 7.0 for Preliminary Foundation Solutions/Recommendations.									Refer Sub-Section 5.1 for quantitative assessment results.						
Preliminary Building Setback Zones are determined through review of the slope(s) affected, slope angle and soil composition. Setbacks are taken from the crest of the slope i.e. where the slope angle is less than 7 degrees. Zone A: 5m, Zone B: 10m, Zone C: 15m, NA: Not Applicable. These recommendations are a minimum requirement, and assuming a flattened building platform is provided. Specific engineering design of foundations may reduce this setback									The recommendations provided within this summary table are based on reduced preliminary site testing for an area wide assesment of the proposed development and are therefore preliminary only. Futher investigation and reporting will be required to support site specific building consents and meet NZ Standard and Territorial Authority specifications. Refer Section 8.0 for further Limitations. NOTE: NA = Not Applicable, NE = Not Encountered, GWT = Ground Water Table, e.g.I. = Existing Ground Level.						
Building platforms within a 100m proximity to a fault avoidance zone may require further investigation building locations are finalised. Lots within a fault avoidance zone may also require further investigation.															

APPENDIX B – DESKTOP INFORMATION



APPENDIX B

250 Ha working Sheep and Beef farm with panoramic views across Lake Taupo, New Zealand

- Self-sufficient gated farm community with its own deep spring water bore, solar and wind power generation with national grid back up.
- Onsite Permaculture produce farm providing residents with fresh organic fruit and vegetables, eggs, honey, herbs and cut flowers.
- Residents own a share in the managed farm and have access to home grown lamb and beef cuts to live a self-sufficient healthy lifestyle.
- 25 high-end Residences built with the finest quality finishings and breathtaking views over Lake Taupo and the surrounding vistas.
- 25 2-3-bedroom Cottages aimed at senior residents who want to downsize in a country environment with grassy 'common' spaces and park-like planted surroundings.
- Farm Shop community centre with coffee shop, organic produce, cooking and preserving classes, cut flower arranging and opportunity for residents to help with farm and produce tasks.

- Community Horse stables and recreation barn with pickle ball court and Hobby room

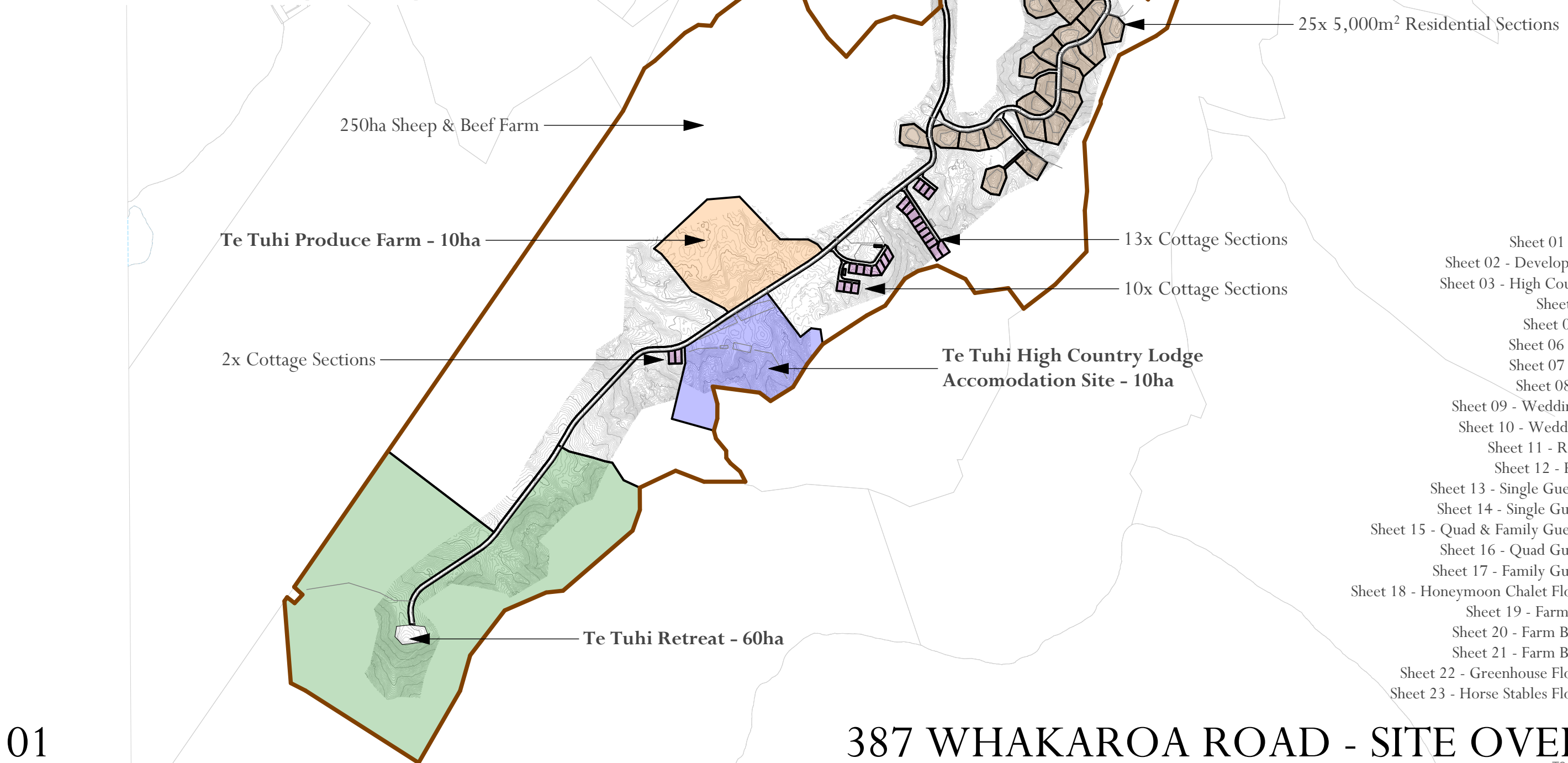
- Te Tuhi High Country Lodge offers a wedding and conference Venue for up to 200-day guests

- 29 Luxury accommodation units offering one-bedroom suites and units, two-bedroom family units and a honeymoon suite.

Accommodation for up to 64 guests

- 40 Seat Degustation restaurant serving organic master chef style menu with meat and produce from the farm.

- Private, 7-bedroom retreat at the end of the peninsula with a private deer farm



Sheet 01 - Site Overview Plan
Sheet 02 - Development Overview Plan
Sheet 03 - High Country Lodge Site Plan
Sheet 04 - Farm Site Plan
Sheet 05 - Cottage Site Plan
Sheet 06 - Residence Site Plan
Sheet 07 - Retreat Floor Plans
Sheet 08 - Retreat Elevations
Sheet 09 - Wedding Venue Floor Plans
Sheet 10 - Wedding Venue Elevations
Sheet 11 - Restaurant Floor Plans
Sheet 12 - Restaurant Elevations
Sheet 13 - Single Guest Chalet Floor Plans
Sheet 14 - Single Guest Chalet Elevations
Sheet 15 - Quad & Family Guest Chalet Floor Plans
Sheet 16 - Quad Guest Chalet Elevations
Sheet 17 - Family Guest Chalet Elevations
Sheet 18 - Honeymoon Chalet Floor Plan & Elevations
Sheet 19 - Farm Building Floor Plans
Sheet 20 - Farm Building 01 Elevations
Sheet 21 - Farm Building 02 Elevations
Sheet 22 - Greenhouse Floor Plan & Elevations
Sheet 23 - Horse Stables Floor Plan & Elevations



RESIDENTIAL DWELLINGS
- 25x 5000m² Sections with high end dwellings clad in stone and dark timber/shiplap claddings with coloursteel roofing

RESIDENTIAL DWELLINGS

PRODUCE LOT
- Large produce section with intergrated water system and solar farm. Produce and animals with horse stables and arena. Large glass houses and barn shop. Truffle tree valley and fruit orchards

PRODUCE LOT

13x COTTAGES

10x COTTAGES

COTTAGES
- 25x Sections with high end cottage dwellings clad in stone and dark timber/shiplap claddings with coloursteel roofing

WEDDING VENUE
- Large section with Wedding Venue & Restaurant. Chalets for guest accomodation including single units and family units. Honeymoon suite

2x COTTAGES

WEDDING VENUE





RESTAURANT & WEDDING VENUE

- Commercial Restaurant seating 50 guests
- Wedding Venue suited for up to 200 guests with prep kitchen, bar & buffet



SCENIC WALKING TRACK
- Gravel walking track through botanical garden & bush including NZ native planting

RESTAURANT & WEDDING VENUE
- Commercial Restaurant seating 50 guests
- Wedding Venue suited for up to 200 guests with prep kitchen, bar & buffet

HONEYMOON SUITE

single bedroom suite, 1 bathroom & 1 living space with kitchenette.
private parking and scenic outlook

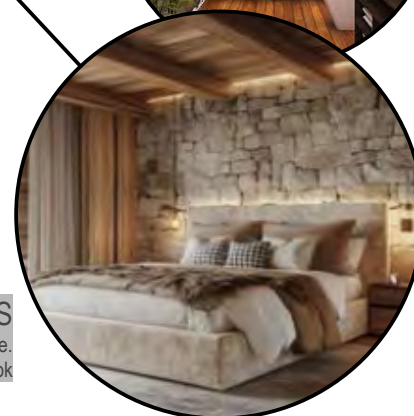


SINGLE BEDROOM & FAMILY SUITES

9x single bedroom suites, 1 bathroom & 1 living space with kitchenette.
1x family suite, 3 bedroom, 2 bathroom & living space with kitchen
private parking and scenic outlook

SINGLE BEDROOM SUITES

SINGLE BEDROOM SUITES
14x single bedroom suites, 1 bathroom & 1 living space with kitchenette.
private parking and scenic outlook



MAIN FARM BUILDINGS

- Main buildings providing packing facilities and farm equipment. Large drive through garage space for packing trucks

SOLAR FARM

- Solar farm providing farm with private power grid system



CROP PLOTS

- Large vege crop plots providing fresh vegetables to residence & restaurant



TRUFFLE OAK TREES

ORCHARD

SOLAR FARM

GLASS HOUSE

CITRUS

HORSE ARENA

WORKERS ACCOMMODATION

PASTURE

CROPS

CROPS

CROPS

CHICKEN RUN

CHICKEN RUN

CHICKEN RUN

CHICKEN CROP

FARM SHOP

PEN

CORN CROPS

SUNFLOWERS

MARKET FLOWERS

MARKET FLOWERS

SUNFLOWERS

CORN CROPS

STORMWATER IRRIGATION POND

PET PASTURE



FARM ANIMALS

- Large roaming chicken pens with custom shelters

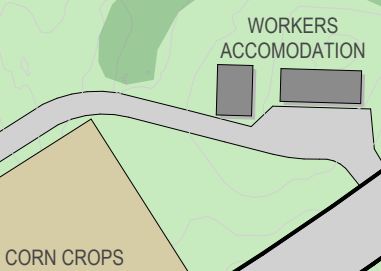


ROADSIDE CROPS & FLOWERS

- Large crop and sunflower fields with market grade flower gardens at site entry



LANE SIDE PLANTING
Japanese Cherry Blossom Trees down lane roads with low grasses and flower planting beds



CORN CROPS



WORKERS
ACCOMODATION

GRASSED
COMMON

COTTAGES
Modern schist stone clad cottages with onsite garage parking. cottages to be 170m2, 3 bedroom, 2 bathroom



COTTAGES
Modern schist stone clad cottages with onsite garage parking. cottages to be 170m2, 3 bedroom, 2 bathroom



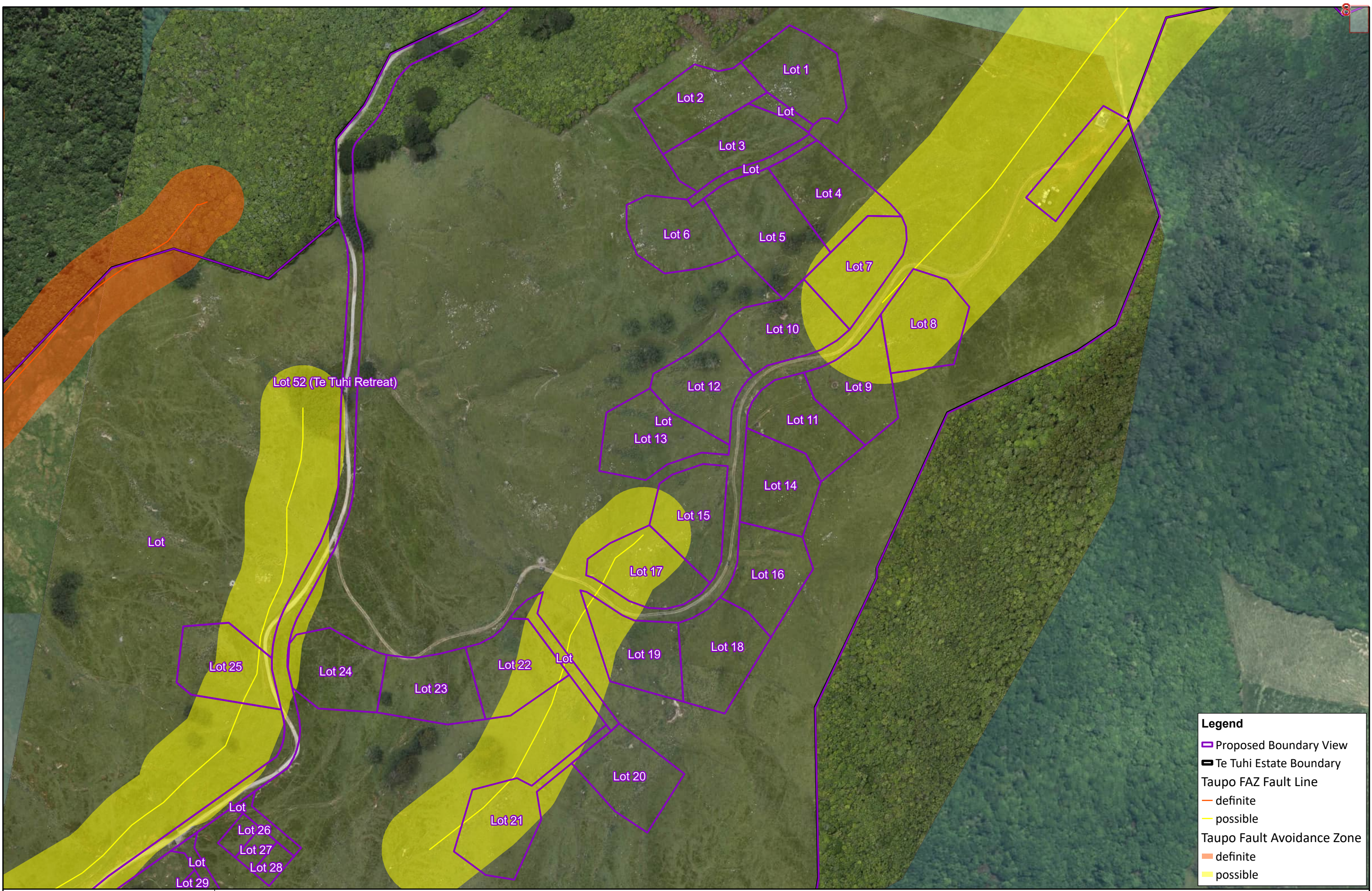
RESIDENTIAL DWELLINGS

High end architectural homes clad with schist stone & dark aluminium or similar cladding. Dwellings are to be of 350-450m² with onsite garaging, landscaping planting, hardscaping and driveways to be completed with the build



RESIDENTIAL DWELLINGS

High end architectural homes clad with schist stone & dark aluminium or similar cladding. Dwellings are to be of 350-450m² with onsite garaging, landscaping planting, hardscaping and driveways to be completed with the build



GENERAL NOTES
1. Coordinates are in terms of New Zealand Transverse Mercator
DISCLAIMER
GIS data and imagery are for indicative purposes only.
Cadastral information sourced from LINZ. Crown copyright reserved.



T24Consult Page 1452 of 1585



GENERAL NOTES
1. Coordinates are in terms of New Zealand Transverse Mercator
DISCLAIMER
GIS data and imagery are for indicative purposes only.
Cadastral information sourced from LINZ. Crown copyright reserved.

LOTS 26-48

0153060

1:1,500 at A3

Export Date: 22/04/2026 2:50 PM

T24Consult Page 1453 of 1565



GENERAL NOTES
1. Coordinates are in terms of New Zealand Transverse Mercator
DISCLAIMER
GIS data and imagery are for indicative purposes only.
Cadastral information sourced from LINZ. Crown copyright reserved.

LOTS 48-51

02550100 m

1:2,500 at A3

Export Date: 22/04/2026 2:49 PM

APPENDIX C – CLIQ ASSESSMENT



APPENDIX C

- 250 Ha working Sheep and Beef farm with panoramic views across Lake Taupo, New Zealand
- Self-sufficient gated farm community with its own deep spring water bore, solar and wind power generation with national grid back up.
 - Onsite Permaculture produce farm providing residents with fresh organic fruit and vegetables, eggs, honey, herbs and cut flowers.
 - Residents own a share in the managed farm and have access to home grown lamb and beef cuts to live a self-sufficient healthy lifestyle.
 - 25 high-end Residences built with the finest quality finishings and breathtaking views over Lake Taupo and the surrounding vistas.
 - 25 2-3-bedroom Cottages aimed at senior residents who want to downsize in a country environment with grassy 'common' spaces and park-like planted surroundings.
 - Farm Shop community centre with coffee shop, organic produce, cooking and preserving classes, cut flower arranging and opportunity for residents to help with farm and produce tasks.
 - Community Horse stables and recreation barn with pickle ball court and Hobby room
 - Te Tuhi High Country Lodge offers a wedding and conference Venue for up to 200-day guests
 - 29 Luxury accommodation units offering one-bedroom suites and units, two-bedroom family units and a honeymoon suite.
- Accommodation for up to 64 guests
- 40 Seat Degustation restaurant serving organic master chef style menu with meat and produce from the farm.
 - Private, 7-bedroom retreat at the end of the peninsula with a private deer farm

250ha Sheep & Beef Farm

Te Tuhi Produce Farm - 10ha

2x Cottage Sections

Te Tuhi Retreat - 60ha

Te Tuhi High Country Lodge
Accommodation Site - 10ha

CPT01

CPT03

CPT02

CPT04

13x Cottage Sections

10x Cottage Sections

25x 5,000m² Residential Sections

Private Road

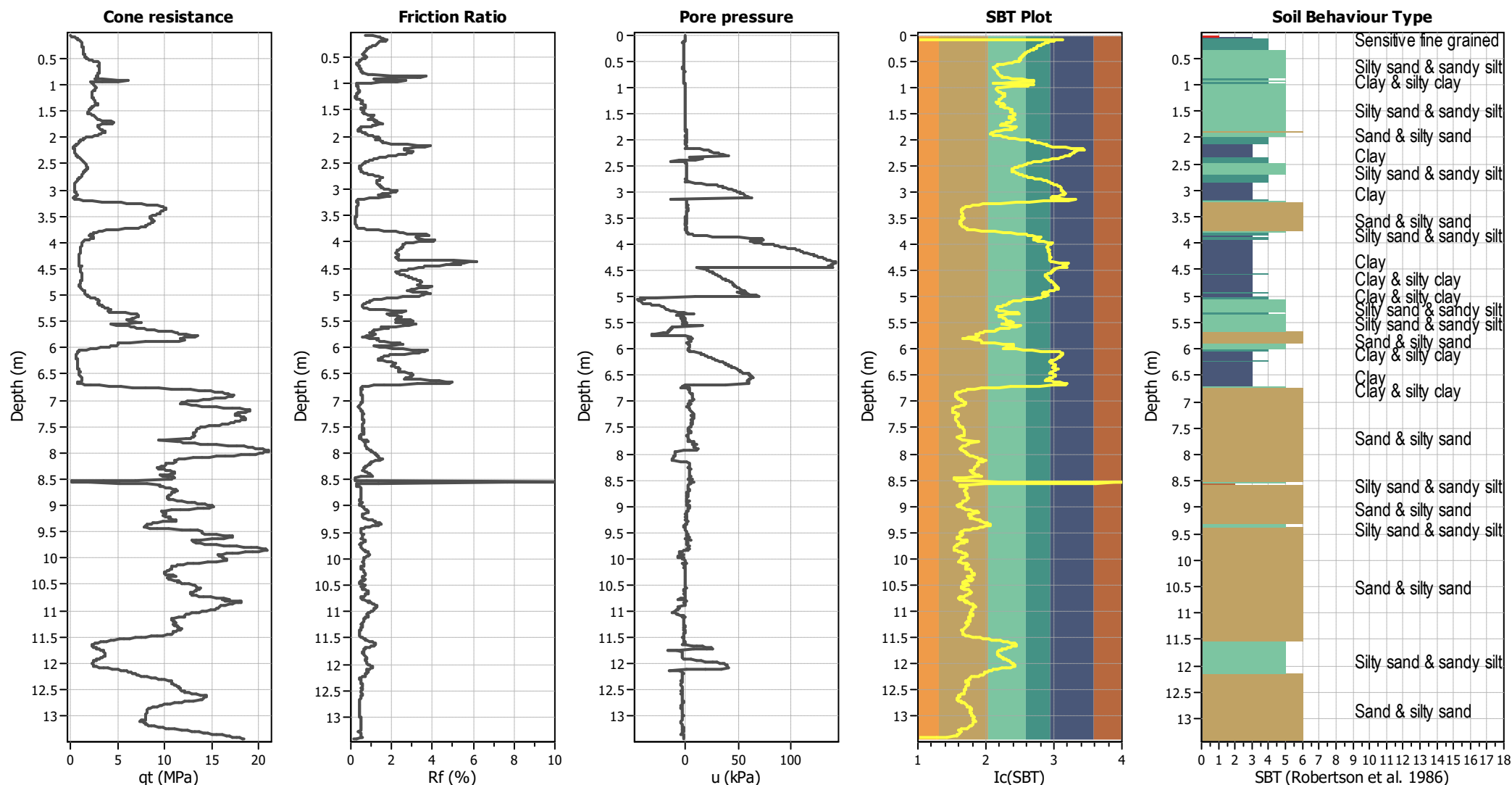
Farm Manager's
Residence

3x 4ha Blocks

Whakaroa Rd

- Sheet 01 - Site Overview Plan
- Sheet 02 - Development Overview Plan
- Sheet 03 - High Country Lodge Site Plan
- Sheet 04 - Farm Site Plan
- Sheet 05 - Cottage Site Plan
- Sheet 06 - Residence Site Plan
- Sheet 07 - Retreat Floor Plans
- Sheet 08 - Retreat Elevations
- Sheet 09 - Wedding Venue Floor Plans
- Sheet 10 - Wedding Venue Elevations
- Sheet 11 - Restaurant Floor Plans
- Sheet 12 - Restaurant Elevations
- Sheet 13 - Single Guest Chalet Floor Plans
- Sheet 14 - Single Guest Chalet Elevations
- Sheet 15 - Quad & Family Guest Chalet Floor Plans
- Sheet 16 - Quad Guest Chalet Elevations
- Sheet 17 - Family Guest Chalet Elevations
- Sheet 18 - Honeymoon Chalet Floor Plan & Elevations
- Sheet 19 - Farm Building Floor Plans
- Sheet 20 - Farm Building 01 Elevations
- Sheet 21 - Farm Building 02 Elevations
- Sheet 22 - Greenhouse Floor Plan & Elevations
- Sheet 23 - Horse Stables Floor Plan & Elevations

CPT basic interpretation plots



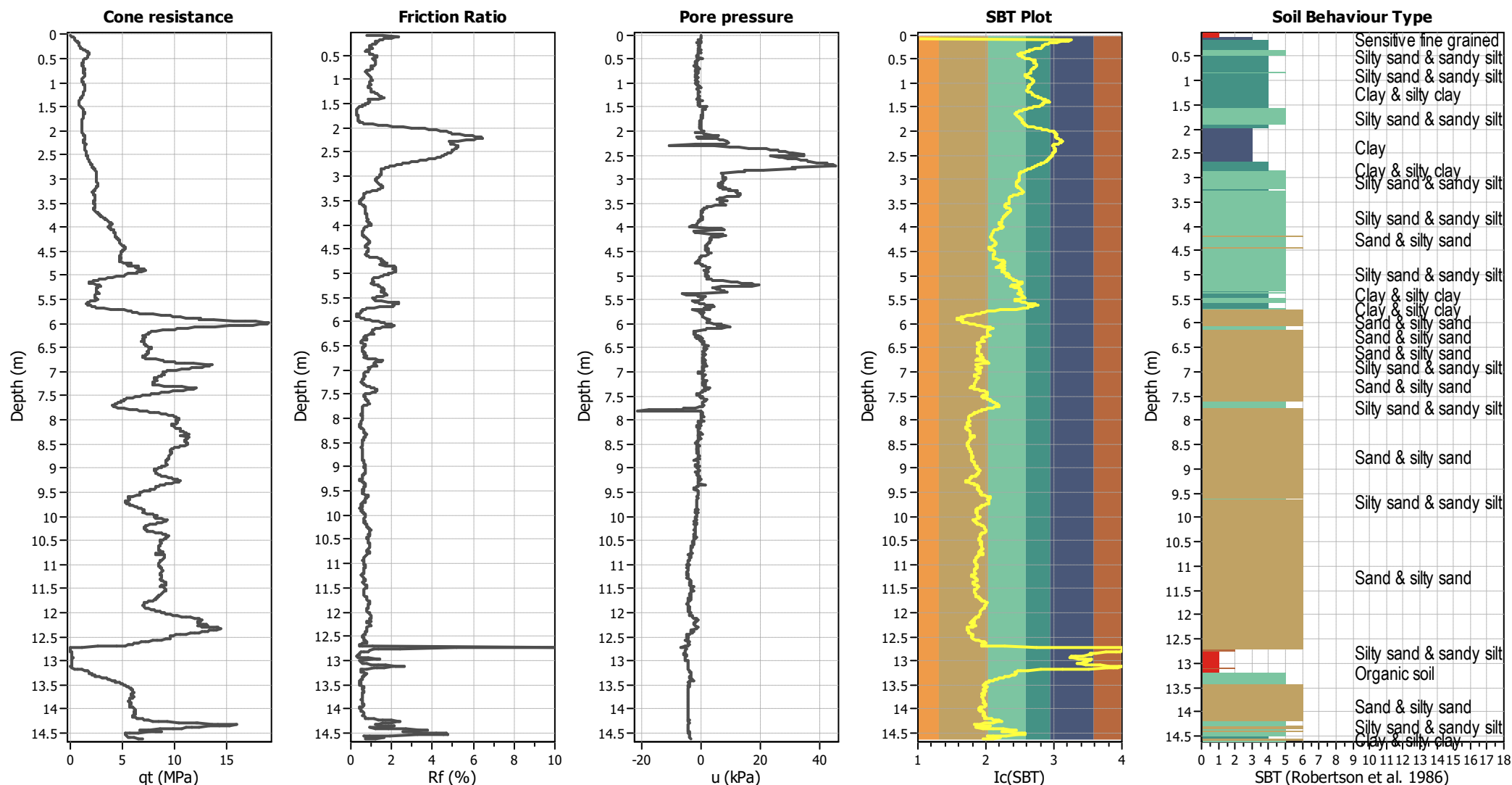
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on I_c value	I_c cut-off value:	2.60	K_g applied:	Yes
Earthquake magnitude M_w :	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots



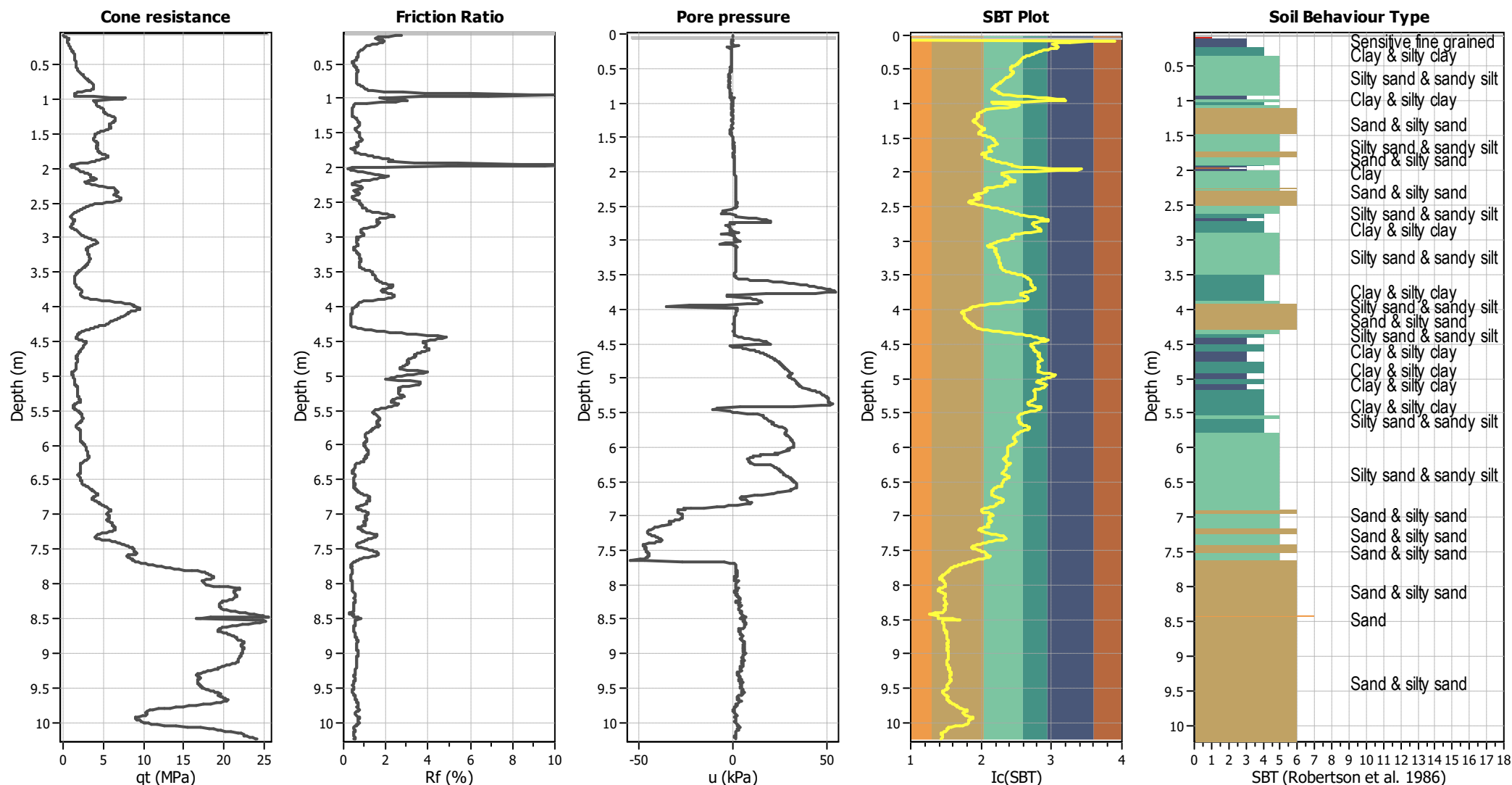
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K ₀ applied:	Yes
Earthquake magnitude M _w :	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots



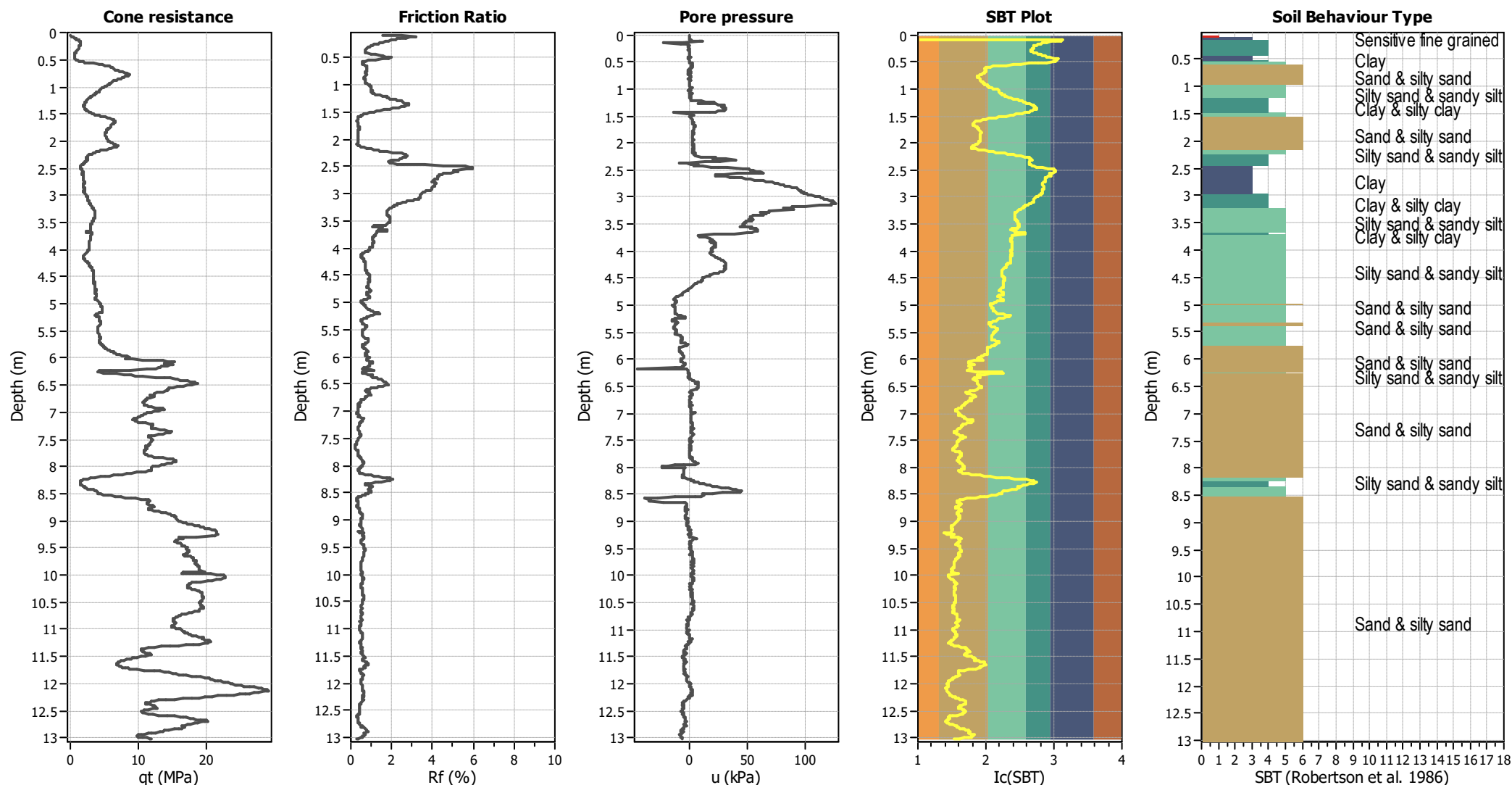
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w :	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots



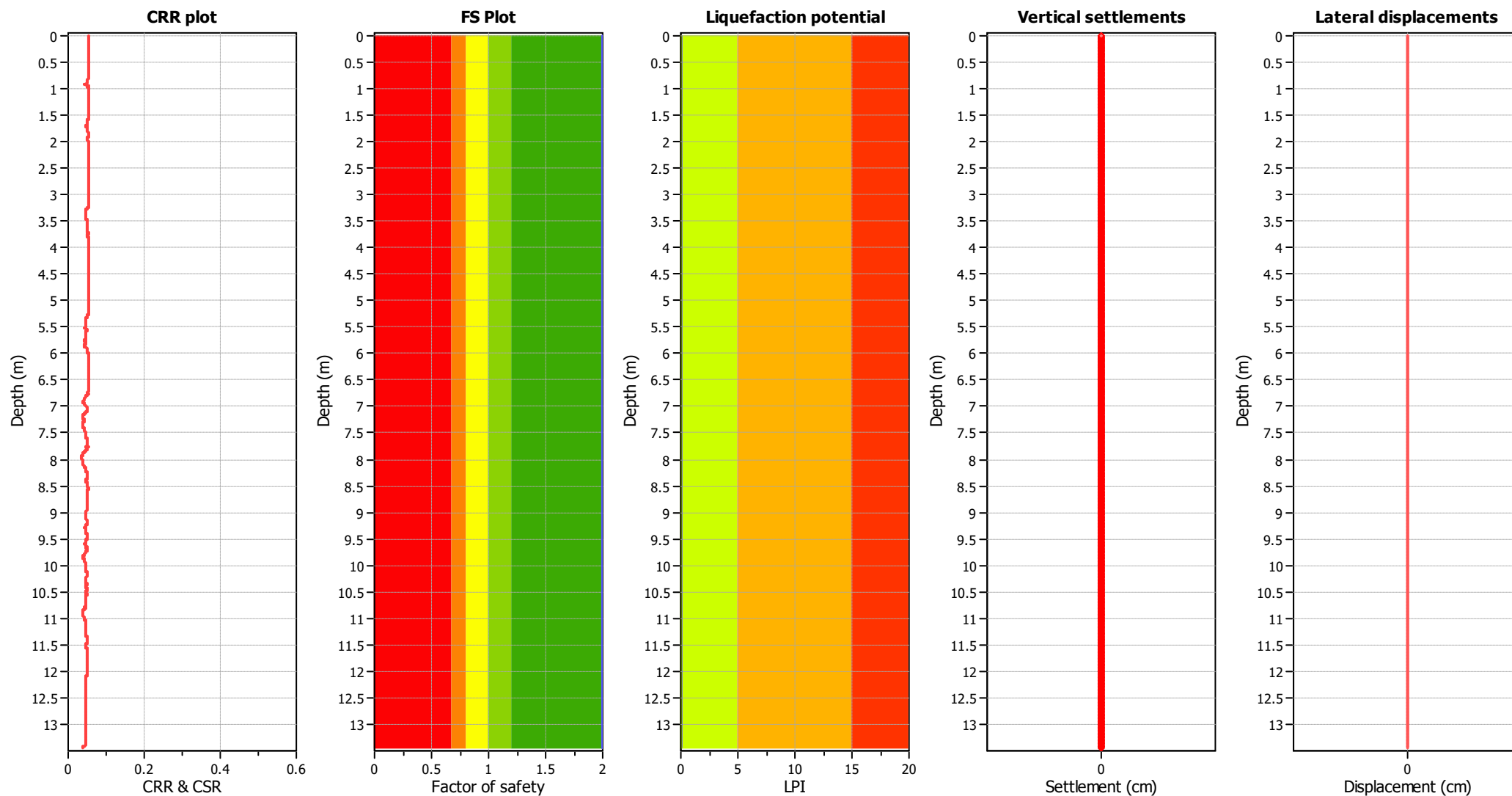
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on I_c value	I_c cut-off value:	2.60	K_G applied:	Yes
Earthquake magnitude M_w :	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

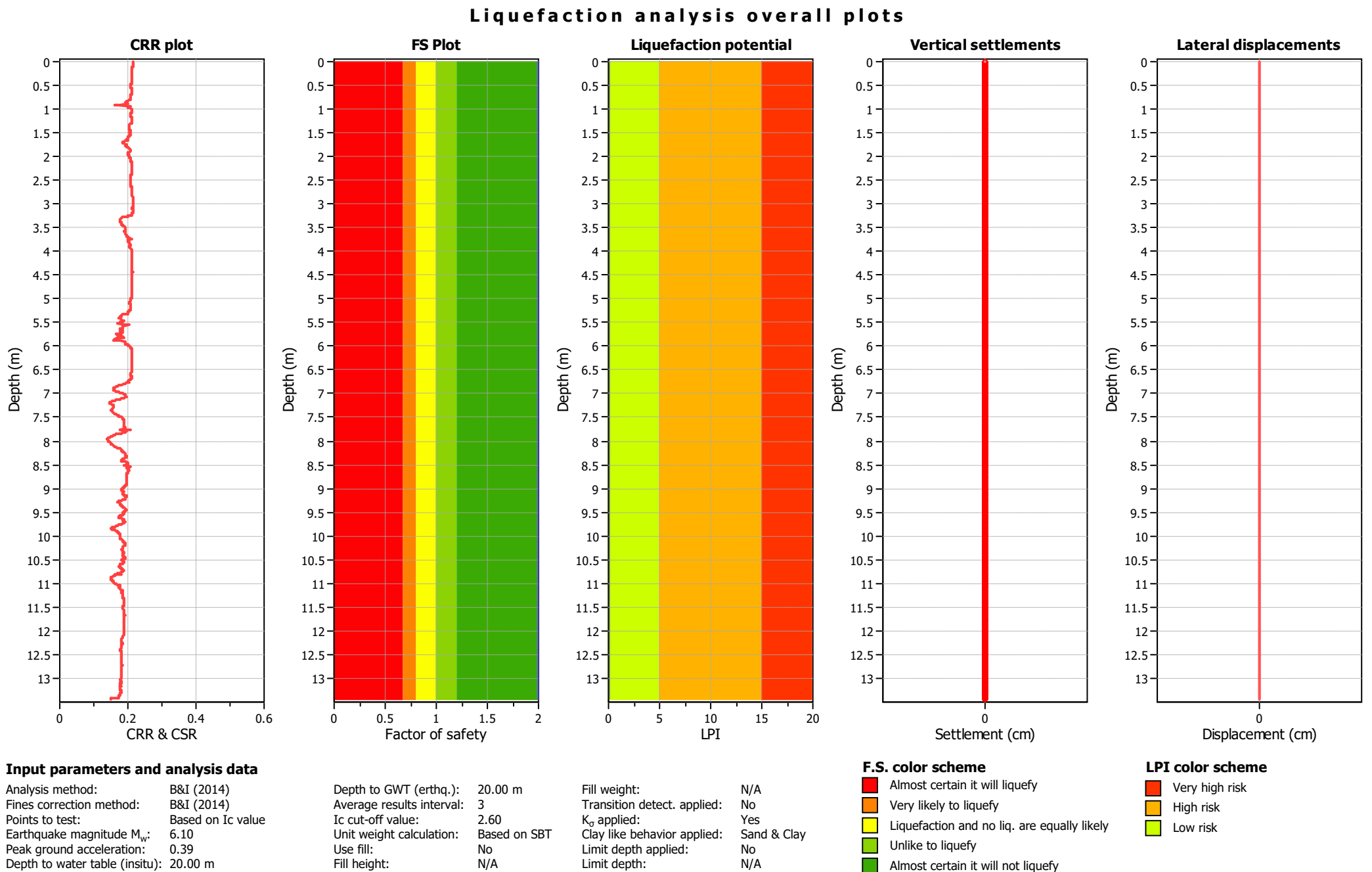
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 m	Fill height:	N/A	Limit depth:	N/A

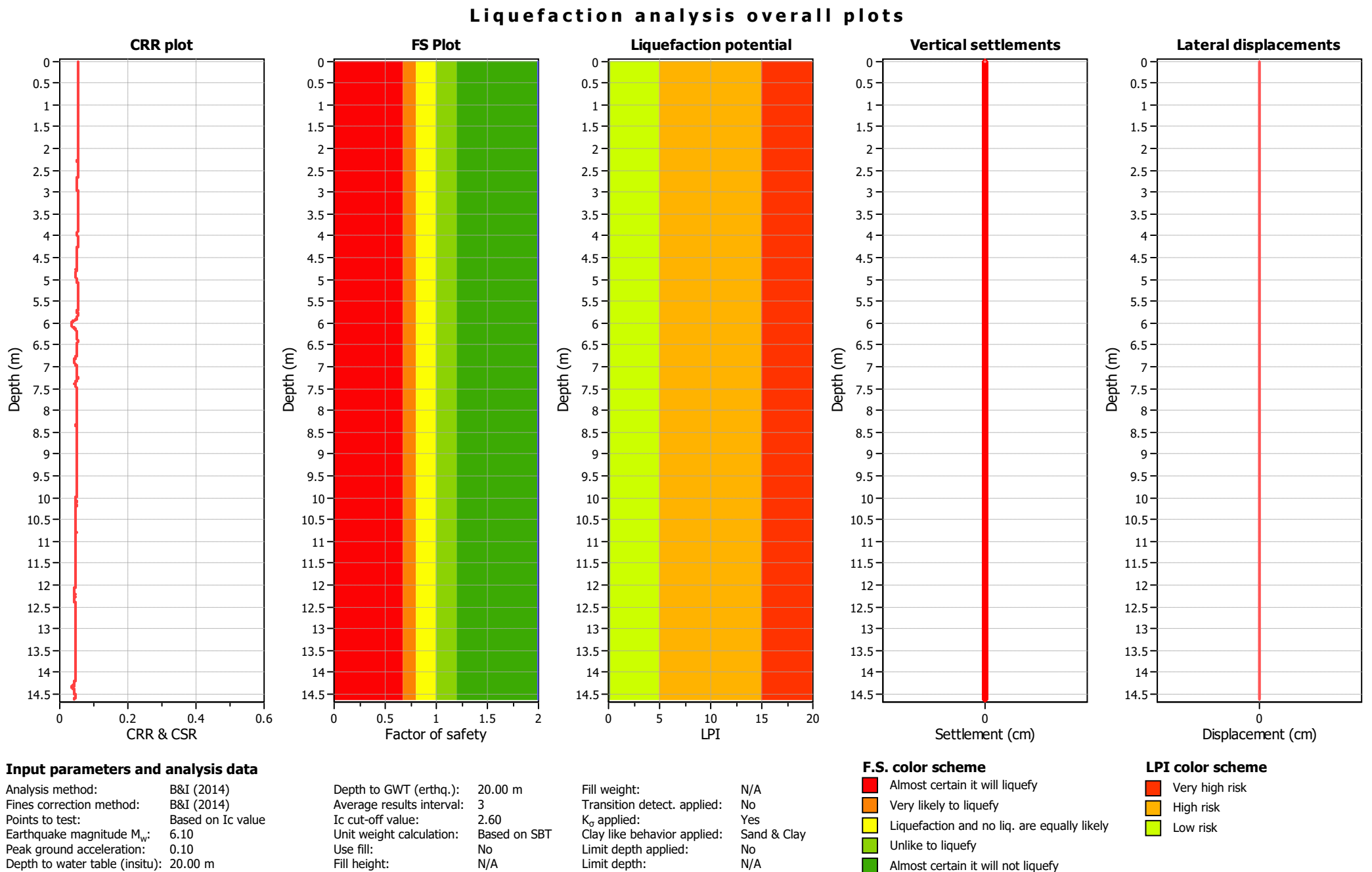
F.S. color scheme

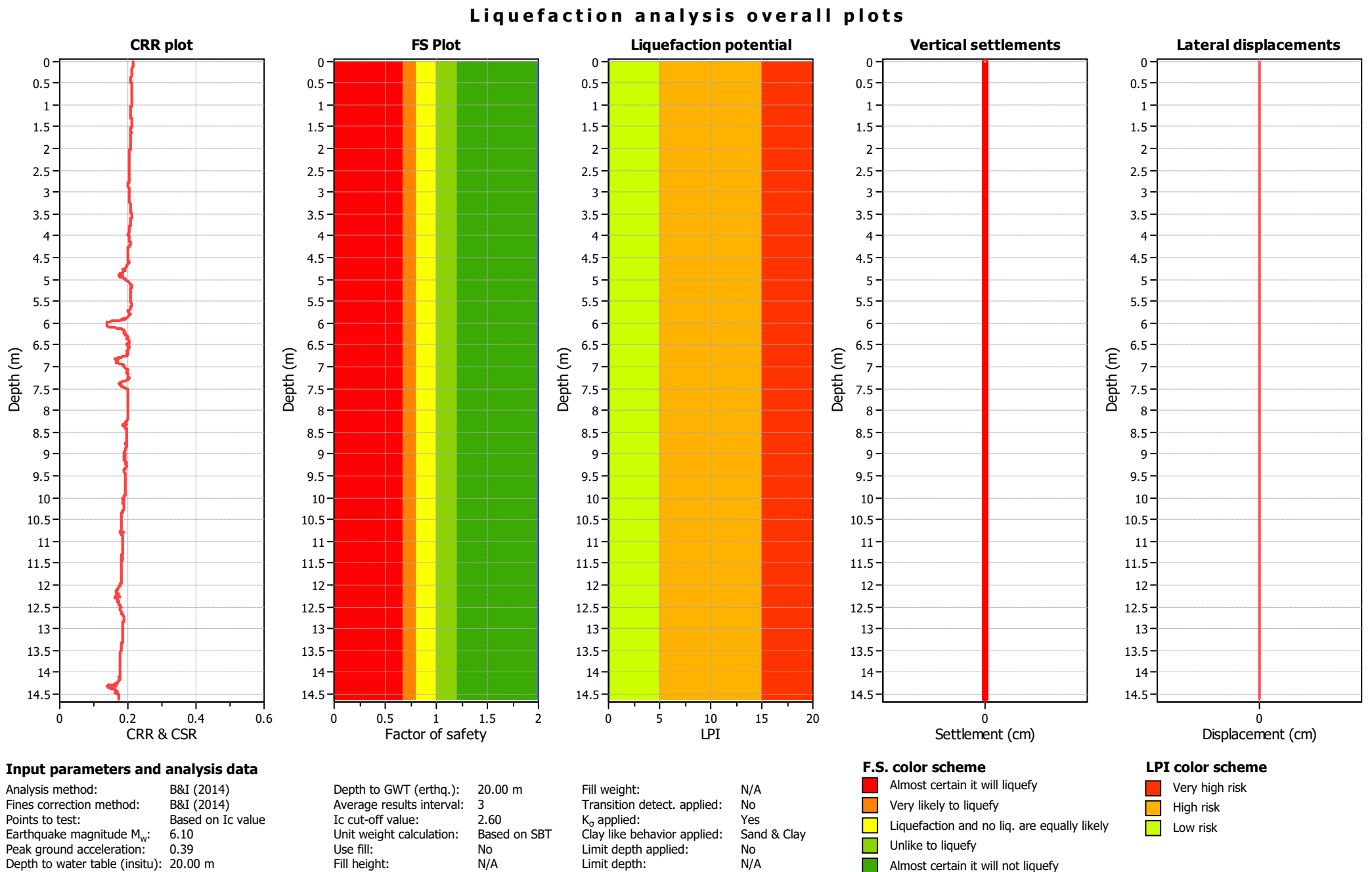
Red	Almost certain it will liquefy
Orange	Very likely to liquefy
Yellow	Liquefaction and no liq. are equally likely
Light Green	Unlike to liquefy
Dark Green	Almost certain it will not liquefy

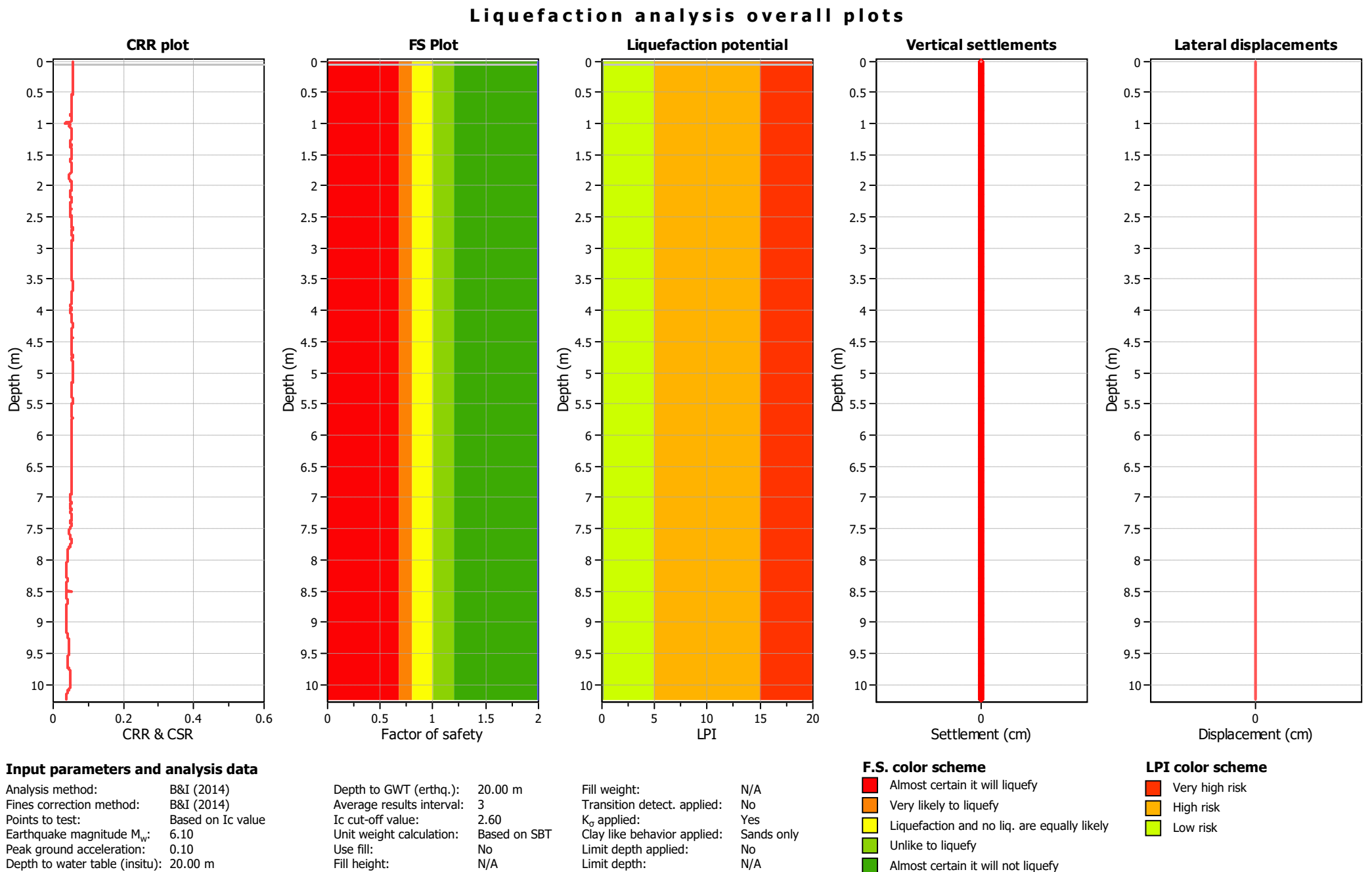
LPI color scheme

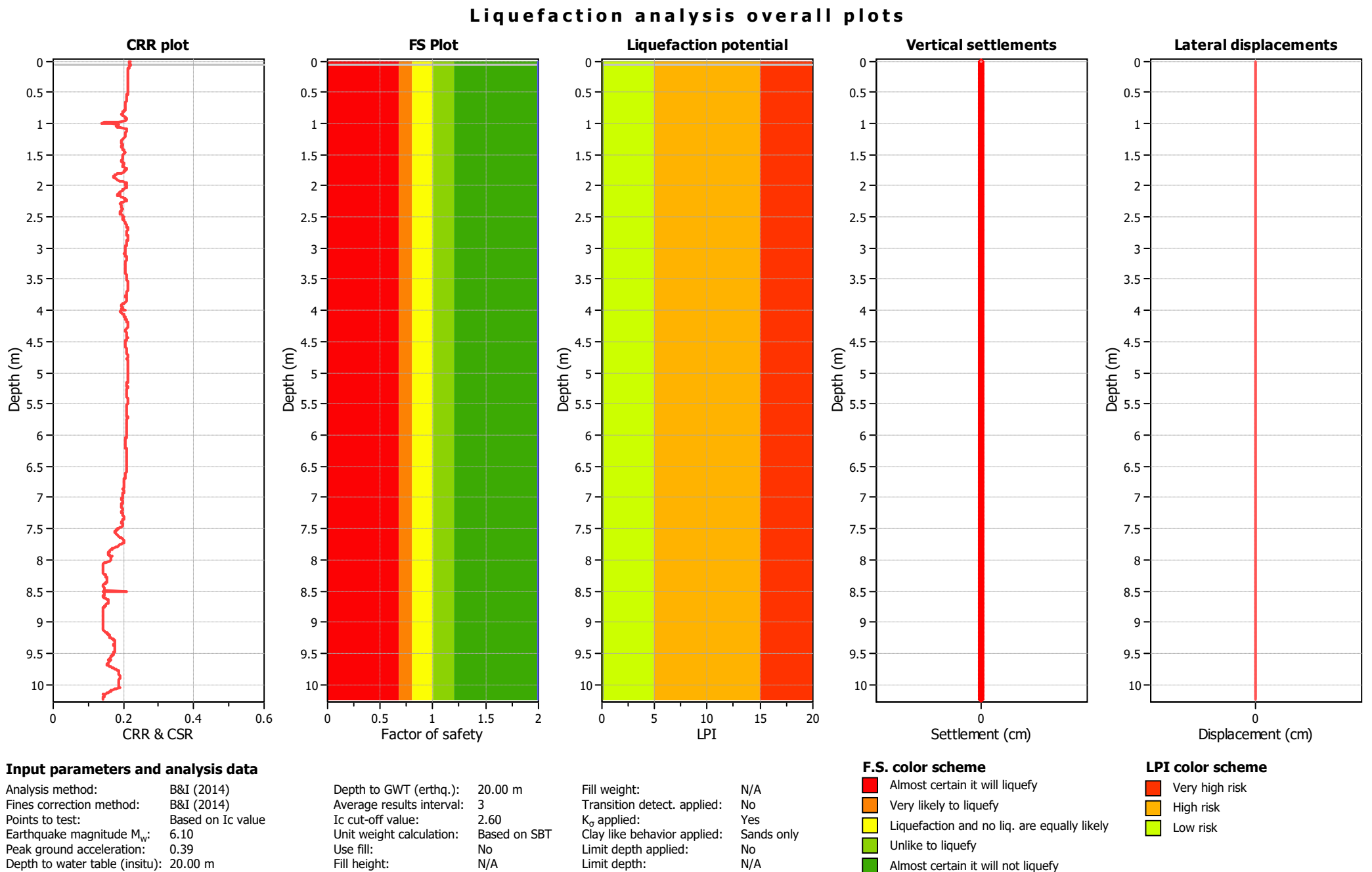
Red	Very high risk
Orange	High risk
Yellow	Low risk



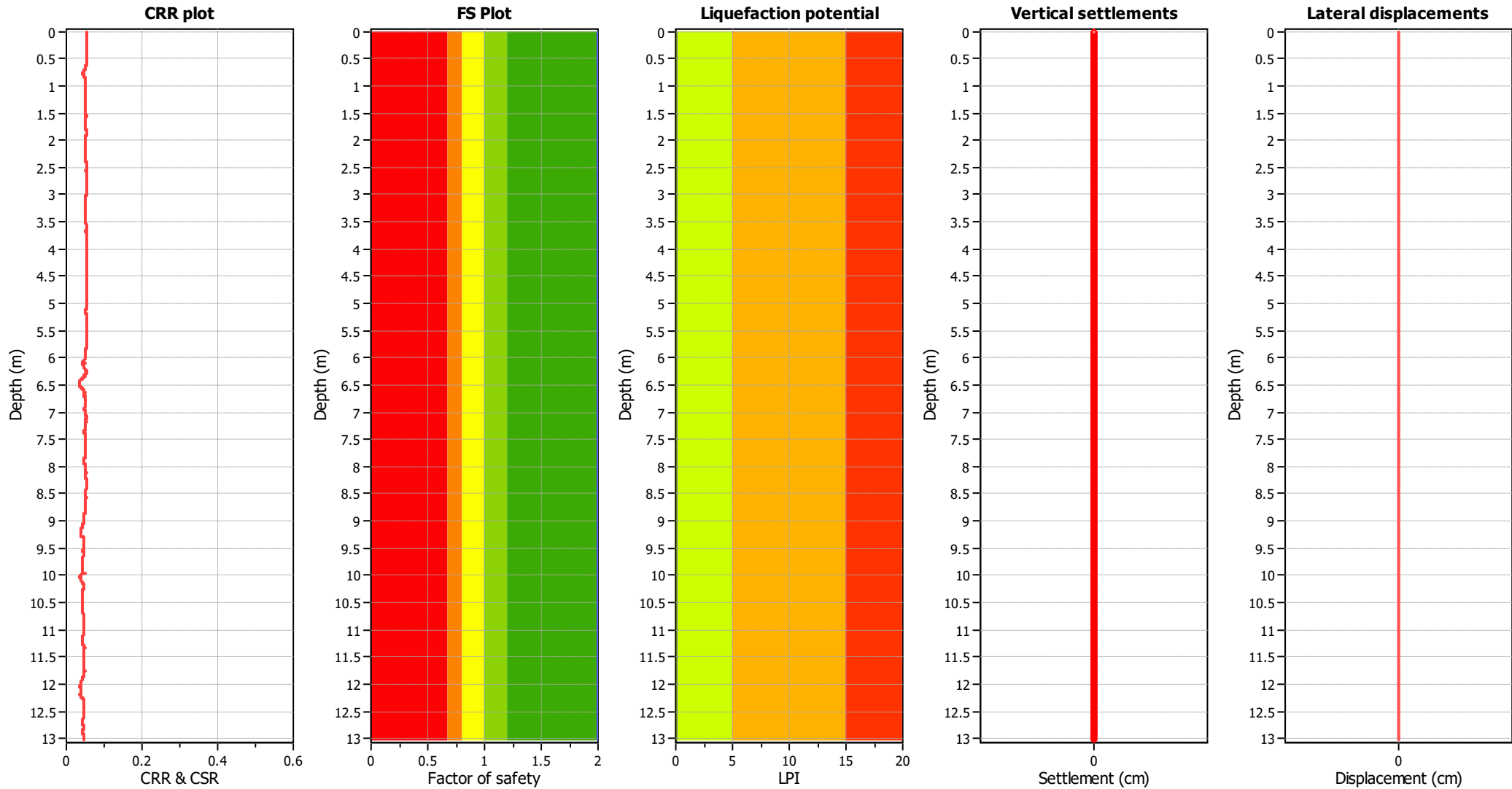








Liquefaction analysis overall plots



Input parameters and analysis data

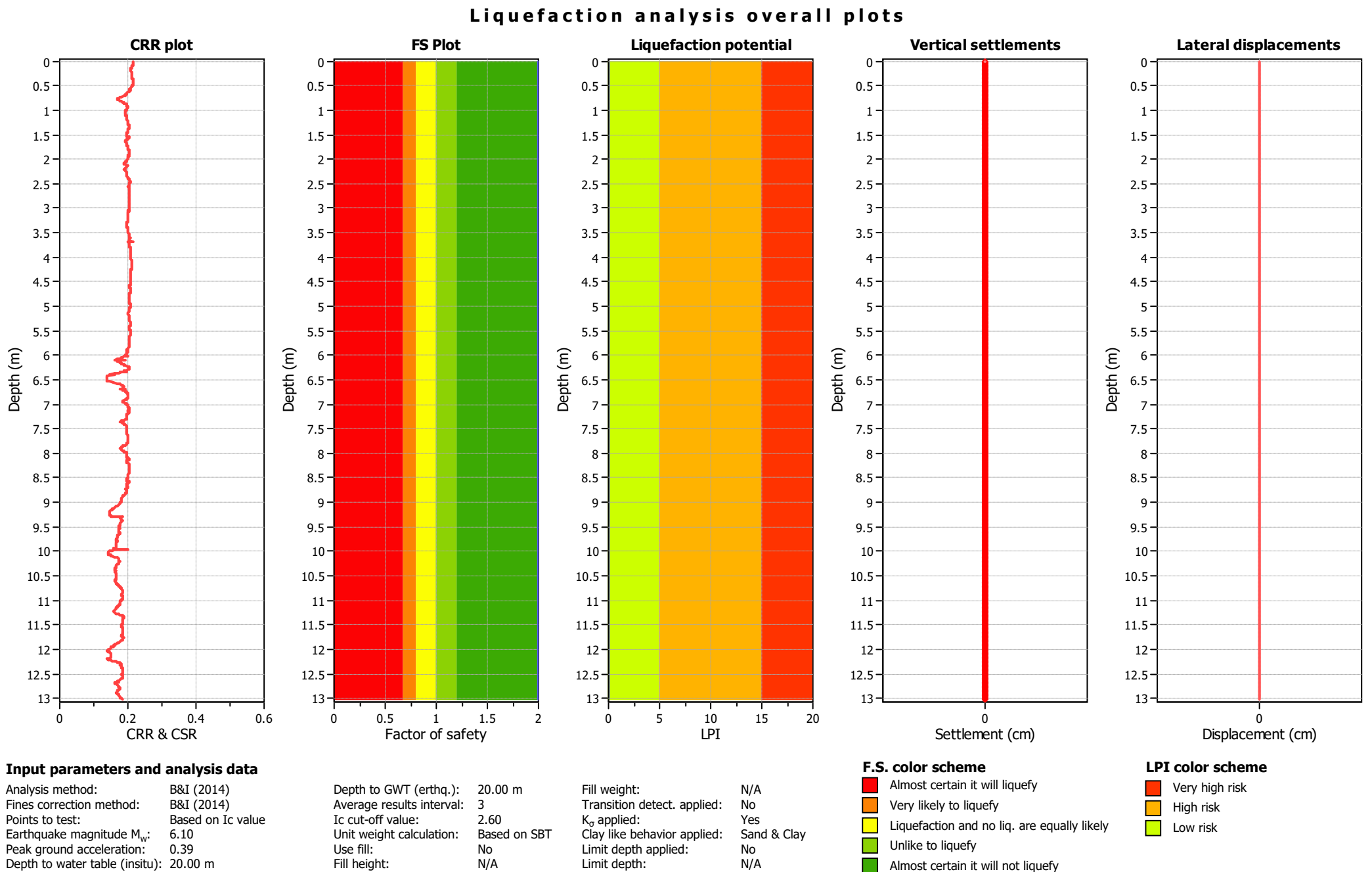
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _σ applied:	Yes
Earthquake magnitude M _w :	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.10	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

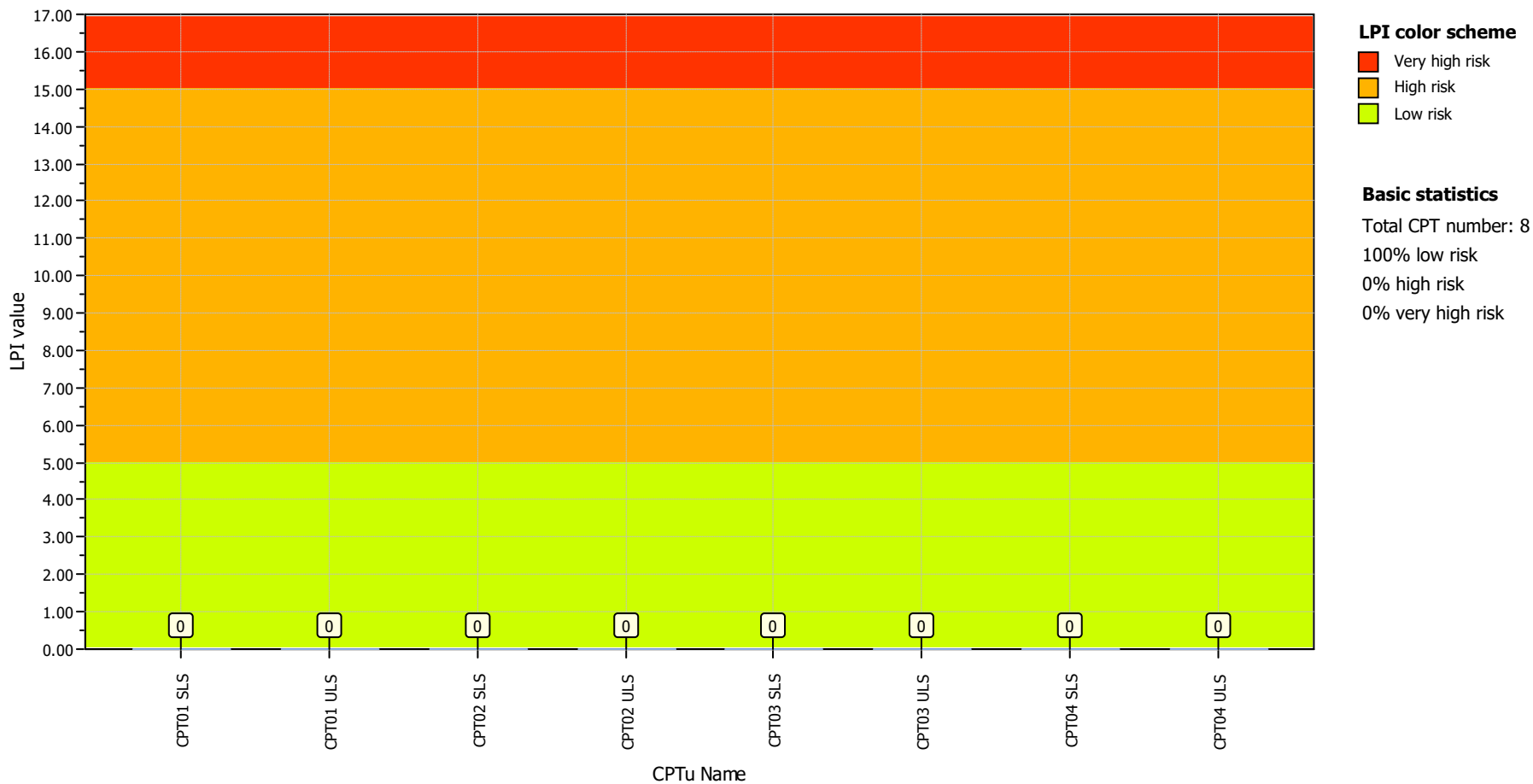
- Very high risk
- High risk
- Low risk



Project title : 260139-SR01 PGR

Location : 387 Whakaroa Road, Taupo

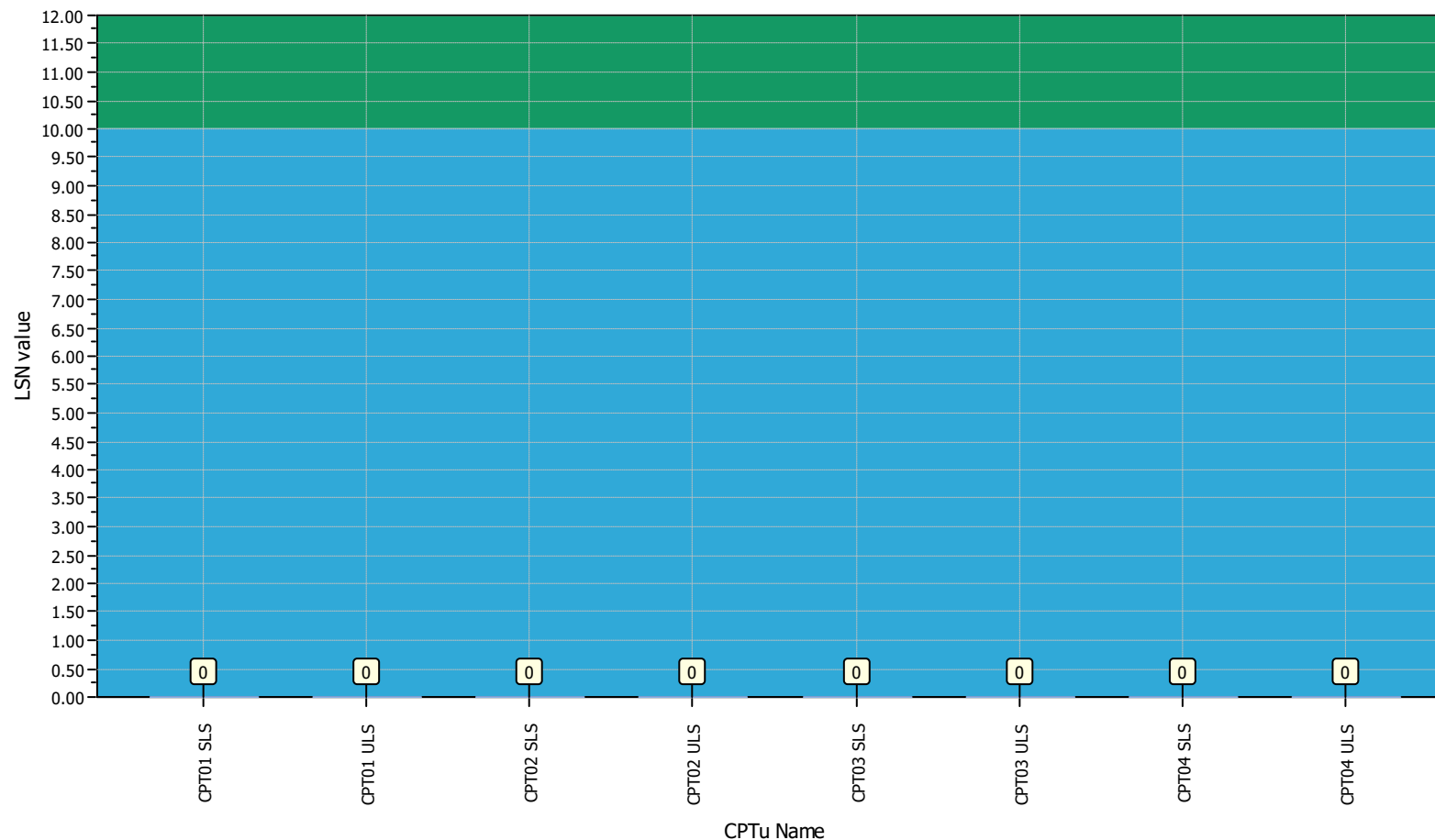
Overall Liquefaction Potential Index report



Project title : 260139-SR01 PGR

Location : 387 Whakaroa Road, Taupo

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

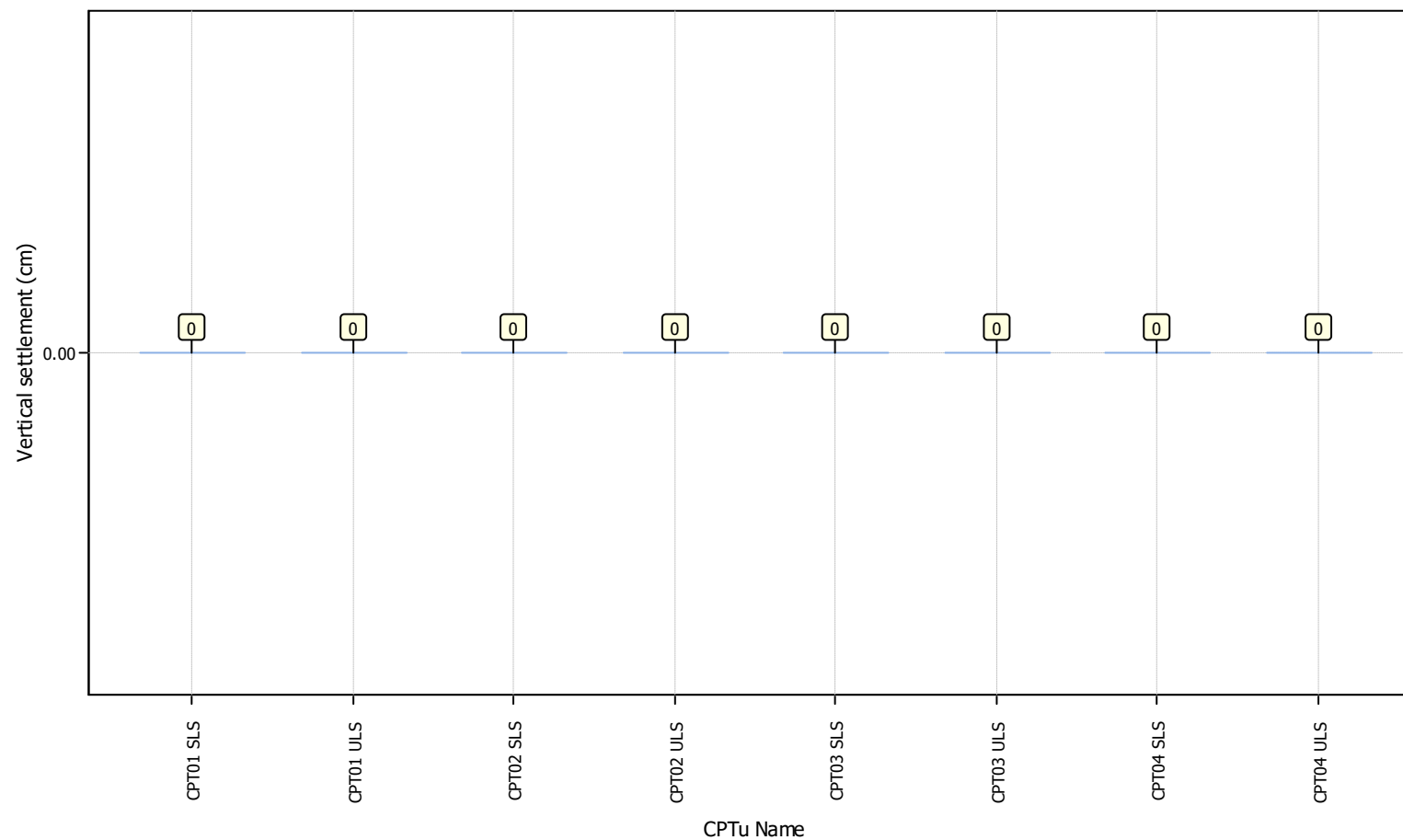
Basic statistics

Total CPT number: 8
 100% little liquefaction
 0% minor liquefaction
 0% moderate liquefaction
 0% moderate to major liquefaction
 0% major liquefaction
 0% severe liquefaction

Project title : 260139-SR01 PGR

Location : 387 Whakaroa Road, Taupo

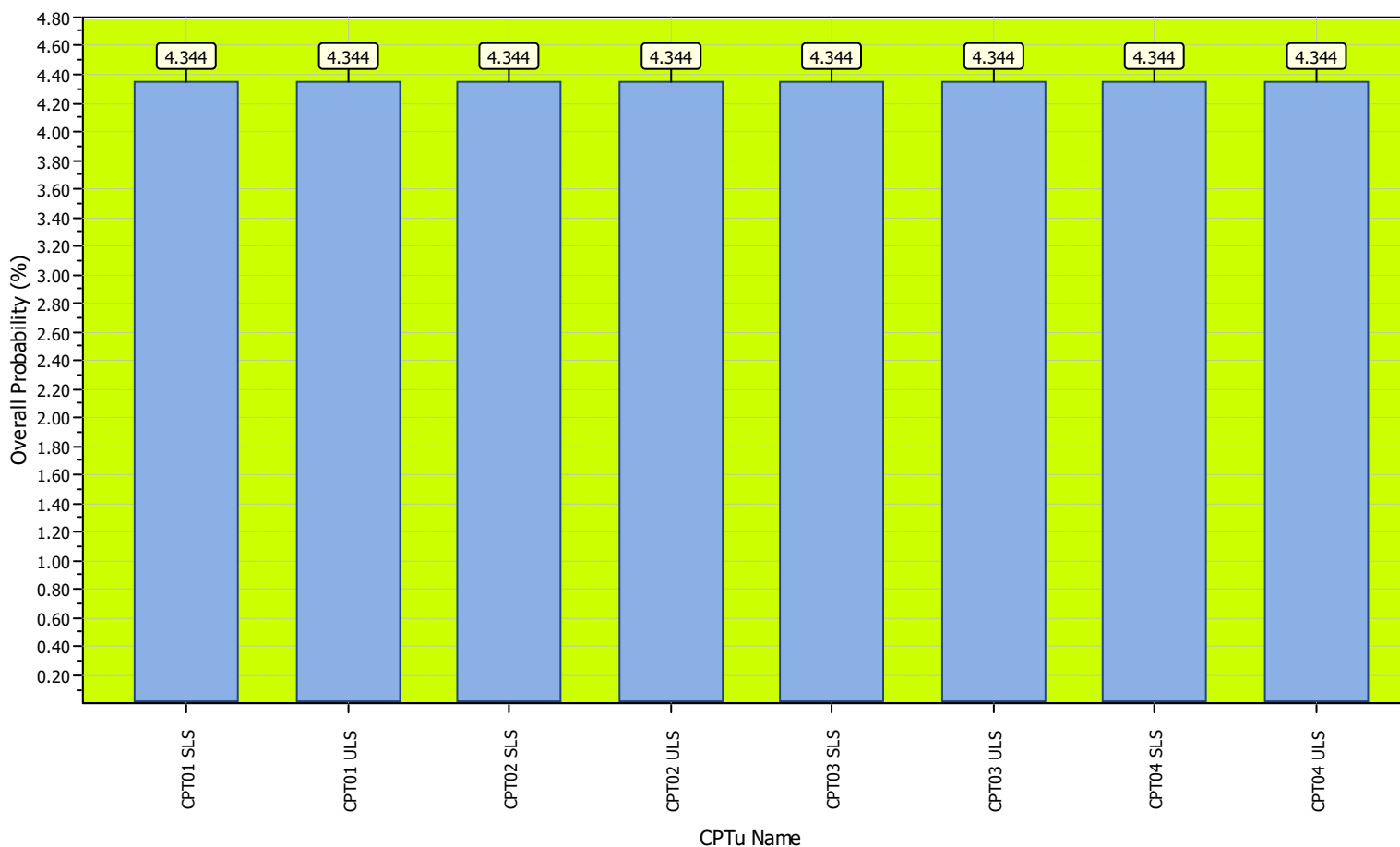
Overall vertical settlements report



Project title : 260139-SR01 PGR

Location : 387 Whakaroa Road, Taupo

Overall Probability for Liquefaction report



Probability color scheme

- Very High Probability
- High Probability
- Low Probability

Basic statistics

Total CPT number: 8
100% low probability
0% high probability
0% very high probability

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 02/06/2026
First name: Kirsteen **Last name:** McDonald
Organisation: McKenzie and Co Consultants Ltd
Preferred method of contact Email
Postal address: PO Box 1325, Taupo, New Zealand, 3351
Email: kirsteen@mccl.co.nz
Daytime Phone: 021563066
Would you like to present your submission in person at a hearing? *
 Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: GRZ-R1 PER activities (deletions)

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

The structures should be provided for as EXCEPTIONS to GRZ-R5.1.

GRZ-R5.1 Maximum Combined Coverage

EXCEPTIONS:

- Fences or walls of 2m in height or less above ground level or retaining walls of 2m in depth or less below ground level;
- Masts and poles less than 2m in height above ground level;
- Radio and television aerials (excluding dish antenna greater than 1.2m in diameter), less than 2m in height
- Uncovered decks not more than 1m above ground level
- Uncovered swimming pools no higher than 1m above ground level
- Up to 0.6m of overhanging eaves
- One building per allotment not exceeding 2m in height and 6m² in GFA provided the height to boundary performance standard is met;

- viii. Temporary structures associated with maintenance activities and construction works;
- ix. Structures that are for the purpose of erosion control or flood protection, for example, debris dams.

The reason for my submission is::

We support the removal of the activities GRZ-R1.5 to 11 as long as they are provided for as exceptions to the standard GRZ-R5.1 as proposed in Plan Change 49 in relation to other zones.

2. Provision: GRZ-R5 Standards > 1. Maximum Combined Coverage

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

The structures should be provided for as EXCEPTIONS to GRZ-R5.1.

GRZ-R5.1 Maximum Combined Coverage

EXCEPTIONS:

- i. Fences or walls of 2m in height or less above ground level or retaining walls of 2m in depth or less below ground level;
- ii. Masts and poles less than 2m in height above ground level;
- iii. Radio and television aerials (excluding dish antenna greater than 1.2m in diameter), less than 2m in height
- iv. Uncovered decks not more than 1m above ground level
- v. Uncovered swimming pools no higher than 1m above ground level
- vi. Up to 0.6m of overhanging eaves
- vii. One building per allotment not exceeding 2m in height and 6m² in GFA provided the height to boundary performance standard is met;
- viii. Temporary structures associated with maintenance activities and construction works;
- ix. Structures that are for the purpose of erosion control or flood protection, for example, debris dams.

The reason for my submission is::

A number of structures that were previously exempt from the definition of building had been provided for as permitted activities as part of the implementation of the National Planning Standards. these will be better provided for as exceptions to standard GRZ-R5.1

3. Provision: GRZ-R5 Standards > 2. Maximum Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain as notified

The reason for my submission is::

We support the removal of plot ratio

4. Provision: MRZ-R1 Permitted activity (deletions)**I seek an amendment to the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

The structures should be provided for as EXCEPTIONS to MRZ-R6.1

The reason for my submission is::

A number of structures that were previously exempt from the definition of building were provided for as permitted activities. We agree with them being deleted from MRZ-R1 providing they are added as exceptions to the standard MRZ-R6.1.

5. Provision: MRZ-R6 Standards > 1. Maximum Combined Coverage**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain with the addition of exceptions for structure previously exempt from the definition of building.

MRZ-R6.1 Maximum Combined Coverage

EXCEPTIONS:

- i. Fences or walls of 2m in height or less above ground level or retaining walls of 2m in depth or less below ground level;
- ii. Masts and poles less than 2m in height above ground level;
- iii. Radio and television aerials (excluding dish antenna greater than 1.2m in diameter), less than 2m in height
- iv. Uncovered decks not more than 1m above ground level
- v. Uncovered swimming pools no higher than 1m above ground level
- vi. Up to 0.6m of overhanging eaves
- vii. One building per allotment not exceeding 2m in height and 6m² in GFA provided the height to boundary performance standard is met;
- viii. Temporary structures associated with maintenance activities and construction works;
- ix. Structures that are for the purpose of erosion control or flood protection, for example, debris dams.

The reason for my submission is::

We support the increase in maximum combined coverage to 60%

6. Provision: MRZ-R6 Standards > 2. Maximum Plot Ratio (deletion)**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Retain as notified

The reason for my submission is::

We support the removal of plot ratio

7. Provision: LRZ-R5 Standards > 1. Maximum Combined Coverage**I seek an amendment to the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

LRZ-R5.1 Maximum Combined Coverage

EXCEPTIONS:

- i. Fences or walls of 2m in height or less above ground level or retaining walls of 2m in depth or less below ground level;
- ii. Masts and poles less than 2m in height above ground level;
- iii. Radio and television aerials (excluding dish antenna greater than 1.2m in diameter), less than 2m in height
- iv. Uncovered decks not more than 1m above ground level
- v. Uncovered swimming pools no higher than 1m above ground level
- vi. Up to 0.6m of overhanging eaves
- vii. One building per allotment not exceeding 2m in height and 6m² in GFA provided the height to boundary performance standard is met;
- viii. Temporary structures associated with maintenance activities and construction works;
- ix. Structures that are for the purpose of erosion control or flood protection, for example, debris dams.
- x. Water tanks. .

The reason for my submission is::

A number of structures that were previously exempt from the definition of building have been provided for as permitted activities. If these permitted activities are to be deleted these exemptions should be provided for as exceptions to the standard for maximum combined coverage.

8. Provision: LRZ-R5 Standards > 2. Maximum Plot Ratio (deletion)**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

retain as notified

The reason for my submission is::

We support the removal of plot ratio.



2 June 2026

Attn: Taupō District Council
 30 Tongariro St
 Taupō Central
 Taupō 3330
Submission via email: info@taupo.govt.nz

**KĀINGA ORA – HOMES AND COMMUNITIES SUBMISSION ON A NOTIFIED
 PROPOSAL FOR PLAN CHANGE 44 ON THE OPERATIVE TAUPŌ DISTRICT
 PLAN UNDER CLAUSE 6 OF SCHEDULE 1 OF THE RESOURCE MANAGEMENT
 ACT 1991**

**This is a submission on Plan Change 44 – Residential Zones (“PC44”) from Taupō
 District Council (“the Council” or “TDC”) on the Taupō District Plan (“the Plan” or
 “TDP”):**

The specific provisions of the proposal that this submission relates to:

The Plan Change 44 – Residential Zones in its entirety.

The Kāinga Ora – Homes and Communities submission is:

1. Kāinga Ora Homes and Communities (“**Kāinga Ora**”) is a Crown Entity and is required to give effect to Government policies. Kāinga Ora has a statutory objective that requires it to contribute to sustainable, inclusive, and thriving communities that:
 - a) Provide people with good quality, affordable housing choices that meet diverse needs; and
 - b) Support good access to jobs, amenities and services; and
 - c) Otherwise sustain or enhance the overall economic, social, environmental and cultural well-being of current and future generations.

The submission is:

2. Kāinga Ora supports PC44 in part and seeks amendments to specific provisions and chapters related to PC44, as indicated below, and within **Appendix 1** providing the substantive detail of submission matters.
3. Kāinga Ora has an interest in PC44 and how it minimises barriers that constrain the ability for Kāinga Ora to deliver existing, planned and future public housing developments, whilst providing clear and transparent information relating to the ongoing use and development of its housing portfolio.

The amendments Kāinga Ora is seeking are:

Plot Ratio Standard and Definition

4. Kāinga Ora supports the removal of the Plot Ratio standard and its definition from the Taupō District Plan. The plot ratio standard does not always reflect how a development affects its surroundings. In many cases, it can unnecessarily constrain design outcomes, preventing developments that could otherwise achieve high-quality urban design and good environmental performance. By removing this standard, the Plan allows development potential to be shaped more directly by controls that better address the actual impacts of buildings, such as height, setbacks, site coverage, and shading.

General Residential Zone

5. Whilst Kāinga Ora supports providing for up to three dwellings as permitted within the General Residential Zone, Kāinga Ora considers that the Comprehensive Residential Development ('**CRD**') definition and standard are overly complicated. Kāinga Ora seeks that the CRD definition is deleted and that GRZ-R3-3.2 is amended to allow for '*up to three dwellings on a site*' as permitted and remove the need to comply with the listed standards. Kāinga Ora considers that specific non-compliance with the development and performance standards can be assessed individually to assess that compliance in itself. Further, Kāinga Ora seeks specific assessment criteria to reflect those matters restricted to an activity providing for four or more dwellings.
6. Kāinga Ora seeks a height-in-relation-to-boundary plane of 3m plus 45 degrees to better provide for two storey dwellings within the GRZ. Kāinga Ora considers that the 2.5m plus 45 degrees is overly restrictive and then requires a 2m setback from side or rear boundaries.

Medium Density Residential Zone

7. Kāinga Ora supports the changes to the Medium Density Residential Zone Chapter proposed through PC14 that will enable development to achieve increased density in the zone. In particular, Kāinga Ora supports the decrease in the yard setback but considers the proposed yard set backs of 3m for the front yard and 1.5m for the side and rear yard to not be congruent to medium density outcomes. Reduced setbacks help foster more active street frontages and stronger neighbourhood character by bringing buildings closer to the public realm, enhancing passive surveillance and walkability. Therefore, Kāinga Ora seeks a 1.5m setback for the front yard and 1m for the rear and side yard as this is more appropriate to enable medium density development in the zone.

Kāinga Ora seeks the following decision from Taupō District Council:

That the specific amendments, additions or retentions which are sought as specifically outlined in **Appendix 1**, shown in red and are struck through or blue, are accepted and adopted into the insert abbreviated plan change/proposed plan name, including such further, alternative or consequential relief as may be necessary to fully achieve the relief sought in this submission.

Kāinga Ora wishes to be heard in support of their submission.

Kāinga Ora seeks to work collaboratively with the Council and wishes to discuss its submission on PC44 to address the matters raised in its submission.

.....
Brendon Liggett
Manager - Development Planning
Kāinga Ora – Homes and Communities

ADDRESS FOR SERVICE:

Attn: Brendon Liggett, Kāinga Ora – Homes and Communities

PO Box 74598, Greenlane, Auckland 1051.

Email: developmentplanning@kaingaora.govt.nz

**Appendix 1: Decisions sought for Plan Change 44 –
Residential Zone**

The following table sets out the amendments sought to the PC44 and also identifies those provisions that Kāinga Ora supports.

Proposed changes are shown as ~~strikethrough~~ for deletion and blue for proposed additional text.

Table 1

ID	Section of Plan	Specific Provision	Support/Support in Part/Oppose	Reasons	Relief Sought
Maps					
1.	Maps	Maps	Support	Kāinga Ora supports the extent of the zones as notified.	Retain zones as notified.
Definition					
2.	3.1	Plot Ratio: The ratio of the total floor area of a building/s to the total area of the land within the allotment, where the total floor area is the sum of all the floors of all the buildings on an allotment measured in m², from the exterior faces of exterior walls or from the centre lines of common walls, provided that the area occupied by a deck at first floor level which is not covered by a roof, pergola, deck or balcony above, shall only be included once, whether or not the area underneath is used for a residential or accessory purpose.	Support	The removal of the <i>Plot Ratio</i> definition aligns with the deletion of the plot ratio standard in the residential chapters.	Delete definition, as notified.

ID	Section of Plan	Specific Provision	Support/Support in Part/Oppose	Reasons	Relief Sought
3.	3.1	Comprehensive Housing Development - "four or more residential units, designed and planned in an integrated manner, where all required land use and subdivision consents are submitted together. The land on which the proposed residential units are to be sited must form one contiguous area."	Oppose	Kāinga Ora opposes the definition as it is overly restrictive and seeks that a rule allowing for 'up to three dwelling' as a permitted activity is provided for.	Delete the definition.
GRZ – General Residential Zone					
4.	13.(R2)(3)	3. Any Comprehensive Housing Development Subject to: a. Compliance with MRZ-R6.1-MRZ-R6.5, and GRZ-R5.6-GRZ-R5.7; and b. Compliance with all relevant standards in District Wide chapters.	Support in part	Kāinga Ora seeks that clause a. and b. are deleted to allow for the rule to stand on its own. Kāinga Ora considers that compliance with other standards can be assessed within their own right if those standards are breached.	Amend 13.(R2)(3) as follows: 3. Four or more residential dwellings on a site. Any Comprehensive Housing Development Subject to: a. Compliance with MRZ-R6.1-MRZ-R6.5, and GRZ-R5.6-GRZ-R5.7; and b. Compliance with all relevant standards in District Wide chapters. and add new 13.(R1)(12) as a consequence of the above relief 12. Up to three residential dwellings on a site. (Permitted)

ID	Section of Plan	Specific Provision	Support/Support in Part/Oppose	Reasons	Relief Sought
5.	13.1(R5)(2)	2. Maximum Plot Ratio: GRZ: 40% Dev1: a. 30% b. 40% within a Height Restricted Area Dev3: 40%	Support	Kāinga Ora considers that relying on more targeted controls rather than a ratio measure allows for a better balance of development potential with environmental and amenity considerations.	Delete standard, as notified.
6.	13.1(R5)(7)	Height in relation to boundary: 2.5m height at the boundary with a 45° recession plane except for common wall boundaries. <u>No building or structure shall project beyond a 45-degree recession plane measured from a point 2.5m vertically above ground level, as measured along boundaries of the site.</u> <u>This standard does not apply to:</u> <u>i. Road boundaries.</u> <u>ii. Adjoining sites that have a common wall along a shared boundary.</u>	Support in part	Kāinga Ora supports the rewording of the standard and the inclusion of when the standard does not apply. This enables users to have a clear understanding of how the standard should apply and reduces and potential for misinterpretation. Kāinga Ora however seeks that the rule is amended to provide for a recession plane of 3m and 45 degrees to better reflect the ability to construct two storey dwelling up to 1.50m from the side and rear boundaries.	Amend 13.1(R5)(7) as follows: <u>No building or structure shall project beyond a 45-degree recession plane measured from a point 2.53m vertically above ground level, as measured along boundaries of the site.</u>

ID	Section of Plan	Specific Provision	Support/Support in Part/Oppose	Reasons	Relief Sought
		iii. <u>Boundaries abutting an access lot or right of way, in which case the farthest boundary of the access lot or right of way shall be used for the purpose of assessing compliance with this standard.</u> iv. <u>Boundaries adjoining sites zoned Centre, Mixed Use, or Industrial.</u> v. <u>Antennas, aerials, satellite dishes, chimneys, flues, and architectural features less than 1m in width, providing they do not exceed the recession plane by more than 3m measured vertically.</u> vi. <u>Structures for the generation of electricity to service the residential unit to which it is affixed (such as solar panels, or micro wind turbines).</u>			
7.	13.1(R6)	Matters of discretion	Support in part	Kāinga Ora seeks that an addition matter of discretion is include within 13.1(R6) to specifically address the proposed Rule 13.(R2)(3).	Include the following sub clause within 13.1(R6):

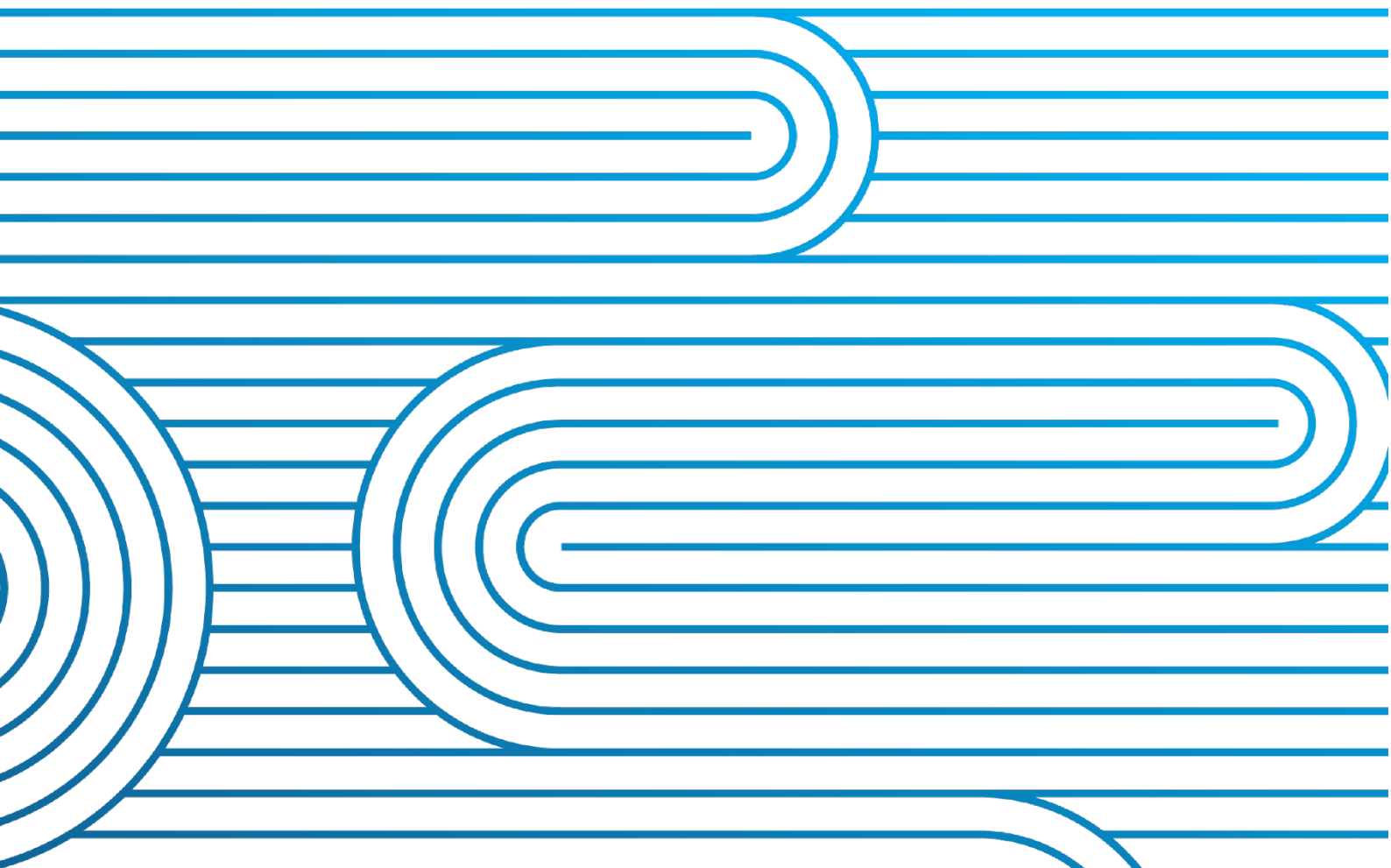
ID	Section of Plan	Specific Provision	Support/Support in Part/Oppose	Reasons	Relief Sought
					10. Four or More Residential Units per Allotment (General Residential Zone) 1. Whether infrastructure can sustainably service the actual or potential cumulative increase in the density of residential units above that which is anticipated through the PER and CON activity status in the District Plan. 2. The extent to which the additional residential units will, singularly or cumulatively, have an adverse effect on the planned amenity and character of the existing or proposed built environment, as identified in the District Plan and any relevant Structure Plans.
MRZ – Medium Density Residential Zone					
8.	MRZ-R6(1)	Maximum combined coverage: 55% <u>60%</u>	Support	Kāinga ora supports the increase in coverage, which will enable development to achieve medium density development in the zone.	Retain standard, as notified.

ID	Section of Plan	Specific Provision	Support/Support in Part/Oppose	Reasons	Relief Sought
9.	MRZ-R6(2)	Maximum plot ratio 100%	Support	Kāinga Ora supports that there is no density standard within the MRZ. Kāinga Ora considers that relying on more targeted controls rather than a ratio measure allows for a better balance of development potential with environmental and amenity considerations.	Delete standard, as notified.
10.	MRZ-R6(4)	Front boundary: a. 5m <u>3m</u> b. 10m if property fronts Lake Tce between Rifle Range and Taharepa Roads <u>This standard does not apply to:</u> i. Fences or walls not exceeding	Support in part	Kāinga Ora supports the decrease in the front yard setback but considers that 1.5m front yard setback is more aligned with medium density development that the zone seeks to achieve.	Amend standard as follows: a. 5m <u>3m</u> <u>1.5m</u> b. 10m if property fronts Lake Tce between Rifle Range and Taharepa Roads <u>This standard does not apply to:</u> i. Fences or walls not exceeding
11.	MRZ-R6(5)	All other boundaries: 1.5m <u>This standard does not apply to:</u> i. Accessory buildings less than <u>10m² in area.</u>	Support in part	Kāinga Ora supports the addition of specific exemption of the rule, however, considers that 1m side and rear yards is more aligned with medium density development that the zone seeks to achieve.	Amend standard as follows: All other boundaries: 1.5m <u>1m</u> <u>This standard does not apply to:</u>

ID	Section of Plan	Specific Provision	Support/Support in Part/Oppose	Reasons	Relief Sought
		<u>ii. Rainwater collection tanks with individual storage capacity not exceeding 10,000l.</u> <u>iii. Fences or walls not exceeding 2m in height.</u>			<u>i. Accessory buildings less than 10m² in area.</u> <u>ii. Rainwater collection tanks with individual storage capacity not exceeding 10,000l.</u> <u>iii. Fences or walls not exceeding 2m in height.</u>
12.	MRZ-R6(8)	2.5m height at the boundary with a 45° recession plane except for common wall boundaries. No building or structure shall project beyond a 60-degree recession plane measured from a point 4m vertically above ground level, as measured along boundaries of the site.	Support	Kāinga Ora supports the proposed height-in-relation-to-boundary rule.	Retain standard, as notified.
LRZ – Low Residential Zone					
13.	13.3(R5)(2)	2. Maximum Plot Ratio 7.5%.	Support	Kāinga Ora considers that relying on more targeted controls rather than a ratio measure allows for a better balance of development potential with environmental and amenity considerations.	Delete standard, as notified.

Submission by Transpower New Zealand Limited on Plan Change 44, to the Taupo District Plan

2 June 2026



For office use only

Submission No:

Receipt Date:

Form 5**Submission by Transpower New Zealand Limited on PC 44 Residential Zone, to the Taupo District Plan:***Clause 6 of Schedule 1, Resource Management Act 1991***To: Taupo District Council**By email: info@taupo.govt.nz

Attn: Planning Technician

Taupo District Council

Private Bag 2005,

Taupō 3352.

Name of submitter: Transpower New Zealand Limited ("Transpower")

This is a submission on Plan Change 44 Residential Zone, to the Taupo District Plan:

Transpower could not gain an advantage in trade competition through this submission.**The specific provisions of the Proposed Plan Change that my submission relates to are:**

Refer attached.

Transpower's submission is:

Attached. Included is background information and relevance of the Plan Change to Transpower.

Transpower's specific submission points are included in **Appendix A**A copy of the National Policy Statement for Electricity Networks 2008 ("**NPS-EN**") (previously named National Policy Statement on Electricity Transmission 2008) is attached as **Appendix B**.**Transpower seeks the following decision from the local authority:**

Amend the provisions of Proposed Plan Change 44 to give effect to the NPS-EN (and any updated/revised Resource Management (National Environmental Standards for Electricity Transmission and Electric Vehicle Charging Infrastructure Activities) Regulations 2009 Amended May 2026 ("**NES-ETA**")) and the relief sought in this submission as set out in Appendix A including such further alternative or consequential relief as may be necessary to fully achieve the relief sought in this submission.

Transpower does wish to be heard in support of its submission.

Due to the specific interests of Transpower, and particularly the national significance of the National Grid, Transpower will not consider presenting a joint case.



**Signature of person authorised to sign
on behalf of Transpower New Zealand Limited**

Date: 2 June 2026

Electronic address for service: environment.policy@transpower.co.nz

Telephone: +64 3 590 6926

Postal address: PO Box 21154, Edgware, Christchurch 8143

Contact person: Daniel Hamilton, Strategic Planning Lead, Transpower New Zealand

Submission by Transpower New Zealand Limited on Proposed Plan Change 44, to the Taupo District Plan:

Background to Transpower and Relevance of PC44

The following provides specific submission points from Transpower New Zealand Limited (“**Transpower**”) on Proposed Plan Change 44, to the Taupo District Plan (“**PC44**”).

Transpower is a State-Owned Enterprise that plans, builds, maintains and operates New Zealand’s National Grid, the high voltage transmission network for the country. The National Grid links generators directly to distribution companies and major industrial users, feeding electricity to the local networks that distribute electricity to homes and businesses (refer Figure 1).

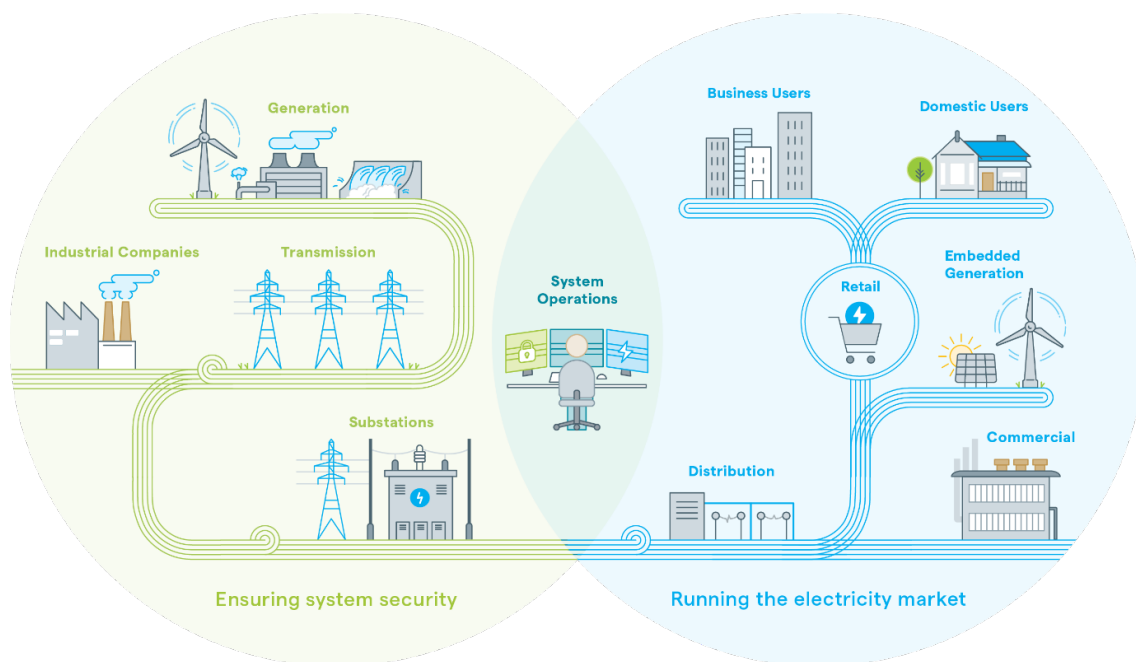


Figure 1. Electricity Industry in New Zealand.

Transpower needs to efficiently maintain, upgrade and develop the electricity transmission network to meet increasing demand, to connect new generation, and to ensure security of supply, thereby contributing to New Zealand’s economic and social aspirations. Specific to PC44, Transpower needs to protect its existing assets to ensure their ongoing operation, maintenance and upgrade is not compromised.

1.1 Statutory Framework

National Policy Statement for Electricity Networks, and National Environmental Standards

The National Policy Statement for Electricity Networks (“**NPS-EN**”) 2008 (Amended December 2025) came into effect on 15 January 2026 and replaced the National Policy Statement on Electricity Transmission (“**NPSET**”).

As with the NPSET, the NPS-EN recognises the national significance of the National Grid (and that this significance be ‘protected’), with specific policies to manage the effects of third party activities on the electricity network. Of particular relevance are Policies 11 and 12, as follows:

Policy 11

(1) Decision-makers and local authorities must manage adverse effects of activities undertaken by third parties on the EN, including by:

- (a) avoiding direct effects on the EN;*
- (b) avoiding reverse sensitivity effects on the EN, to the extent reasonably possible; and*
- (c) ensuring that the effective operation, maintenance, upgrading and development of the EN is not compromised.*

Policy 12

(1) To manage adverse effects of activities undertaken by third parties on the EN:

- (a) local authorities must identify and map the ETN and other EN assets of national or regional significance within their district, whether or not these are designated;*
- (b) decision-makers, as relevant, must engage with the operator of the ETN to implement the buffer corridors, provided in any national environmental standards for electricity networks or similar standards, within which it can be expected that sensitive activities, buildings, earthworks, subdivision and other activities that have the potential to compromise the ETN are to be generally avoided;*
- (c) decision-makers, as relevant, must engage with EDN providers to implement the provisions of any national environmental standards for electricity networks or similar standards that protect the EDN from adverse effects of third parties;*
- (d) decision-makers must ensure that buildings, structures, earthworks, subdivision and land use activities are designed and located to maintain safe distances from, and allow sufficient space for access to, and maintenance, construction, development and upgrading of EN assets; and*
- (e) decision-makers must ensure the nature and location of any proposed trees or vegetation to be planted around the EN do not compromise its function and operation.*

Policy 11 is very directive in requiring that adverse effects on the National Grid must be managed and that adverse effects on the National Grid must be avoided (including reverse sensitivity (to the extent reasonably possible)) and that the National Grid is not compromised. Policy 12 then outlines how Policy 11 will be achieved, including through buffer corridors. Policy 12(1)(b) makes specific reference to buffer corridors provided in any national standards. This reflects the intent to

introduce buffer corridors in a revised electricity network national environment standard (to replace the Resource Management (National Environmental Standards for Electricity Transmission and Electric Vehicle Charging Infrastructure Activities) Regulations 2009 (Amended May 2026) (“**NES-ETA**”). Transpower understands the release of the revised NES (being the National Environmental Standards for Electricity Network Activities (“**NES-ENA**”)) is imminent.

The inclusion of buffer corridor provisions within the NES will prevail over any district plan provisions. However, until such time the revised NES is gazetted, in order to give effect to Policy 11 of the NPS-EN, it is appropriate National Grid Corridor provisions apply in district plans.

1.2 Relevance of PC44 to Transpower

PC44 requests to change the Taupo District Plan to amend the Residential Zone chapter, provide for intensification, address the effectiveness of performance standards and rezone areas of General Rural to Residential.

While Transpower has no position on the merits of PC44, it has concerns the residential zone provisions do not give effect to the policy directive within the NPS-EN in that the zone has no applicable National Grid Corridor provisions which manage the effect of third parties on the National Grid.

Operative National Grid Yard Rules

Existing National Grid assets are predominantly located within Rural and Industrial zones within the district. However, there are also discrete areas of General Residential zoned land which have existing National Grid assets (refer Figure 2 and Figure 3 below).

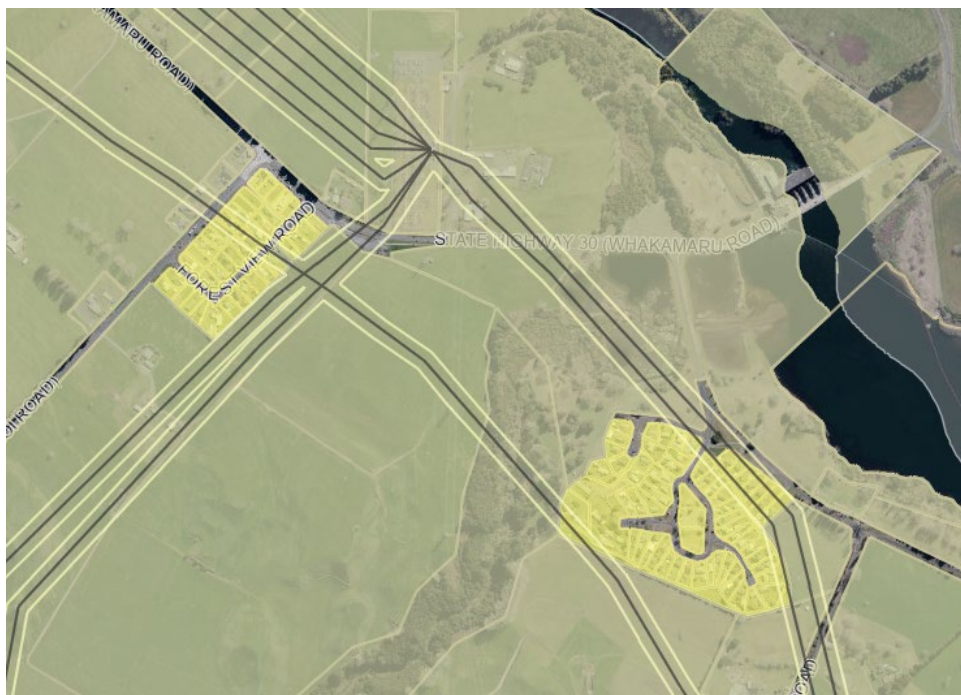


Figure 2: Existing assets in residential zones (Forest View Road)



Figure 3: Existing assets in residential zones (Monowai Drive)

As noted above, the Taupo District Plan General Residential Zone has no National Grid Corridor provisions which manage the effect of third parties on the National Grid.

Transpower not only has concerns with the existing 'gap', it has concerns with the potential for intensification of residential activities through PC44.

The following explains the structure of the operative Taupo District Plan relating to the National Grid within the Energy and Earthworks chapters.

Energy Chapter

As provided below in Table 1, the Energy Chapter provides a general permitted activity rule ENGY-R1 that requires compliance with the zone standards and ENGY-Other Plan Matters (ENG-Y-R4).

While there are National Grid specific rules ENGY-R1.16 and ENGY-R4, these rules only apply to sites within the General Rural Zone or Rural Lifestyle Zone (with the provisions introduced through Plan Change 42). Similarly, the performance standard (ENG-Y-R4.4 Standard) is only required to be met if development occurs within the General Rural Zone or Rural Lifestyle Zone. Restricted Discretionary Activity rule and Discretionary activity rule ENGY-R2 and ENGY-R3, respectively, applies to the Heavy Industrial Zone.

There are no equivalent rules that apply to the residential zones.

Table 1: Energy Chapter Rules

ENG-Y - Rules	
ENG-Y-R1 - PER Activities	Subject to
1. Any activity that (<i>as provided in subsequent rules</i>)	a. Complies with all of the standards for the Zone in which it is located; and b. Complies with all the ENGY-Other Plan Matters standards; and c. Is not identified as a RDIS or DIS activity within the Zone in which it is located; and

	d. Is not identified as a CON, RDIS or DIS activity within the ENG-Y-Other Plan Matters Rules.
National Grid - GRUZ and RLZ	
16. Any building, structure, and activity in the National Grid Yard which complies with the standards.	ENG-Y-R4.4
ENG-Y-R4 - NC activities National Grid – GRUZ and RLZ	
1. Any permitted building, structure or activity within the National Grid which does not comply with the standards in ENG-Y-R4.4 or any building or structure that is not otherwise provided for.	Notification: Transpower will be considered to be an affected party where consent is required under the National Grid specific rules. Notice of any application for resource consent under this rule must be served on Transpower New Zealand Limited in accordance with Clause 10(2) of the Resource Management (Forms, Fees, and Procedure) Regulations 2003.
ENG-Y - Standards	
ENG-Y-4.4 – Standard	
4. National Grid - The activity, building or structure is not used for or associated with a sensitive activity. - Accessory buildings or structures for sensitive activities located more than 12m from a National Grid support structure, that are no more than 2.5m in height and no more than 10m² in area. - The building or structure meets the safe electrical clearance distances required by New Zealand Electrical Code of Practice for Safe Electrical Distances (NZECP 34:2001) under all transmission line operating conditions and is: - a fence or artificial screen not exceeding 2.5 metres in height measured from ground level. - an uninhabited farm or horticultural structure or building (but not intensive indoor primary production, commercial greenhouses, wintering barns, produce packing facilities, or milking/dairy sheds (excluding ancillary stockyards and platforms). - irrigation equipment used for agricultural or horticultural purposes including the reticulation and storage of water where it does not permanently physically obstruct existing vehicular access to a National Grid support structure. - undertaken by a network utility operator, infrastructure or any part of electricity infrastructure that connects to the National Grid. - The building or structure does not permanently physically impede existing vehicular access to any National Grid support structure. - The building or structure is not for the handling or storage of Class 1-4 hazardous substances (Hazardous Substances (Hazard Classification) Notice 2020) with explosive or flammable intrinsic properties (except this does not apply to the accessory use and storage of hazardous substances in domestic scale quantities). - The building or structure is located at least 12 metres from the outer visible edge of a foundation of a National Grid transmission line support structure, except where it:	

- i. is a fence or artificial screen not exceeding 2.5 metres in height that is located at least 6 metres from the outer visible edge of a foundation of a National Grid transmission line tower.
- ii. meets the requirements of clause 2.4.1 of New Zealand Electrical Code of Practice for Safe Electrical Distances (NZECP 34:2001).
- iii. undertaken by a network utility operator, infrastructure or any part of electricity infrastructure that connects to the National Grid.

5. Setbacks in the GRUZ

- a. There shall be no front boundary setback for buildings and activities associated with electricity generation and renewable energy generation activities on land identified as geothermal area in SCHED7.1-GA or within an electricity generation core site where the road extends over any power generation building or structure.
- b. There shall be no boundary setback for buildings and activities associated with electricity generation on land identified as geothermal area in SCHED7.1-GA or within an electricity generation core site.

Earthworks Chapter

Similar to land use, the Earthworks chapter (Rule EW-R1 and Standard EW-R5) provides for development that is subject to the National Grid overlay, within the General Rural Zone or Rural Lifestyle Zone only. This highlights a further gap for earthworks in residential zones which are subject to the National Grid overlay (as the relevant earthworks chapter rules are not relevant to the residential zones).

General Residential Zone

Within the Residential Chapter there are no rules specific to the National Grid, and while *GRZ-R7 Other Plan Matters* requires plan users to consider *Section 7.1 Energy*, as highlighted above, the Energy specific rules only relate to the General Rural Zone, Rural Lifestyle Zones and Heavy Industrial Zone.

Conclusions

Based on the above framework, Transpower submits there is a gap in the district plan and the NPS-EN is not given effect to. This gap became evident to Transpower in late 2025 when approval was granted by Council for a second dwelling on a site (zoned General Residential) that was within the defined National Grid Yard. While Transpower anticipates the 'gap' will be addressed by the proposed inclusion of National Grid Corridor provisions to manage third party activities within the NES-ENA, until the NES is gazetted, Transpower remains concerned about the gap and the ability for intensification and residential activities within proximity of the National Grid that do not give effect to policies 11 and 12 of the NPS-EN.

1.3 Relief Sought

In order to give effect to the NPS-EN and manage the effect of third parties on the National Grid Transpower requests future development to be appropriately managed within the National Grid Yard, in the General Residential zone. While Transpower acknowledges that any amendments to the Energy and Earthworks chapter would fall outside of the scope of PC44, Transpower requests amendment to the General Residential Zone provisions to recognise the National Grid. This could be achieved by the following options:

1. A new rule in the General Residential Zone stating activities must comply with ENGY-R5 Standards 4;
2. A consequential rule specifying Non-compliance with ENGY-R5 results in Non-Complying Activity status;
3. Explicit cross-referencing to the Energy Chapter (including earthworks provisions).

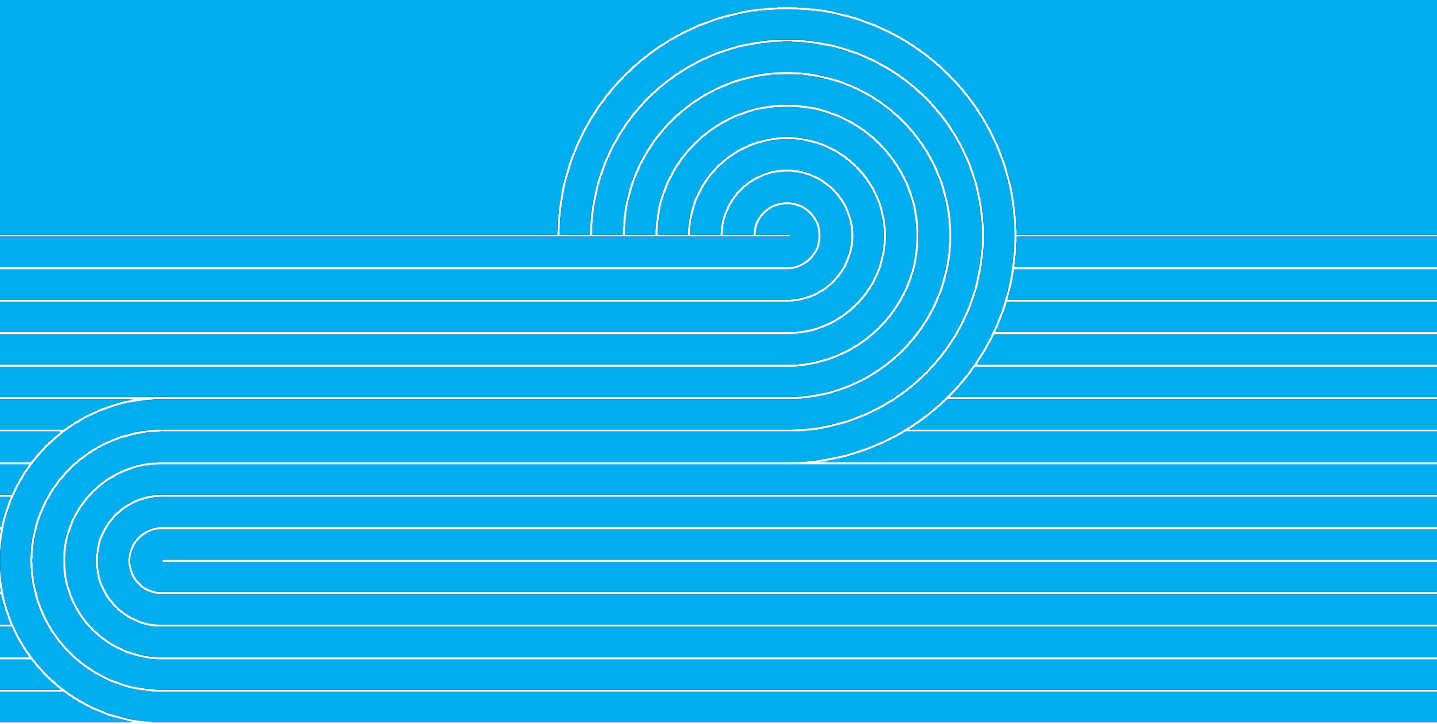
Transpower is open to consideration of alternative options to achieve the above.

1.4 Specific Submission Points

In addition to the above general relief, specific submission points are included in the below table as Appendix A, and for the avoidance of doubt, include any consequential relief to the specific relief sought, and to give effect to the commentary above. Transpower would also consider any alternative wording that achieves the intent.

Transpower's proposed amendments are shown in red underlined and ~~red-strikethrough~~.

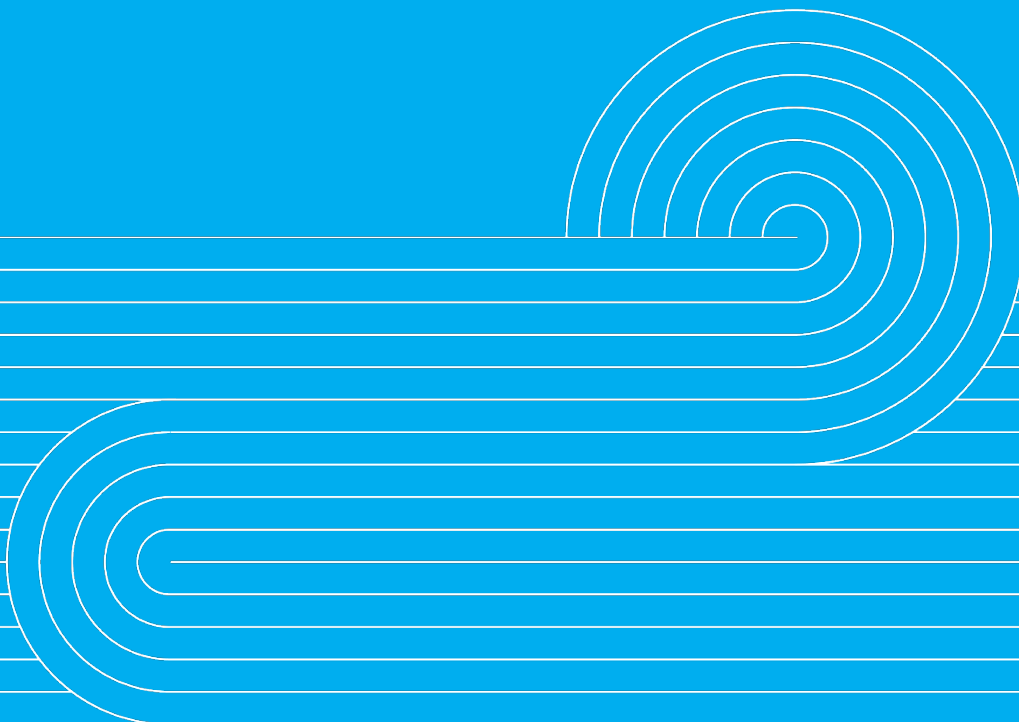
Appendix A: Specific Submission Points



The following table sets out the decisions sought by Transpower, including specific amendments to the provisions of PC44 and the reasons for Transpower's support for, or opposition to, the notified provisions. Transpower's proposed amendments are shown in blue underlined and ~~blue strikethrough~~

Notified PC44 Provision	Support/ Oppose/ Amendment	Reasons for Submission	Relief Sought
Plan Change 44 – General submission point			
General submission point – Giving effect to National Instruments	Amend	Transpower seeks the planning provisions within PC44 give effect to the NPS-EN, and any replacement to the NES-ETA (anticipated to be renamed the NES-ENA). As outlined in this submission, the national significance of the National Grid is recognised in the NPS-EN.	Amend the plan change accordingly to give effect to national instruments, specifically the NPS-EN and any revised NES-ETA.
Plan Change 44 – Amend GRZ-S5 Standards			
Amend the General Residential Standards as follows:	Amend	Transpower seeks reference to the energy performance standards within the General Residential Zone, for works within the National Grid Yard. The current frameworks does not require consideration of the National Grid Yard which allows uncontrolled development within the National Grid. This has the potential to undermine and compromise the safe and efficient operation of the National Grid. Transpower considers the sought amendment gives effect to the NPS-EN, and any replacement to the NES-ETA (anticipated to be renamed the NES-ENA). As outlined in this submission, the national significance of the National Grid is recognised in the NPS-EN.	Amend the General Residential Standards to require any development within the National Grid Yard to comply with ENG-4.4.
GRZ-R5 – Standards			
<u>Activities within the National Grid Yard</u>			
<u>9. National Grid</u>			
<u>10 Earthworks within the National Grid Yard</u>			
Plan Change 44 – Amend GRZ-R1 - PER activities			
A consequential amendment to GRZ-R1 - PER activities as follows:	Amend	If the amendment to GRZ-S5 Standards is accepted, a consequential change to the numbering in GRZ-R1 is required.	Amend the reference to standards.
GRZ-R1 - PER activities			
1. Any activity that complies with the standards			
Plan Change 44 – Amend GRZ-R4 – NC activities			
Amend GRZ-R4 as follows:	Amend	Transpower seeks that the activities and land uses within the National Grid, that do not comply with the relevant standards, to default to non-complying. Transpower considers the amendment to give effect to the NPS-EN, and any replacement to the NES-ETA (anticipated to be renamed the NES-ENA). As outlined in this submission, the national significance of the National Grid is recognised in the NPS-EN.	Amend GRZ-R4 to include activities not meeting the National Grid standards to have a non-complying activity status.
GRZ-R4 – NC standards			
<u>3. Any activity within the National Grid Yard that does not comply with additional standards on ENG-4.4 and EW-R5.1.a and b</u>			

**Appendix B: National Policy
Statement for Electricity Networks
2008 Amended December 2025
(previously named National Policy
Statement on Electricity
Transmission 2008)**



National Policy Statement for Electricity Networks 2008

Amended December 2025

[Previously National Policy Statement on Electricity Transmission 2008]



Ministry for the
Environment
Manatū Mō Te Taiao



**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
HĪKINA WHAKATUTUKI



Te Kāwanatanga o Aotearoa
New Zealand Government

Authority

This National Policy Statement was approved by the Governor-General under section 52(2) of the Resource Management Act 1991 on 10 March 2008, and is published by the Minister for the Environment under section 52(3) of that Act.

This version of the National Policy Statement incorporates the following amendments:

1. amendments made by the Minister for the Environment under section 53(1) of the Resource Management Act 1991 regarding the title, objective and policies.

Contents

Part 1: Preliminary provisions	4
1.1 Title	4
1.2 Commencement	4
1.3 Application	4
1.4 Interpretation	4
1.5 Incorporation by reference	6
Part 2: Objectives and policies	7
2.1 Objective	7
2.2 Policies	7
Part 3: Timing	11
3.1 Timing	11

Part 1: Preliminary provisions

1.1 Title

- (1) This is the National Policy Statement for Electricity Networks 2008 (previously named National Policy Statement on Electricity Transmission 2008).

1.2 Commencement

- (1) This National Policy Statement came into force on 10 April 2008.
- (2) See [Part 3](#) for timeframes for giving effect to this National Policy Statement.

1.3 Application

- (1) This National Policy Statement applies to electricity network activities, including all electricity transmission and distribution networks and ancillary electricity network activities.
- (2) This National Policy Statement applies across the whole of New Zealand.

1.4 Interpretation

- (1) In this National Policy Statement:

Act means the Resource Management Act 1991

ancillary electricity network activities (ancillary EN activities) mean all supporting and subsidiary activities necessary to provide for the EN and EN assets, including, but not limited to:

- (a) vegetation clearance and tree trimming;
- (b) earthworks and land disturbance;
- (c) construction, maintenance, repair and upgrading of access tracks, accessways, bridges and culverts; and
- (d) construction, maintenance, repair and upgrading of power supply, telecommunication cables and devices

decision-maker means any person exercising functions or powers under the Act

electricity distribution network (EDN) means all assets and activities that provide electricity distribution and that:

- (a) is owned or used by a person or body who is both an electricity distributor and an electricity operator;
- (b) comprise the network of distribution lines, cables (overhead, underground or submarine), switching stations, support structures, substations, transformers, kiosks, cabinets, connections to grid exit points, customer connections, and works used to distribute electricity from the electricity transmission network or generation activities; and
- (c) includes ancillary EN activities

The EDN does not include the electricity transmission network (ETN).

electricity distribution network provider (EDN provider) means an electricity distributor and/or electricity operator

electricity distributor as defined in section 2 of the Electricity Act 1992

electricity network (EN) means the electricity transmission network (ETN) and the electricity distribution network (EDN)

electricity network activities (EN activities) means the construction, operation, maintenance, development, upgrading, replacement, decommissioning or removal of electricity network assets, and includes ancillary EN activities

electricity network assets (EN assets) means the physical components of the EN and any physical components of ancillary EN activities that support operation of the EN

electricity network line (EN line) means EN assets in the form of lines or cables that are used for, or associated with, the overhead, underground or submarine transmission or distribution of electricity, including where attached to a structure or bridge, but does not include an EN substation

electricity network resilience (EN resilience) means the capacity of the EN to absorb and recover from a shock or disruption, or adapt to changing conditions, while retaining an appropriate level of service as determined by the EN provider

electricity operator as defined in section 2 of the Electricity Act 1992

electricity transmission network (ETN) means all assets and activities that provide electricity transmission and that:

- (a) comprise the network of transmission lines, and cables (overhead, underground and submarine, including the high-voltage direct current link), stations and substations, support structures, facilities and works;
- (b) includes ancillary EN activities;
- (c) includes other works necessary to connect grid injection points and grid exit points to convey electricity;
- (d) is owned or used by Transpower New Zealand Limited; and
- (e) is commonly known as the National Grid

The ETN does not include the electricity distribution network (EDN).

functional need has the meaning set out in the National Planning Standards 2019

local authority has the meaning set out in the Act

national environmental standard means a standard prescribed by regulations made under the Act

non-routine electricity network activities (non-routine EN activities) means:

- (a) the upgrading, rebuilding or replacement of, or changes to, EN assets or EN activities that are not defined as routine EN activities; or

- (b) the construction of new EN assets not carried out on or related to EN lines, or at an EN substation, that exist at the time of construction; or
- (c) new connections to electricity generation or demand activities upon request of a third party (other than Transpower New Zealand Limited or an electricity distributor); or
- (d) relocation or undergrounding of assets to enable urban or infrastructure development upon request of a third party (other than Transpower New Zealand Limited or an electricity distributor)

operational need has the meaning set out in the National Planning Standards 2019

routine electricity network activities (routine EN activities) mean:

- (a) activities required for, or associated with, the operation of existing EN assets; or
- (b) activities that replace an existing EN asset with a modern equivalent or substitute, where the replacement will not result in an increase in the nature, scale or intensity of the activity; or
- (c) maintenance, repair and upgrading of existing EN assets necessary to continue to deliver the same or a similar level of service; or
- (d) upgrading of existing EN assets necessary to improve resilience, where the upgrade will not result in an increase in the nature, scale or intensity of the activity; or
- (e) the removal, decommissioning or dismantling of EN assets; or
- (f) all activities identified as a permitted or controlled activity in any national environmental standards for electricity networks or similar standards; and
- (g) related ancillary EN activities to (a)–(f)

sensitive activities mean activities that are susceptible to actual or potential adverse effects (such as noise, vibration, odour, glare or emissions) generated by adjacent or nearby activities. In relation to the EN, this means residential units (including visitor accommodation and retirement accommodation), care facilities, childcare facilities, schools, hospitals, custodial or supervised accommodation where residents are detained on site, papakāinga, marae or place of worship

upgrading means improving the capacity, level of service, efficiency, safety, security, resilience, effectiveness or longevity of existing EN assets and includes the replacement, renewal, addition, expansion and intensification of existing EN assets.

1.5 Incorporation by reference

- (1) Clause 2(1) of Schedule 1AA of the Act does not apply to any material incorporated by reference in this National Policy Statement.

Part 2: Objectives and policies

2.1 Objective

- (1) The national significance of the electricity network is recognised, protected and provided for, so that the network:
 - (a) is upgraded, improved and resilient to provide for the social, economic and cultural wellbeing of present and future generations and their health and safety;
 - (b) is developed and operated in a timely, efficient and ongoing manner while managing adverse effects from or on the EN; and
 - (c) supports achievement of New Zealand's climate change mitigation and renewable energy targets.

2.2 Policies

National significance and benefits of the EN

Policy 1

- (1) Decision-makers on EN activities must:
 - (a) recognise and provide for the national significance of the EN; and
 - (b) provide for the ongoing benefits of the EN to be realised at national, regional and local scales, relative to any localised adverse effects.

Policy 2

- (1) Decision-makers must recognise that the benefits of the EN include:
 - (a) providing for the social, economic and cultural wellbeing of people and communities to meet the needs of present and future generations and their health and safety;
 - (b) providing services that are essential to support human life and the development, growth and functioning of districts, regions, New Zealand and the economy;
 - (c) providing safe, secure, reliable and resilient electricity supply that is responsive to demand from homes, communities and businesses at a local, regional and national scale;
 - (d) efficient storage and transfer of electricity;
 - (e) supporting climate change mitigation and the electrification of the economy, including by:
 - (i) supporting new, expanded or increased renewable electricity generation;
 - (ii) increasing and improving network capacity; and
 - (iii) providing direct connections for industry and commercial development; and
 - (f) enhancing supply of electricity through the ETN by removing points of congestion.

Māori interests

Policy 3

- (1) Decision-makers must recognise and provide for Māori interests in relation to EN activities, including by:
 - (a) taking into account the outcomes of any engagement with tangata whenua on any relevant resource consent, notice of requirement or private plan change;
 - (b) recognising the opportunities tangata whenua may have in developing and operating their own EDN assets at any scale or in partnership;
 - (c) avoiding, where practicable, or otherwise mitigating, the adverse effects of EN activities on sites of significance to Māori; and
 - (d) local authorities:
 - (i) providing opportunities for tangata whenua involvement where EN activities may affect a site of significance or issue of cultural significance to Māori; and
 - (ii) operating in a way that is consistent with any relevant iwi participation legislation or Mana Whakahono ā Rohe.

Site, route and method selection for EN activities

Policy 4

- (1) Decision-makers must recognise that it is the role of Transpower New Zealand Limited or the EDN provider to:
 - (a) determine the purpose, scope, required capacity and technical solution for proposed EN activities; and
 - (b) consider sites, routes and methods, where appropriate, and identify the preferred site, route and method for EN activities, ancillary EN activities and EN assets.

Providing for EN activities and managing the effects of proposed EN activities on the environment

Policy 5

- (1) Decision-makers must provide for routine EN activities to occur in all locations and environments, provided adverse effects on the environment are, where practicable, avoided, remedied or mitigated, while acknowledging the existing nature of the assets.

Policy 6

- (1) In rural environments, decision-makers should ensure that non-routine EN activities seek to avoid adverse effects on outstanding natural features and landscapes, areas of high natural character, and areas of high recreation value and amenity.

Policy 7

- (1) Decision-makers must recognise and provide for the operational need or functional need of the EN to operate in, be located in, or traverse environments, including:
 - (a) the need for EN assets to convey electricity over long distances and in all locations and environments, including:

- (i) within and across urban and rural environments;
- (ii) within the coastal environment, including the coastal marine area; and
- (iii) across jurisdictional boundaries within and across districts and regions; and
- (b) the need for the EN to operate effectively and efficiently as an interconnected system across New Zealand;
- (c) recognition that the ETN and EDN are separate networks that have differing functional needs and operational needs;
- (d) the requirement for regular maintenance and upgrading of the EN due to its age, the need to improve EN resilience, and the need to increase and improve capacity to meet changing demand and supply;
- (e) the need for the EN to connect to electricity generation, and to respond to demand, wherever located; and
- (f) the functional need for the EN to locate in areas at risk from natural hazards, where Transpower New Zealand Limited or the EDN provider have considered and managed potential natural hazard risks.

Policy 8

- (1) When considering the environmental effects of EN activities and ancillary EN activities, including measures to avoid, remedy or mitigate any adverse effects on the environment, decision-makers must:
 - (a) have regard to the extent to which any adverse effects have been avoided, remedied or mitigated through the selection of route, site or method of undertaking the work;
 - (b) recognise that there may be unavoidable adverse effects, regardless of the route, site and method chosen, with adverse effects reduced as far as practicable;
 - (c) provide for EN activities that have an operational need or functional need to be in particular locations and environments, including in areas where section 6 matters apply, even where there may be unavoidable adverse effects on those environments;
 - (d) consider the constraints imposed on achieving those measures by any operational need of the EN;
 - (e) recognise that development, upgrading and improvement of the EN will be necessary to maintain and improve the capacity and delivery of the EN over time;
 - (f) recognise that EN activities may result in changes in amenity that are unavoidable and necessary to achieve an effective, efficient, safe, secure, reliable and resilient EN, and that such changes may not constitute adverse effects under the Act;
 - (g) adopt relevant international standards (that have been adopted for use in New Zealand), national standards, and recognised best practice standards and methodologies to assess and manage adverse effects; and
 - (h) consider the financial and timing implications of mitigation measures and any consent conditions to ensure these are proportionate to the adverse effects of the EN or particular EN activities.

Policy 9

- (1) In urban environments:
 - (a) decision-makers must recognise that the EN forms an essential part of well-functioning urban environments that must be provided for;
 - (b) decision-makers must recognise that the effective and efficient development, operation, maintenance and upgrading of the EN may be appropriate use and development when protecting historic heritage;
 - (c) decision-makers must ensure, wherever practicable, that new EDN lines are placed underground, particularly within new subdivisions, while recognising the financial and technical constraints of undergrounding;
 - (d) decision-makers must ensure that, where development will result in an increase in demand for electricity, sufficient on-site space is provided for EDN assets to meet demand; and
 - (e) local authorities must consult with EDN providers to determine an appropriate method or means for identifying when EDN assets are required to meet increasing demand.

Policy 10

- (1) Transpower or the EDN provider must consider practicable opportunities and measures to reduce the existing adverse effects of EN assets when considering non-routine EN activities, taking into account the functional need, operational need and the financial implications of any measures to reduce adverse effects.

Managing the effects of third parties on the EN

Policy 11

- (1) Decision-makers and local authorities must manage adverse effects of activities undertaken by third parties on the EN, including by:
 - (a) avoiding direct effects on the EN;
 - (b) avoiding reverse sensitivity effects on the EN, to the extent reasonably possible; and
 - (c) ensuring that the effective operation, maintenance, upgrading and development of the EN is not compromised.

Policy 12

- (1) To manage adverse effects of activities undertaken by third parties on the EN:
 - (a) local authorities must identify and map the ETN and other EN assets of national or regional significance within their district, whether or not these are designated;
 - (b) decision-makers, as relevant, must engage with the operator of the ETN to implement the buffer corridors, provided in any national environmental standards for electricity networks or similar standards, within which it can be expected that sensitive activities, buildings, earthworks, subdivision and other activities that have the potential to compromise the ETN are to be generally avoided;
 - (c) decision-makers, as relevant, must engage with EDN providers to implement the provisions of any national environmental standards for electricity networks or similar standards that protect the EDN from adverse effects of third parties;

- (d) decision-makers must ensure that buildings, structures, earthworks, subdivision and land use activities are designed and located to maintain safe distances from, and allow sufficient space for access to, and maintenance, construction, development and upgrading of EN assets; and
- (e) decision-makers must ensure the nature and location of any proposed trees or vegetation to be planted around the EN do not compromise its function and operation.

Long-term spatial and strategic planning for the EN

Policy 13

- (1) When undertaking long-term spatial and strategic planning:
 - (a) local authorities must engage with EN operators to facilitate the medium- to long-term strategic planning for the construction, operation, maintenance and upgrading of the EN;
 - (b) local authorities should utilise regional and district spatial plans and future development strategies as tools to identify existing and future EN asset needs and to make provision for sufficient space for EN assets to be developed as far as practicable;
 - (c) local authorities and decision-makers, as relevant, must recognise that the designation process can facilitate long-term planning for construction, operation, maintenance, upgrading and development of the EN; and
 - (d) local authorities must recognise that not all EN activities and EN assets can be spatially identified in advance.

Electric and magnetic fields

Policy 14

- (1) Local authorities must manage electric or magnetic fields associated with the EN based on recommendations from the World Health Organization monograph Environmental Health Criteria (No 238, Extremely low frequency fields) and International Commission on Non-ionizing Radiation Protection 'Guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz to 100 kHz)' (*Health Physics* 99(6): 818–836; 2010) (ICNIRP Guidelines) or their revisions, or any other applicable New Zealand standards.

Part 3: Timing

3.1 Timing

- (1) Decision-makers must give effect to this National Policy Statement on and from the commencement date.

Made at Wellington on 15 December 2025.

Hon Chris Bishop
For the Minister for the Environment

Explanatory note

This note is not part of the National Policy Statement for Electricity Networks but is intended to indicate its general effect.

This National Policy Statement amends the National Policy Statement on Electricity Transmission 2008.

This National Policy Statement recognises the electricity network as a matter of national significance under the Resource Management Act 1991 (the Act).

New Zealand needs to invest in electricity networks to support growth of the economy, support new housing development, provide for the wellbeing of people and communities, improve resilience and achieve better environmental outcomes, including support for achievement of climate change and renewable energy targets.

This National Policy Statement applies to all decisions made under the Act affecting the development of new electricity networks and the operation, maintenance, renewal and upgrade of existing electricity networks, including all electricity transmission and distribution networks.

This National Policy Statement acts in parallel with the National Policy Statement for Infrastructure 2025 and the National Policy Statement for Renewable Electricity Generation 2011, which have interfaces with, but do not overlap with, this statement.

The National Policy Statement for Indigenous Biodiversity 2023 does not apply to the development, operation, maintenance or upgrade of electricity transmission network assets and activities.

No national policy statement overrides another. Each national policy statement must be applied to the relevant decision-making process.

In relation to managing the effects of EN activities, this national policy statement must be read alongside other national direction and local authority planning documents that govern RMA section 6 matters. The protection of section 6 RMA matters is achieved through Policy 6 'seek to avoid' and Policy 7(1) 'functional and operational need' which set a high bar for EN activities to be located in section 6 environments. However, this NPS acknowledges that for linear network infrastructure required to connect to demand and supply, avoidance of all section 6 values along the length of a route is not always possible.

This National Policy Statement is to be applied by all persons exercising powers and functions under the Act. The objective and policies are intended to guide decision-makers in making decisions on the determination of resource consent applications, in considering a requirement for a designation or a heritage order, in considering an application for a water conservation

order and when exercising other relevant powers as required by the Act. The objective and policies will also provide guidance for local authorities in relation to plan making.

In applying this National Policy Statement, local authorities should be aware of their obligations with regard to other legislation, including Te Ture Whenua Māori Act 1993, the Local Government Act 2002, Treaty settlement legislation, iwi participation legislation and the Treaty of Waitangi. Local authorities should also be aware of their obligations in any Mana Whakahono ā Rohe agreement they may have with relevant hapū and iwi.

In August 2025, the Government passed an amendment to the Act that introduced a requirement to stop most plan making under the Act, unless it was subject to an exemption. This 'plan stop' amendment suspends the requirement to review plans and policy statements and prevents notification of new plan or policy statement changes or variations until the end of 2027, when the new resource management system will be in effect.

Due to the plan stop amendment, plans and policy statements will not be updated to give effect to this amendment (unless a relevant exemption applies).

For the avoidance of doubt, plan and policy statement content that implements the original National Policy Statement on Electricity Transmission does not require amendment.

This is secondary legislation issued under the authority of the [Legislation Act 2019](#).

Title	National Policy Statement for Electricity Networks 2008
Principal or amendment	N/A
Consolidated version	Yes
Empowering Act and provisions	Resource Management Act 1991, section 52(2)
Replacement empowering Act and provisions	N/A
Maker name	Minister for the Environment
Administering agency	Ministry for the Environment
Date made	10 March 2008
Publication date	13 March 2008
Notification date	13 March 2008
Commencement date	10 April 2008
End date (when applicable)	N/A
Consolidation as at date	15 January 2026
Related instruments	National Policy Statement on Electricity Transmission 2008 [as made] National Policy Statement for Electricity Networks Amendment 2025



PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 02/06/2026
First name: c/- Alice **Last name:** Blackwell
Organisation: Ika Nui Limited
Preferred method of contact Email
Postal address: Level 3, 181 Wakefield Street, Wellington, 6011, New Zealand
Email: alice@uep.co.nz
Daytime Phone: 0224391969
Would you like to present your submission in person at a hearing? *
 Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: Planning Maps

I oppose the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

- Rezoning of the site at 64-68 Lake Terrace, Taupō from Medium Density Residential Zone to Town Centre Zone.
- Any consequential changes or alternative relief required to achieve the intended outcomes sought within this submission

The reason for my submission is::

This submission opposes the proposed zoning of the site at 64-68 Lake Terrace Taupō as Medium Density Residential Zone and requests the rezoning to Town Centre Zone (TCZ-PREC1-Taupō).

The reasons for this request are:

- The site is currently used for a commercial purpose as a motel and this use is better reflected as TCZ.
- The site at 64-68 Lake Terrace is a corner site which a commercial where a commercial zoning would be optimal.
- The site also directly adjoins the existing TCZ.
- The TCZ specifically provides for accommodation activities through TCZ-P3 and TCZ-PR7.

The Medium Density Residential Zone does not specifically provide for accommodation activities such as motels.

Alternative relief sought in this submission is for the rezoning for the row of properties fronting Lake Terrace (from 48 Lake Terrace to 68 Lake Terrace) to Town Centre Zone (TCZ-PREC1-Taupō). This is sought as an alternative to the site specific rezoning at 64-68 Lake Terrace. A comprehensive strip rezoning from 48 Lake Terrace to 68 Lake Terrace is appropriate as it reflects existing uses and would result in a cohesive TCZ that better reflects current land uses.

Finally, the submitter is open to whether the site would be within the Retail Expansion Overlay or Commercial Fringe Overlay.

SUBMISSION ON
PROPOSED PLAN CHANGE 44 – RESIDENTIAL ZONES
TAUPŌ DISTRICT COUNCIL

To: Taupō District Council
 By email to: districtplan@taupo.govt.nz

Submission on: Proposed Plan Change 44 – Residential Zones

Name of Submitter: **Ika Nui Limited**
Address for service: Ika Nui Limited
 C/- Urban Edge Planning
 PO Box 39071
 Wellington Mail Centre
 Lower Hutt 5045

Attention: Alice Blackwell
 022 439 1969
 alice@urbanedgeplanning.co.nz

- This is a submission made on behalf of Ika Nui Limited concerning Plan Change 44 as notified by Taupō District Council.
- **Ika Nui Limited could not gain an advantage in trade competition** through this submission.
- **Ika Nui Limited would like to be heard** in support of this submission.
- **Ika Nui Limited would consider presenting a joint case** with others that make a similar submission.
- The specific provision of the plan change that this submission relates to zoning of 64-68 Lake Terrace.
- **Ika Nui Limited seeks the following - 64-68 Lake Terrace is rezoned to Town Centre Zone**

The Site / Area

This submission relates to the site at 64-68 Lake Terrace, Taupō.



Figure: Site to which this submission relates at 64-68 Lake Terrace – aerial (left source: GRIP), Operative District Plan (right)

The site can be described as follows:

Address	64-68 Lake Terrace
Size	2978m ²
Legal description	Lot 1 Deposited Plan South Auckland 18525
Operative DP Zoning	Medium Density Residential Zone
Operative DP Overlays	Stormwater Disposal – Type: 100% of Site Area Statutory Acknowledgements
Proposed DP Zoning	Medium Density Residential Zone
Plan Change 44 Zoning	Medium Density Residential Zone
Current Use and Development	Ika Nui Motel
Surrounding Area	Commercial to the north. Motels to the east and west. Recreation reserve across the road to the east.

SUBMISSION

This submission **opposes** the proposed zoning of the site at 64-68 Lake Terrace Taupō as Medium Density Residential Zone and requests the rezoning to Town Centre Zone (TCZ-PREC1-Taupō).

The reasons for this request are:

- The site is currently used for a commercial purpose as a motel and this use is better reflected as TCZ.
- The site at 64-68 Lake Terrace is a corner site which a commercial where a commercial zoning would be optimal.
- The site also directly adjoins the existing TCZ.
- The TCZ specifically provides for accommodation activities through TCZ-P3 and TCZ-PR7.
- The Medium Density Residential Zone does not specifically provide for accommodation activities such as motels.

Alternative relief sought in this submission is for the rezoning for the row of properties fronting Lake Terrace (from 48 Lake Terrace to 68 Lake Terrace) to Town Centre Zone (TCZ-PREC1-Taupō). This is sought as an alternative to the site specific rezoning at 64-68 Lake Terrace. A comprehensive strip rezoning from 48 Lake Terrace to 68 Lake Terrace is appropriate as it reflects existing uses and would result in a cohesive TCZ that better reflects current land uses.

Finally, the submitter is open to whether the site would be within the Retail Expansion Overlay or Commercial Fringe Overlay.

DECISION SOUGHT

- **Rezoning of the site at 64-68 Lake Terrace, Taupō from Medium Density Residential Zone to Town Centre Zone.**
- **Any consequential changes or alternative relief required to achieve the intended outcomes sought within this submission.**

AJ Blackwell

Alice Blackwell

On behalf of

Ika Nui Motel Limited

Date: 2 June 2026

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 02/06/2026
First name: Richard **Last name:** Cashmore
Organisation: Great Lake LP
Preferred method of contact Email
Postal address: PO Box 14085, Tauranga Central, Tauranga, New Zealand, 3141
Email: aimee@haysonknell.co.nz
Daytime Phone: 0272573408

Would you like to present your submission in person at a hearing? *

I do NOT wish to speak in support of my submission and ask that the following submission be fully considered.

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: 3.1 Definitions > Comprehensive Housing Development

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

Clarification for readability of the zone provisions and associated plans.

2. Provision: 3.1 Definitions > Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

Removal of plot ratio is supported as it simplifies the plan framework and avoids an unnecessarily restrictive control that can constrain efficient site design without necessarily delivering better amenity outcomes.

3. Provision: Restricted Discretionary Activity - GRZ-R2.3**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought

The reason for my submission is::

Neutral. No change sought.

4. Provision: GRZ-R1 PER activities (deletions)**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought.

The reason for my submission is::

Neutral. No change sought.

5. Provision: GRZ-R5 Standards > 1. Maximum Combined Coverage**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought.

The reason for my submission is::

Neutral. No change sought.

6. Provision: GRZ-R5 Standards > 2. Maximum Plot Ratio (deletion)**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

Neutral. No change sought.

The reason for my submission is::

The total coverage standard is supported as it appropriately balances a more enabling development framework with retention of sufficient on-site space for amenity and functional site outcomes.

7. Provision: GRZ-R5 Standards > Note**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

Neutral. No change sought.

The reason for my submission is::

Supported because the note improves clarity around how coverage is calculated, which will assist with consistent interpretation and administration of the standard.

8. Provision: GRZ-R5 Standards > 3. Minimum Setbacks - Front Boundary**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought.

The reason for my submission is::

Neutral.

9. Provision: GRZ-R5 Standards > 4. Minimum Setbacks - All Other Boundaries**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought.

The reason for my submission is::

Neutral.

10. Provision: GRZ-R5 Standards > 6. Maximum height**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought.

The reason for my submission is::

Neutral

11. Provision: GRZ-R5 Standards > 7. Height to Boundary**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought.

The reason for my submission is::

Neutral

12. Provision: MRZ-R1 Permitted activity (deletions)**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought.

The reason for my submission is::

6 - Supported as it streamlines the permitted activity framework and removes unnecessary duplication from the zone provisions.

7 & 8 - Supported because it clarifies the treatment of minor structures and contributes to a more efficient and readable planning framework.

9 - Supported as a consequential amendment that improves the coherence of the activity framework and avoids unnecessary prescription for minor structures.

10 - Supported as it helps rationalise the rule set and ensures regulatory effort is focused on development with the greatest potential effects.

11 - Supported as a practical amendment that simplifies the zone provisions without undermining the management of effects.

12 - Supported because it avoids unnecessary regulation of temporary construction related structures and improves the usability of the plan.

13. Provision: MRZ-R1 Permitted activity (deletions)**I support the provision****I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:**

No change sought

The reason for my submission is::

1 - Supported as it removes redundant controls and contributes to a clearer and more efficient permitted activity framework.

2 & 3 - Supported because it improves readability and reduces unnecessary complexity in the activity provisions.

4 - Supported as a sensible consequential amendment that streamlines the rule set for minor structures.

5 & 6 - Supported because it assists in rationalising the provisions and focusing controls on matters with greater potential effects.

12 - Supported as a practical clean-up amendment that improves plan efficiency and ease of interpretation.

14. Provision: MRZ-R6 Standards > 1. Maximum Combined Coverage

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

The increased combined coverage standard is supported as it better reflects the level of development anticipated within the Medium Density Residential Zone and enables more efficient use of urban land.

15. Provision: MRZ-R6 Standards > 2. Maximum Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

Removal of plot ratio is supported as it avoids a control that can unnecessarily constrain development capacity and design flexibility in a zone intended to accommodate greater residential intensity.

16. Provision: MRZ-R6 Standards > 3. Maximum Total Coverage

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

The total coverage standard is supported as it provides a more enabling development envelope while still retaining a framework for amenity, landscape treatment, and site functionality.

17. Provision: MRZ-R6 Standards > Note

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

Supported because the note assists with clarity and will promote consistent interpretation of how coverage is to be assessed.

18. Provision: MRZ-R6 Standards > Minimum building setbacks - Front Boundary**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Change front boundary setback to 1.5m to align with the MDRS.

The reason for my submission is::

Support in part - The proposed reduction in the front boundary setback is supported because it improves flexibility for building design and can assist with activation of the streetscape. However, a further reduction is sought so the provision better aligns with the MDRS.

19. Provision: MRZ-R6 Standards > Minimum building setbacks - all other boundaries**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Change setback to 1m in line with the MDRS.

The reason for my submission is::

Support in part - This provision although not changed is supported in part as it maintains an appropriate interface with adjoining sites while avoiding unnecessary constraints on the form and efficiency of development but does not align with the MDRS.

20. Provision: MRZ-R6 Standards > Minimum building setbacks - common wall boundaries**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

Common wall boundaries are supported as an important mechanism to enable coordinated and efficient medium density townhouse development outcomes.

21. Provision: MRZ-R6 Standards > 6. Maximum Height**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

The proposed maximum height is supported as it provides a realistic built form envelope for medium density development and better aligns with the scale and intensity anticipated in the zone and aligns with the MDRS.

Amendment to 'exception' - Supported as a sensible allowance for minor roof forms and architectural elements that will not materially undermine the outcomes sought by the height standard.

22. Provision: MRZ-R6 Standards > 7. Height to Boundary**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

The proposed increase in height in relation to boundary is supported because it aligns with the MDRS, improves flexibility for building design, and better enables the higher density development anticipated within the zone.

The retention of this provision without amendment is supported because the definition provides certainty for plan users and assists with consistent application of the standard.

23. Provision: LRZ-R1 Permitted Activities (deletions)**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

1 - Supported as it streamlines the permitted activity provisions and removes unnecessary duplication from the rule framework.

2 & 3 - Supported because it clarifies the activity status of minor structures and improves readability of the zone provisions.

4 - Supported as a consequential amendment that contributes to a more coherent and user-friendly planning framework.

5 & 6 - Supported because it rationalises the provisions and ensures the rule set is focused on managing effects of substantive development.

12 - Supported as a practical amendment that improves plan efficiency and reduces unnecessary regulation of temporary works.

24. Provision: LRZ-R5 Standards > 1. Maximum Combined Coverage**I support the provision**

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give

precise details].:

No change sought

The reason for my submission is::

The increased combined coverage standard is supported as it modestly improves development flexibility while remaining consistent with the intended character and lower intensity outcomes of the zone.

25. Provision: LRZ-R5 Standards > 2. Maximum Plot Ratio (deletion)

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

Removal of plot ratio is supported as it simplifies the rule framework and avoids an unnecessarily rigid control where other standards are sufficient to manage built form and amenity effects.

Maximum total coverage - Support is appropriate as there is no total coverage standard proposed in this zone, which is consistent with the broader low density development framework and the other controls that continue to manage site outcomes.

26. Provision: LRZ-R5 Standards > Note

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

27. Provision: LRZ-R5 Standards > 4. Minimum Setback - Front boundary

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought.

The reason for my submission is::

Neutral

28. Provision: LRZ-R5 Standards > 5. Minimum setback - all other boundaries

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give

precise details].:

No change sought

The reason for my submission is::

Neutral

29. Provision: LRZ-R5 Standards > 5. Minimum setback - all other boundaries

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

Common wall boundaries - Supported as a limited flexibility provision that can enable efficient site design in appropriate circumstances without undermining the overall low density character of the zone. The exception for overhanging eaves is supported as a practical design allowance that does not materially compromise the setback outcome.

30. Provision: LRZ-R5 Standards > 7. Maximum Height

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought

The reason for my submission is::

Neutral

31. Provision: LRZ-R5 Standards > 8. Height to Boundary

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

No change sought.

The reason for my submission is::

Supported because the height to boundary control continues to provide an appropriate level of protection for adjoining site amenity in a low density context.

32. Provision: PC44 General

I support the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

Overall, Plan Change 44 represents a pragmatic and appropriate refinement to the District Plan, and the provisions supported in this submission should be retained.

The reason for my submission is::

The submitter supports the overall intent of Plan Change 44 as a more enabling planning response to growth and changing housing needs within the Taupō District. In particular, the proposed amendments are supported where they increase development capacity, remove unnecessarily restrictive controls, and provide for a planning framework that better enables a range of residential outcomes across the relevant zones. The proposed approach promotes the efficient use and redevelopment of urban land, is consistent with the direction toward a more responsive and enabling urban environment, and appropriately manages potential adverse effects through the proposed standards and assessment framework. Overall, Plan Change 44 represents a pragmatic and appropriate refinement to the District Plan, and the provisions supported in this submission should be retained.

Taupō District Plan Change 44 – Residential Zone – Submission from Richard Cashmore, Great Lakes LP

The submitter supports the overall intent of Plan Change 44 as a more enabling planning response to growth and changing housing needs within the Taupō District. In particular, the proposed amendments are supported where they increase development capacity, remove unnecessarily restrictive controls, and provide for a planning framework that better enables a range of residential outcomes across the relevant zones. The proposed approach promotes the efficient use and redevelopment of urban land, is consistent with the direction toward a more responsive and enabling urban environment, and appropriately manages potential adverse effects through the proposed standards and assessment framework. Overall, Plan Change 44 represents a pragmatic and appropriate refinement to the District Plan, and the provisions supported in this submission should be retained.

Provision	Oppose/Support	Reason	Change sought
3. Interpretation			
3.1 Definitions			
Definitions: Comprehensive Housing Development - “four or more residential units, designed and planned in an integrated manner, where all required land use and subdivision consents are submitted together. The land on which the proposed residential units are to be sited must form one contiguous area.”	Support	Clarification for readability of the zone provisions and associated plans.	No change sought
Plot Ratio The ratio of the total floor area of a building/s to the total area of the land within the allotment, where the total floor area is the sum of all the floors of all the buildings on an allotment measured in m2, from the exterior faces of exterior walls or from the centre lines of common walls, provided that the area occupied by a deck at first floor level which is not covered by a roof, pergola, deck or balcony above, shall only be included once, whether or not the area underneath is used for a residential or accessory purpose.	Support	Removal of plot ratio is supported as it simplifies the plan framework and avoids an unnecessarily restrictive control that can constrain efficient site design without necessarily delivering better amenity outcomes.	No change sought
13.1 GRZ – General Residential Zone			
GRZ-R2 – RDIS activities	Neutral		No change sought
3. Any Comprehensive Housing Development Subject to:			

Provision				Oppose/Support	Reason	Change sought
a. Compliance with MRZ-R6.1-MRZ-R6.5, and GRZ-R5.6-GRZ-R5.7; and b. b. Compliance with all relevant standards in District Wide chapters.						
5. One accessory building per allotment. a. The maximum gross floor area of the accessory building shall not exceed 6m² b. The maximum height of the accessory building shall not exceed 2m c. c. Compliance with GRZ-R5.8				Neutral		No change sought
6. Any uncovered deck, terrace, platform or bridge; and/or 7. Any pool or tank (including a detention tank, swimming pool, spa pool, swirl pool, plunge pool and hot tub). Not exceeding 1m above ground level. NOTE: structures not provided for in GRZR1.7 and GRZ-R1.8 - i.e., those that exceed 1m in height - shall be provided for in GRZ-R1.1.				Neutral		No change sought
8. Any mast, pole or radio, or television aerial. The maximum height of the structure shall not exceed 2m in height (excluding dish antenna greater than 1.2m in diameter) above the ground level.				Neutral		No change sought
9. Fences and walls – or any combination of these, whether separate or joined together – 2m in height or less above ground level. 10. Retaining walls of 2m in depth or less below ground level. a. Compliance with GRZ-R5.8 outside of the yard setback.				Neutral		No change sought
11. Temporary structures associated with maintenance activities and construction works.				Neutral		No change sought
GRZ-R5 - Standards						
Footprint	GRZ	DEV1-Kinloch Development Area- GRZ	DEV3-Nukuhau Development Area - GRZ			

Provision				Oppose/Support	Reason	Change sought
1. Maximum Combined Coverage	40%	a. 30% b. 35% within a Height Restricted Area	35% 40%	Neutral		
2. Maximum Plot Ratio	40%	a. 30% b. 40% within a Height Restricted Area	40%	Neutral		
2. Maximum <u>Total Coverage</u>	50%	50%	50%	Neutral	The total coverage standard is supported as it appropriately balances a more enabling development framework with retention of sufficient on-site space for amenity and functional site outcomes.	
NOTE: Maximum Combined Coverage is a calculation of the combined coverage of <u>Building Footprint</u> and any <u>Structures</u> that are not otherwise provided for as permitted activities.				Neutral	Supported because the note improves clarity around how coverage is calculated, which will assist with consistent interpretation and administration of the standard.	
Building Setbacks (minimum) Minimum Setbacks						
3. Front boundary This standard does not apply to: i. Fences or	5m	a. 5m b. 7.5m if boundary adjacent to Whanga-mata,	5m	Neutral		

Provision				Oppose/Support	Reason	Change sought
walls not exceeding 2m in height.		Okaia, Otaketake scenic reserves and <u>Lake</u> Shore reserves				
4. All other boundaries This standard does not apply to: i. Accessory buildings less than 10m2 in area. ii. Rainwater collection tanks with individual storage capacity not exceeding 10,000l. iii. Fences or walls not exceeding 2m in height.	a. 1.5m or b. 5m Foreshore Protection Boundary	a. 1.5m b. 7.5m if boundary adjacent to Whanga-mata, Okaia, Otaketake scenic reserves and Lake Shore reserves	1.5m	Neutral		
5. Common wall boundaries	0m			Neutral		
	EXCEPTION: Up to 0.6m of overhanging eaves.			Neutral		
Height (maximum)						

Provision				Oppose/Support	Reason	Change sought
6. Building Maximum Height	a. 8m or b. 5m within Height Restricted Areas unless otherwise indicated on Map D2.	a. 7.5m b. 4.5m within Kinloch Height Restricted Area and for residential units within 50m of the Whangamata, Okaia, Otaketake scenic reserves and Lake Shore reserves	8m	Neutral		
EXCEPTION: Any structure attached to a building which does not exceed 0.6m in any horizontal distance, or exceed the permitted height by more than 1.5m				Neutral		
7. Height to boundary	2.5m height at the boundary with a 45° recession plane except for common wall boundaries. No building or structure shall project beyond a 45-degree recession plane measured from a point 2.5m vertically above ground level, as measured along boundaries of the site. This standard does not apply to: i.Road	a. 2.5m height at the boundary with a 45° recession plane except: b. 3.5m height at the boundary with a 45° recession plane where a common wall boundary is in place as		Neutral		

Provision			Oppose/Support	Reason	Change sought
	boundaries. ii.Adjoining sites that have a common wall along a shared boundary. iii.Boundaries abutting an access lot or right of way, in which case the farthest boundary of the access lot or right of way shall be used for the purpose of assessing compliance with this standard. iv.Boundaries adjoining sites zoned Centre, Mixed Use, or Industrial. v.Antennas, aerials, satellite dishes, chimneys, flues, and architectural features less than 1m in width, providing they do not exceed the recession plane by more than 3m measured vertically. vi.Structures for the generation of electricity to service the residential unit to which it is affixed (such as solar panels, or micro wind turbines).	provided by GRZR5.5			
Height to boundary means the plane measured at the boundary of an allotment from ground level, through which no part of any building or structure including eaves may project, except for a chimney, mast or antenna up to 0.8m in any horizontal direction and not exceeding 2.0m.			Neutral		

Provision			Oppose/Support	Reason	Change sought
Refer to DEV3-Nukuhau 9. for additional standards on Landscaping and Stormwater Management, Fencing, Walls and Hedges, and Streetscape, Walking and Cycling Access.			Neutral		
13.2 MRZ – Medium Density Residential Zone					
MRZ-R6 Standards					
	MRZ	DEV3-Nukuhau Development Area – MRZ			
6. One accessory building per allotment.	a. The maximum gross floor area of the accessory building shall not exceed 6m² b. The maximum height of the accessory building shall not exceed 2m c. Compliance with MRZ-R6.8		Support	Supported as it streamlines the permitted activity framework and removes unnecessary duplication from the zone provisions.	No change sought
7. Any uncovered deck, terrace, platform or bridge; and/or 8. Any pool or tank (including a detention tank, swimming pool, spa pool, swirl pool, plunge pool and hot tub). Not exceeding 1m above ground level. NOTE: structures not provided for in			Support	Supported because it clarifies the treatment of minor structures and contributes to a more efficient and readable planning framework.	No change sought

Provision			Oppose/Support	Reason	Change sought
MRZR1.7 and MRZ-R1.8 - i.e., those that exceed 1m in height shall be provided for in MRZ-R1.1.					
9. Any mast, pole or radio, or television aerial.	The maximum height of the structure shall not exceed 2m in height (excluding dish antenna greater than 1.2m in diameter) above the ground level.		Support	Supported as a consequential amendment that improves the coherence of the activity framework and avoids unnecessary prescription for minor structures.	No change sought
10. Fences and walls - or any combination of these, whether separate or joined together - 2m in height or less above ground level	a. Compliance with MRZ-R6.8 outside of the yard setback.		Support	Supported as it helps rationalise the rule set and ensures regulatory effort is focused on development with the greatest potential effects.	No change sought
11. Retaining walls of 2m in depth or less below ground level.			Support	Supported as a practical amendment that simplifies the zone provisions without undermining the management of effects.	
12. Temporary structures associated with maintenance activities and			Support	Supported because it avoids unnecessary regulation of temporary construction related structures and improves the usability of the plan.	No change sought

Provision			Oppose/Support	Reason	Change sought
construction works.					
MRZ-R1 – PER activities					
1. One accessory building per allotment.	d. The maximum gross floor area of the accessory building shall not exceed 6m ² e. The maximum height of the accessory building shall not exceed 2m f. Compliance with MRZ-R6.8		Support	Supported as it removes redundant controls and contributes to a clearer and more efficient permitted activity framework.	No change sought
2. Any uncovered deck, terrace, platform or bridge; and/or 3. Any pool or tank (including a detention tank, swimming pool, spa pool, swirl pool, plunge pool and hot tub). Not exceeding 1m above ground level. NOTE: structures not provided for in MRZR1.7 and MRZ-R1.8 - i.e., those that exceed 1m in height shall			Support	Supported because it improves readability and reduces unnecessary complexity in the activity provisions.	No change sought

Provision			Oppose/Support	Reason	Change sought
be provided for in MRZ-R1.1:					
4. Any mast, pole or radio, or television aerial:	The maximum height of the structure shall not exceed 2m in height (excluding dish antenna greater than 1.2m in diameter) above the ground level.		Support	Supported as a sensible consequential amendment that streamlines the rule set for minor structures.	No change sought
5. Fences and walls – or any combination of these, whether separate or joined together – 2m in height or less above ground level. 6. Retaining walls of 2m in depth or less below ground level.	b. Compliance with MRZ-R6.8 outside of the yard setback:		Support	Supported because it assists in rationalising the provisions and focusing controls on matters with greater potential effects.	No change sought
12. Temporary structures associated with maintenance activities and construction works.			Support	Supported as a practical clean-up amendment that improves plan efficiency and ease of interpretation.	No change sought
Footprint					

Provision			Oppose/Support	Reason	Change sought
1. Maximum Combined Coverage	55% 60%	60%	Support	The increased combined coverage standard is supported as it better reflects the level of development anticipated within the Medium Density Residential Zone and enables more efficient use of urban land.	No change sought
2. Maximum Plot Ratio	100%	100%	Support	Removal of plot ratio is supported as it avoids a control that can unnecessarily constrain development capacity and design flexibility in a zone intended to accommodate greater residential intensity.	No change sought
2. Maximum Total Coverage	a. 75% b. 3m landscape strip along front boundary c. <u>DEV3-Nukuhau Development Area – MRZ</u> 80%	80%	Support	The total coverage standard is supported as it provides a more enabling development envelope while still retaining a framework for amenity, landscape treatment, and site functionality.	No change sought
NOTE: Maximum Combined Coverage is a calculation of the combined coverage of Building Footprint and any Structures that are not otherwise provided for as permitted activities.			Support	Supported because the note assists with clarity and will promote consistent interpretation of how coverage is to be assessed.	No change sought
Building Setbacks (minimum) Minimum Setbacks					No change sought
3. Front Boundary	a. 5m 3m b. 10m if property fronts Lake Tce between Rifle	3m	Support in part	The proposed reduction in the front boundary setback is supported because it improves flexibility for building design and can assist with activation of the	Change front boundary setback to 1.5m to align with the MDRS.

Provision			Oppose/Support	Reason	Change sought
	Range and Taharepa Roads This standard does not apply to: i. Fences or walls not exceeding 2m in height.			streetscape. However, a further reduction is sought so the provision better aligns with the MDRS.	
4. All Other Boundaries	1.5m This standard does not apply to: i. Accessory buildings less than 10m² in area. ii. Rainwater collection tanks with individual storage capacity not exceeding 10,000l. iii. Fences or walls not exceeding 2m in height.	1.5m	Support in part	This provision although not changed is supported in part as it maintains an appropriate interface with adjoining sites while avoiding unnecessary constraints on the form and efficiency of development but does not align with the MDRS.	Change setback to 1m in line with the MDRS.
5. Common Wall Boundaries	0m	0m	Support	Common wall boundaries are supported as an important mechanism to enable coordinated and efficient medium	No change sought

Provision			Oppose/Support	Reason	Change sought
				density townhouse development outcomes.	
	EXCEPTION: Up to 0.6m of overhanging eaves.				No change sought
Height (maximum)					
6. Building Maximum Height	8m—11m+1 for pitched roofs or 5m within Height Restricted Areas	8m	Support	The proposed maximum height is supported as it provides a realistic built form envelope for medium density development and better aligns with the scale and intensity anticipated in the zone and aligns with the MDRS.	No change sought
	EXCEPTION: Any structure attached to the a building that does not exceed 0.6m in any horizontal distance, or exceed the permitted height by more than 1.5m.		Support	Supported as a sensible allowance for minor roof forms and architectural elements that will not materially undermine the outcomes sought by the height standard.	No change sought
7. Height to Boundary	2.5m height at the boundary with a 45° recession plane except for common wall boundaries. No building or structure shall project beyond a 60-degree recession plane measured from a point 4m vertically above ground level, as	a. 2.5m height at the boundary with a 45° recession plane, except b. 3.5m height at the boundary with a 45° recession plane where a common wall	Support	The proposed increase in height in relation to boundary is supported because it aligns with the MDRS, improves flexibility for building design, and better enables the higher density development anticipated within the zone.	No change sought

Provision			Oppose/Support	Reason	Change sought
	measured along boundaries of the site. This standard does not apply to: i. Road boundaries. ii. Adjoining sites that have a common wall along a shared boundary. iii. Boundaries abutting an access lot or right of way, in which case the farthest boundary of the access lot or right of way shall be used for the purpose of assessing compliance with this standard. iv. Boundaries adjoining sites zoned as Centre, Mixed Use, or Industrial. v. Antennas, aerials, satellite	boundary is in place as provided by MRZ-R6.5			

Provision			Oppose/Support	Reason	Change sought
	dishes, chimneys, flues, and architectural features less than 1m in width, providing they do not exceed the recession plane by more than 3m measured vertically. vi. Structures for the generation of electricity to service the residential unit to which it is affixed (such as solar panels, or micro wind turbines).				
Height to boundary means the plane measured at the boundary of an allotment from ground level through which no part of any building or structure, including eaves, may project, except for a chimney, mast or antenna up to 0.8m in any horizontal direction and not exceeding 2.0m.			Support	The retention of this provision without amendment is supported because the definition provides certainty for plan users and assists with consistent application of the standard.	No change sought
Refer to DEV3-Nukuhau 9. for additional standards on Landscaping and Stormwater Management, Fencing, Walls and Hedges, and Streetscape, Walking and Cycling Access.					
13.3 LRZ – Low Density Residential Zone					

Provision			Oppose/Support	Reason	Change sought
LRZ-R1 – PER activities					
1. One accessory building per allotment.	d. The maximum gross floor area of the accessory building shall not exceed 6m ² e. The maximum height of the accessory building shall not exceed 2m f. Compliance with LRZ-R5.8		Support	Supported as it streamlines the permitted activity provisions and removes unnecessary duplication from the rule framework.	No change sought
2. Any uncovered deck, terrace, platform or bridge; and/or 3. Any pool or tank (including a detention tank, swimming pool, spa pool, swirl pool, plunge pool and hot tub). Not exceeding 1m above ground level. NOTE: structures not provided for in LRZR1.4 and LRZ-R1.5 – i.e., those that exceed 1m in height shall be provided for in LRZ-R1.1.			Support	Supported because it clarifies the activity status of minor structures and improves readability of the zone provisions.	No change sought
4. Any mast, pole or radio, or television aerial.	The maximum height of the structure shall not		Support	Supported as a consequential amendment that contributes to a	No change sought

Provision			Oppose/Support	Reason	Change sought
	exceed 2m in height (excluding dish antenna greater than 1.2m in diameter) above the ground level.			more coherent and user-friendly planning framework.	
5. Fences and walls – or any combination of these, whether separate or joined together – 2m in height or less above ground level. 6. Retaining walls of 2m in depth or less below ground level.	b. Compliance with LRZ-R5.8 outside of the yard setback.		Support	Supported because it rationalises the provisions and ensures the rule set is focused on managing effects of substantive development.	No change sought
12. Temporary structures associated with maintenance activities and construction works.			Support	Supported as a practical amendment that improves plan efficiency and reduces unnecessary regulation of temporary works.	
LRZ-R5 Standards					
Footprint	LRZ including Kinloch LRZ in DEV1-Kinloch Development Area				
1. Maximum Combined Coverage	a. 5% 10% of gross site area b. Dev1-Kinloch 5% of gross site area		Support	The increased combined coverage standard is supported as it modestly improves development flexibility while remaining consistent with the intended	No change sought

Provision		Oppose/Support	Reason	Change sought
			character and lower intensity outcomes of the zone.	
2. Maximum Plot Ratio	7.5%	Support	Removal of plot ratio is supported as it simplifies the rule framework and avoids an unnecessarily rigid control where other standards are sufficient to manage built form and amenity effects.	No change sought
2. Maximum Total Coverage	N/A	Support	Support is appropriate as there is no total coverage standard proposed in this zone, which is consistent with the broader low density development framework and the other controls that continue to manage site outcomes.	No change sought
NOTE: Maximum Combined Coverage is a calculation of the combined coverage of Building Footprint and any Structures that are not otherwise provided for as permitted activities.		Support		No change sought
Building Setbacks (minimum) Minimum Setbacks				
3. Front boundary	10m unless otherwise provided within an existing <u>subdivision</u> consent This standard does not apply to: i. Fences or walls not exceeding 2m in height.	Neutral		No change sought
4. All other boundaries	10m unless otherwise provided within an existing <u>subdivision</u> consent	Neutral		No change sought

Provision		Oppose/Support	Reason	Change sought
	This standard does not apply to: i. Accessory buildings less than 10m² in area. ii. Rainwater collection tanks with individual storage capacity not exceeding 10,000L. iii. Fences or walls not exceeding 2m in height.			
5. Common wall boundaries	0m	Support	Supported as a limited flexibility provision that can enable efficient site design in appropriate circumstances without undermining the overall low density character of the zone.	No change sought
	EXCEPTION: Up to 0.6m of overhanging eaves.	Support	The exception for overhanging eaves is supported as a practical design allowance that does not materially compromise the setback outcome.	No change sought
Height (maximum)				
6. Maximum Height Building height	8m or 5m within Height Restricted Areas unless	Neutral		No change sought

Provision		Oppose/Support	Reason	Change sought
	otherwise indicated by Map D2. EXCEPTION: Any structure attached to the a building that which does not exceed 0.6m in any horizontal distance, or exceed the permitted height by more than 1.5m.			
7. Height to boundary	2.5m height at the boundary with a 45° recession plane except for common wall boundaries. Height to boundary means the plane measured at the boundary of an allotment from ground level, through which no part of any building or structure, including eaves, may project, except for a chimney, mast or antenna up to 0.8m in any horizontal direction and not exceeding 2.0m.	Support	Supported because the height to boundary control continues to provide an appropriate level of protection for adjoining site amenity in a low density context.	No change sought

PC 44 - Residential Zones (2026)

Submitter Details

Submission Date: 02/06/2026
First name: Catriona **Last name:** Eagles
Organisation: LG & PR Lusty Trust
Preferred method of contact Email
Postal address: PO Box 165, Taupo, New Zealand, 3351
Email: catrionae@cheal.co.nz
Daytime Phone: 073786405
Would you like to present your submission in person at a hearing? *
 Yes

Additional requirements for hearing:

Person of interest declaration: I am *

Explain the grounds for saying you come within category (a) or (b) above:

Note to person making further submission:

- A further submission can only support or oppose an original submission listed in the summary. It is not an opportunity to make a fresh submission on matters not raised in the submission.
- A copy of your further submission must be served on the original submitter within 5 working days of making the further submission to the Council

Consultation Document Submissions

1. Provision: PC44 General

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

LG & PR Lusty Trust request that Taupō District Council rezone the property 271 Spa Road from General Rural Zone to General Residential Zone

The reason for my submission is::

The proposal to rezone 271 Spa Road, Taupo to General Residential seeks to allow residential uses such as retirement villages or tourism accommodation, and/or commercial business uses (storage sheds, commercial tenancies) where landownership remains in a large entity. Retaining the site as General Rural Zone may create significant conflict between incompatible uses, namely adjoining accommodation activities. The proposal recognises the importance of the Geothermal Subdivision Rule for the ongoing needs of Contact Energy and the impact of the subsidence bowl in this location.

The proposal seeks to provide additional land for residential uses and/or commercial uses in Taupo to provide for economic, social, cultural wellbeing through the sustainable use of land resource to provide for the reasonably foreseeable needs of future generations.

The proposal to rezone this site represents a logical, efficient and planned extension of the Taupō's urban area. The site is surrounded by non-rural uses and is able to be fully serviced. It is an efficient use of land to have this site not in rural zoning.

No additional provisions are sought in the plan for this site to be General Residential. The normal subdivision rules and assessment criteria are applicable and suitable, with geotechnical assessment, roading design, and stormwater design at the time of subdivision further determining constraints, building platforms and lot size. Retaining some provision of control similar to Area X may be appropriate.

2. Provision: Planning Maps

I seek an amendment to the provision

I seek that the whole (or part [describe part]) of the submission be allowed (or disallowed): [give precise details].:

LG & PR Lusty Trust request that Taupō District Council rezone the property 271 Spa Road from General Rural Zone to General Residential Zone

The reason for my submission is::

The proposal to rezone 271 Spa Road, Taupo to General Residential seeks to allow residential uses such as retirement villages or tourism accommodation, and/or commercial business uses (storage sheds, commercial tenancies) where landownership remains in a large entity. Retaining the site as General Rural Zone may create significant conflict between incompatible uses, namely adjoining accommodation activities. The proposal recognises the importance of the Geothermal Subdivision Rule for the ongoing needs of Contact Energy and the impact of the subsidence bowl in this location.

The proposal seeks to provide additional land for residential uses and/or commercial uses in Taupo to provide for economic, social, cultural wellbeing through the sustainable use of land resource to provide for the reasonably foreseeable needs of future generations.

The proposal to rezone this site represents a logical, efficient and planned extension of the Taupō's urban area. The site is surrounded by non-rural uses and is able to be fully serviced. It is an efficient use of land to have this site not in rural zoning.

No additional provisions are sought in the plan for this site to be General Residential. The normal subdivision rules and assessment criteria are applicable and suitable, with geotechnical assessment, roading design, and stormwater design at the time of subdivision further determining constraints, building platforms and lot size. Retaining some provision of control similar to Area X may be appropriate.

2 June 2026

Taupō District Council
Private Bag 2005
Taupō Mail Centre
TAUPŌ 3352

ATTENTION: TAUPŌ DISTRICT PLAN REVIEW TEAM

Website: DistrictPlan@taupo.govt.nz

271 SPA ROAD TAUPŌ : DISTRICT PLAN CHANGES – 44 : REZONING

LG & PR Lusty Trust request that Taupō District Council rezone the property 271 Spa Road from General Rural Zone to General Residential Zone

This submission has been prepared on behalf of LG & PR Lusty Trust.

1. Proposal

This submission proposes to rezone the property at 271 Spa Road, Taupō (Lot 2 DP 370249 RoT 284755) from General Rural to General Residential (Image 1), and supports the Plan change with some amendments to the text and the planning maps. Any subsequent amendments are also supported.



**Image 1: The zoning and wider environment area of subject site highlighted in blue
(Source: eplan Taupo)**

The proposal to rezone the site to General Residential seeks to allow residential uses such as retirement villages or tourism accommodation, and/or commercial business uses (storage sheds, commercial tenancies) where landownership remains in a large entity. Retaining the site as General Rural Zone may create significant conflict between incompatible uses, namely adjoining accommodation activities. The proposal recognises the importance of the Geothermal Subdivision Rule for the ongoing needs of Contact Energy and the impact of the subsidence bowl in this location.

The submitter could not gain an advantage in trade competition through this submission.

Without limiting the detail of the subsequent detail of this submission, the specific provisions of the Proposal that this submission relates to is the zoning of land at 271 Spa Road, Taupo

LG & PR Lusty Trust generally seeks the following decisions:

- 3.6793ha (Lot 2 DP 370249) is rezoned from the operative General Rural Zone (GRUZ) to the General Residential Zone (GRZ)

This submission demonstrates that the site meets the requirements of section 32 of the Resource Management Act 1991. Although not directly specified this submission is consistent with the specified criteria in Section 8.2 of Council's Section 32 Evaluation Report.

The submitter considers that their land satisfies criteria identified by Council, and the rezoning would represent a logical, efficient and planned extension of the Taupo's urban area, consistent with higher-order planning direction. No development plan is proposed with this rezoning submission as the site has limited characteristics for connectivity that would require a development plan.

2. Surrounding Area Context

271 Spa Road, Taupō (Lot 2 DP 370249 – RoT 284755) is located within an area that, although zoned General Rural, is surrounded by recreation and accommodation uses. To the south is a recreation reserve and across Centennial Drive is the AC Baths Recreation Reserve with large recreation buildings. To the southwest is 284 Spa Road, a General Industrial zoned site with a spot zone precinct with large industrial buildings used for commercial activities. Beside that site, 256 Spa Road has storage sheds.

To the northwest and across Spa Road, is Spa Park, used for recreation purposes under the Spa Park Reserve Management Plan. To the north, is 281 Spa Road, the historic Spa Hotel site. To the northeast, across the Otumuheke Stream is Owen Delany Park, the main sport fields for Taupō. To the east is 41 Centennial Drive, the Lake Taupō Holiday Resort, which operates under a resource consent.

All surrounding sites are zoned General Rural Environment except 284 Spa Road. Geographically, the land to the south, southwest and west is slightly higher than the site. The land to the north is lower than the site and the land to the east at a similar level.

3. 271 Spa Road, Taupō

The subject property, legally described as Lot 2 DP 370249 (RoT 284755), comprises 3.679ha of irregular-shaped land vacant of buildings. The property has access off Spa Road via a steep formed metal track that takes you to the top of the site. The site has been vacant for many years but was historically a timber milling business operated from the site between 1961 until the 1980s. This was then followed with commercial / industrial activity occurring on the site until 1990. All buildings have since been removed.

The site itself is terraced with the upper terrace being level to the Lake Taupō Holiday Resort site. The site then slopes down to the lower terrace which sits approx. 4m above the Spa Hotel site. Significant earthworks have been undertaken on the upper terrace to establish a flat area. During these earthworks some of the existing vegetation along the site entrance and adjoining the Council reserve to the south has been removed. Minor earthworks occurred on the lower terrace which remains largely original in soil profile. The earthworks have been topsoiled and re-grassed. The upper terrace has been consented under RM230092B for use as a campground for a period between 12 June 2024 and 15 April 2026. Between Spa Road and the main area of the site is the Kathleen Stream, located in an incised valley.

There is a 100mm water main that transects the site within a water easement in favour of Taupō District Council. There is no wastewater main in near vicinity of the site, the nearest point of connection is 300m south along Spa Road.

The site is zoned General Rural with Hot Ground overlay and within the Geothermal Area X and Y subdivision overlay (Image 2). The site adjoins the Otumuheke Stream Significant Natural Area (SNA 133) and is within the Ngāti Tūwharetoa Wairakei Tauhara Geothermal Statutory Acknowledgement. The site is in the area of a known subsidence bowl and is within the Waikato River catchment.



Image 2: The subject site with Hot Ground overlay (Source: eplan Taupo)

Under the current General Rural zoning, Rural industry is the main activity, along with main commercial activities and tourism/accommodation activities. Subdivision below 10ha is a non-complying activity. As a result, the District Plan provisions are highly restrictive and are designed to maintain rural uses (including rural commercial uses and tourism activities) rather than enable residential development. Rural Industry can include stock (sheep, pigs, calves, chickens), crops (indoor or outdoor), horticulture, rural maintenance yards, timber mills/firewood yard etc.

4. Statutory Framework

National Policy Statements

a) National Policy Statement for Urban Development

The National Policy Statement on Urban Development (NPS-UD) recognises the national significance of having well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future, and to provide sufficient development capacity to meet the different needs of people and communities.

Taupō is an urban environment to which the NPS-UD is relevant. Objectives 1 & 3 of the NPS-UD are key because they recognise the importance of well-functioning urban environments now and into the future. Policy 1 & 2 support these objectives.

Objective 1: New Zealand has well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future.

Objective 3: Regional policy statements and district plans enable more people to live in, and more businesses and community services to be located in, areas of an urban environment in which one or more of the following apply:

- a. the area is in or near a centre zone or other area with many employment opportunities*
- b. the area is well-serviced by existing or planned public transport*
- c. there is high demand for housing or for business land in the area, relative to other areas within the urban environment.*

Policy 2: Tier 1, 2, and 3 local authorities, at all times, provide at least sufficient development capacity to meet expected demand for housing and for business land over the short term, medium term, and long term.

Taupō's Future Development Strategy outlines an overall sustained demand for residential housing, and future scarcity of Light industrial/trade retail sites, however it also outlines the sufficiency of retail and commercial floor space for the next three decades (FDS – our Growth Picture).

This proposal aligns with the NPS-UD and FDS as it is a sufficient large enough site for housing, or rather residential activities such as retirement village or tourist accommodation. These uses are important to support for Taupō's continued population growth. These uses are also compatible with the adjoining uses, more so than permitted rural activities.

b) National Policy Statement for Natural Hazards

The National Policy Statement for National Hazards (NPS-NH) seeks to manage natural hazard risk using a risk based proportionate approach. The sites are not identified in the District Plan as being within an Erosion Hazard Area, Flood Hazard Area, or Landslide Hazard Area, nor is it located on or near a fault line. It is however within the Hot Ground Hazard Area.

The site has two terraces. Future development of the site will require geotechnical investigations and reporting. It is expected that these reports (required by Council at the time of development) will be undertaken in accordance with the risk based framework required by Policy 1 and be managed in line with the proportionate management approach anticipated by Policy 2.

The risks identified on this site are subsidence, Hot Ground and possibly slope instability and uncontrolled fill. All of these risks have identified management techniques – foundation requirements, appropriate materials/limited hard surface, slope setbacks/foundation design and removal of fill/recompaction. As such, a future proposal can incorporate mitigation measures appropriate to minimise the hazards on this site. This site is not considered to be hazard prone areas and the proposal is consistent with Policy 3.

The primary hazard risks on the site are subsidence, hot ground and slope instability near the bank edges. As such the medium/low risks are internal to the site or with mitigation measures are able to avoid significant natural hazard risk beyond the site and is consistent with Policy 4.

Specifically related to the Rakaunui Subsidence Bowl, advice received from Contact Energy is that the rate of subsidence occurring in this subsidence bowl is decreasing (Appendix 1).

The hazards identified are not unusual in Taupō, and as such can be further identified and managed at time of development with more detailed testing. Known hot ground in the area provides base information on this matter and the location of the geothermal field is known. Likely mitigation measures for slope instability are also known. The proposal therefore satisfies the requirements of Policy 5.

Detailed geotechnical testing and future stormwater modelling will be required by Taupō Code of Practice, NZ4404 and best practice to take into account climate change adjusted runoff assumptions, ensuring that long term changes in rainfall intensity and frequency have been appropriately accounted for. The proposal is therefore consistent with Policy 6.

Overall, the proposal has a low/medium level of natural hazard risk, future development can incorporate proportionate and effective mitigation measures, the proposal is unlikely to increase significant risk to other sites, and has been assessed using the best available information, including climate change considerations. The proposal is therefore consistent with the NPS-NH.

c) National Policy Statements for Highly Productive Land, Electricity Networks, Infrastructure, Freshwater, and Indigenous Biodiversity

National Policy Statement for Highly Productive Land applies to all land within a rural zone that is identified as being Land Use Capability (LUC) Classes 1 to 3. A search on the Landcare Research Our Environment Map identifies that the site has LUC Class 4 over the site (Image 3). To the south is LUC Class 3 (where a stormwater pond now is). The NPS-HPL does not apply to LUC4 and under amendments to NPS-HPL undertaken in late 2025, Clause 3.6(1) to 3.6(4) do not apply to urban rezoning of LUC 3 land. Clause 3.6(5) continues to apply. It states:

Territorial authorities must take measures to ensure that the spatial extent of any urban zone covering highly productive land is the minimum necessary to provide the required development capacity while achieving a well-functioning urban environment.

This proposal assists in providing additional land for residential and commercial uses.



Image 3: Manaaki Whenua Mapping

National Policy Statement for Electricity Networks is not applicable as there are no electricity distribution network lines on the site, nor will the future development of the site be likely to place significant pressure on the network in the future. Unison Networks capacity mapping shows spare 11kV capacity in the network located in Centennial Drive, in close proximity to the site. The proposal is consistent with the NPS-EN.

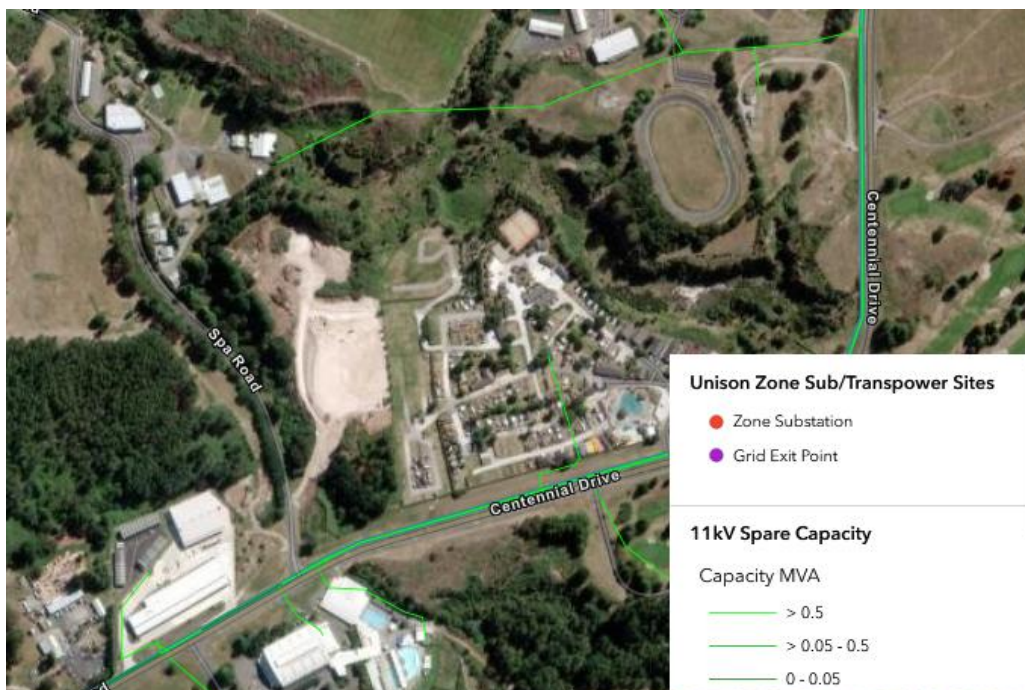


Image 4: Power Network Capacity Mapping

National Policy Statement for Infrastructure is applicable as the possible extension of the wastewater main and relocation of the water main will require construction in accordance with industry standards and be to the satisfaction of Taupō District Council prior to vesting. The proposal is consistent with the NPS-I.

National Policy Statement for Freshwater Management is applicable, however there are no wetlands on the property. The proximity to the Kathleen Stream requires consideration in any earthworks activity. There is a buffer between the Kathleen Stream and any developable area of the site created by the topography of the site. The proposal is able to be consistent with the NPS-FW or consents obtained at time of development.

National Policy Statement for Indigenous Biodiversity is not applicable as the site is void of native vegetation.

Waikato Regional Statement

d) Waikato Regional Policy Statement – Vision and Strategy for the Waikato River

Under s11 of the Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 and s12 of the Ngāti Tuwharetoa, Raukawa, and Te Arawa River Iwi Waikato River Act 2010, the Vision and Strategy (V&S) is deemed to be part of the Waikato Regional Policy Statement. Under s104(1)(b), the Waikato Regional Council must “have regard to” the RPS when considering any application for resource consent. However, additionally, the river settlement legislation also requires that the Waikato Regional Council must have “particular regard” to the Vision and Strategy for the Waikato River when carrying out any of its functions under RMA 1991. Through case law, the V&S is acknowledged as the primary, direction-setting policy for the Waikato Awa River.

The guiding Vision and Strategy is for a future where a healthy Waikato River sustains abundant life and prosperous communities. All people are responsible for restoring and protecting the river's health for generations to come. To achieve this vision, the strategy focuses on the following objectives – Water Quality, Integrated Management, Holistic Health, Cultural Significance, Public Access.

Under Te Ture Wahimana Vision and Strategy consideration is necessary to activities and their potential adverse effects on water quality of Waikato River and avoidance of further degradation. The future development of this site, either under rural or residential zoning, requires compliance with Waikato Regional Plan requirements or a consent be obtained. Any such consent will require assessment under the Waikato Vision and Strategy where adverse effects or betterment can then be appropriately assessed.

e) Waikato Regional Policy Statement (amended by Plan Change 1)

The future development of this site, either under rural or residential zoning, requires compliance with Waikato Regional Plan requirements or a consent be obtained. Any such consent will require assessment under the Waikato Regional Plan.

Key issues of Waikato Regional Policy Statement that the proposal addresses are the state of resources (SRMR-I1), managing the built environment (SRMR-PR4), relationship of tangata whenua with the environment (SRMR-I5), and Health and wellbeing of the Waikato River Catchment (SRMR-I6).

In relation to the Integrated Management objectives (IM-O1, IM-O2), the use of the site for residential activities is more compatible with adjoining uses, is in close proximity to Taupō town, can be designed with limited environmental effects in light of nearby services. The site provides an opportunity to provide residential activities or business to support Taupō's growth utilising existing infrastructure, contributing to social and economic wellbeing while maintaining environmental safeguards.

The proposal is consistent with IM-O5 (Climate Change), as development is able to be undertaken in a staged and planned manner, enabling future design to incorporate resilience. Development occurring adjacent to the existing urban area provides the ability to support reductions in emissions through the potential for future improved connectivity and potential active transport links. The site is in locations clear of the impacts of flooding and sea level rise.

No consultation has been undertaken with tangata whenua on this proposal. If future development is likely to impact on the Kathleen Stream or Otumuheke Stream, consultation will occur (IM-O7 – Tangata Whenua Relationships)

The proposal is consistent with IM-O6 (Ecosystem Services) and ECO-O1 (Ecological Integrity) as the site has low to no ecological values, and opportunities exist to enhance ecological values through planting and design.

The proposal provides for integrated and planned urban development, consistent with UFD-O1 (Built Environment), notably being within serviced catchments. The proposal adjoins existing residential areas and is able to be fully serviced with water, wastewater and stormwater services. It aligns land use with infrastructure capacity through the potential for staging, supports housing/residential use supply, and recognises the need to integrate transport, water, and servicing. It also contributes to a well-functioning urban environment by providing housing choice/residential uses through greenfield development in Taupō where supply is required. The use of this particular greenfield land to achieve these outcomes, avoids for now the use of more productive urban land surrounding Taupō being used for urban uses.

Iwi Management Plans/Statutory Acknowledgement Area

The site is located within the areas of interest for Ngāti Tūwharetoa and Raukawa being in the Waikato River catchment. The site is within the Waikato River catchment however sits above Huka Falls. Therefore Tūwharetoa Māori Trust Board as iwi authority above Huka Falls, not the Waikato River Authority.

f) Ngāti Tūwharetoa Iwi Management Plan

The Ngāti Tūwharetoa Environmental Iwi Management Plan provides a background to and identifies key resource based issues for Ngāti Tūwharetoa. The vision of the management plan is for Ngāti Tūwharetoa to 'assert their custodial and customary right of tino rangatiratanga over their respective taonga, and Tūwharetoa collectively, will sustain and protect the life force of all tribal and inherited taonga.'

As the site is within an existing modified area, adjoining an existing urban area, no identified waahi tapu, waahi taonga sites, in terms of the relevant chapters *Papatuānuku*, and *Ngā Wāhi Tapu*, it is considered that the proposal is not inconsistent with those policies and is consistent with this iwi management plan. Any activity in close proximity to Kathleen Stream may require consultation with mana whenua.

g) Wairakei Tauhara Geothermal Statutory Acknowledgement Area

The site is within the Wairakei Tauhara Geothermal Field and therefore is within the Statutory Acknowledgement area of Ngāti Tūwharetoa via Te Kohitanga O Ngāti Tūwharetoa (TKNT). This Statutory Acknowledgement relates to the geothermal field and therefore should be considered in applications relating to use of Geothermal waters, and any impacts on geothermal features.

Although the site is in close proximity to the Geothermal Feature of the Kathleen Stream, there is a buffer to any development site created by the incised stream valley. Any future works that occur in close proximity to a geothermal water body or involves a geothermal take, will require consent under the Waikato Regional Plan, and possible consultation if required.

Waikato Regional Plan

h) Waikato Regional Plan

Any development on the site will need to meet with the requirements of the Waikato Regional Plan, including for any matters associated with land development including earthworks and subsequent discharges (including stormwater and wastewater), air quality, excavation. It is expected that any development would discharge wastewater and stormwater via the Taupo District Council reticulated network and pursuant to TDC's resource consents.

Taupō Future Development Strategy

i) Taupō Future Development Strategy

The Waikato Regional Policy Statement UFD-P18 recognises new urban development be undertaken in accordance with a growth strategy for the Taupō District.

Taupō's Future Development Strategy has been developed in accordance with National Policy Statement for Urban Development and replaces the former growth management strategy TD2050. It is the third growth strategy for the district. TD2050 was adopted in 2006 and updated in 2018 (which is referenced in the Taupō District Plan). The FDS uses population projections to identify how many additional people will call the district home over the period to 2060 and how many homes and business land are required to accommodate these people. Taupō's FDS identifies the district's residential, retail, commercial and industrial growth needs and the constraints it faces to meet anticipated growth. It provides guidance on where development and growth are anticipated to occur. It considers risk and helps Council to plan for infrastructure and gives the community and landowners certainty over where development is expected to be located and when.

Taupō's Future Development Strategy outlines an overall sustained demand for residential housing, and future scarcity of Light industrial/trade retail sites, however it also outlines the sufficiency of retail and commercial floor space for the next three decades (FDS – our Growth Picture).

Residential uses/housing are considered to also include retirement villages, tourism accommodation and other uses where housing is provided by an entity responsible for operations of the site.

National Environmental Standards

j) National Environmental Standards

The relevant National Environmental Standards are National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (NES-SCS).

In early 2024 WWLA were commissioned to undertake a PSI & DSI for this site. In conjunction with a landuse consent (RM230092B), the PSI & DSI were provided to Taupō District Council. This PSI and DSI (now on the property file) concluded that the HAIL activity is confined to the northeastern fill area of the site and the remainder of the site is not a piece of land. Further advice was sought from WWLA regarding options for addressing the northeastern fill area in May 2024. The applicant undertook encapsulation of this area in 2024 in accordance with the advice received. A site validation report was provided by WWLA. No soils were removed from the site and the works were within the Regulation 8 permitted volumes for earthworks, therefore this work was undertaken under the permitted provisions of NESCS. This area has been marked on plans for future identification.

5. Reasons for Supporting the Rezoning

The following are reasons to support this rezoning proposal.

a) Appropriate land characteristics

The site has flat contour across two platforms. The land is not highly productive rural land, nor is used for rural uses. Its landscape character align more closely with residential living than with traditional rural production. The site is noted as being in the Hot Ground Hazard Area. Recent hot ground testing on the adjoining sites shows that the ground temperatures are low, as such measures are able to be designed into the foundation and building design. The site has limited visibility from adjoining neighbours and the road due to its level relative to adjoining properties. There is the ability to screen any future use from adjoining sites also.

b) Infrastructure feasibility

The area is already serviced by water, roading, power, and telecommunications. Onsite servicing solutions for wastewater and stormwater are feasible and consistent with the servicing approach used throughout the General Rural Zone, Low Density Residential Zone and General Residential Zone. There is sufficient area within the site for road (private or public) stormwater management which can be designed and managed in accordance with Taupō Council and Waikato Regional Council requirements. The site has a wide access crossing to Spa Road with good visibility which is able to be upgraded for any future use. Connection 300m along the Spa Road is possible to provide a wastewater connection to the site.

c) Positive effects on housing or commercial land supply

Rezoning may enable additional residential opportunities or business uses, in a location near to services and part of the Taupō urban area, in accordance with Taupō's Future Development Strategy and Housing Strategy.

d) Alignment with existing character

The surrounding area already functions as a non-rural area, it has large recreation buildings, large retail and commercial buildings and uses which are not rural in use or activity. Rezoning the site would reflect the existing character and settlement pattern rather than keeping the Rural zoning, reducing the conflicts between rural uses and residential uses often found in these areas.

e) Planning efficiency and land value

The current General Rural zoning significantly limits the ability to develop the land for residential purposes despite the surrounding non-rural context. Rezoning to Residential would enable development that is consistent with the area's character and would unlock the site's potential; improving its economic viability and enabling future residential use.

No additional provisions are sought in the plan for this site to be General Residential. The normal subdivision rules and assessment criteria are applicable and suitable, with geotechnical assessment, roading design, and stormwater design at the time of subdivision further determining constraints, building platforms and lot size. Retaining some provision of control similar to Area X may be appropriate to provide an avenue for consultation and approval from Contact Energy.

6. Section 32 Criteria

Plan Change 44 Section 32 Section 8.2 outlines a set of criteria for urban development to be successfully considered for residential development. The Section 32 is focused on Low Density Residential development provision however it is used here to demonstrate that this proposal largely meets these criteria also.

a) Location Relative to Existing LRZ or GRZ/Consistent Existing Development Pattern

The site is located immediately adjacent to sites which are zoned General Rural zoned land, however have non-rural or recreation activities on them. None of them have productive rural uses. The recreation sites have large buildings on them creating larger urban form. Lake Taupō Holiday Resort operates under a resource consent with high building coverage. Both Environment Court decisions and subsequent Council decisions conclude that this area has a character not of a rural zone but one of open space and large buildings adjoining the urban area. Rezoning would therefore be a small yet logical extension of the urban area. Undertaking development in this area avoids future commercial pressure on the surrounding rural area, aligning with the intent of PC44.

b) Infrastructure Servicing – Council Water & Wastewater Supply

There is understood to be no limitation to capacity in the water main in this location. Future development of the site can involve the realignment of this water main to Spa Road road formation, unless Council re-aligns the main first as part of planned upgrade. Connection to the wastewater main in Spa Road is possible via a pumped connection.

c) Land Transport Effects

Spa Road and Centennial Drive are arterial roads constructed for high traffic volumes. Any additional traffic generated by a future non-rural use is likely to be accommodated in the current formations. Additionally the Spa Road/Centennial Drive intersection is well formed with good visibility for the 50km/h

speed limit. The site's proximity to State Highway 1 East Taupō Arterial on well formed roads provides an opportunity for business activities to occur while meeting PC44's effects-based approach to managing transport impacts.

d) Outstanding Natural Landscape and Significant Natural Areas

The site is not identified as an Outstanding Natural Landscape nor as a Significant Natural Area in the Taupō District Plan (Image 5). The proposal therefore avoids adverse effects on nationally or regionally significant landscapes or ecological areas, and is consistent with the environmental limits recognised in PC44 and higher-order planning documents.

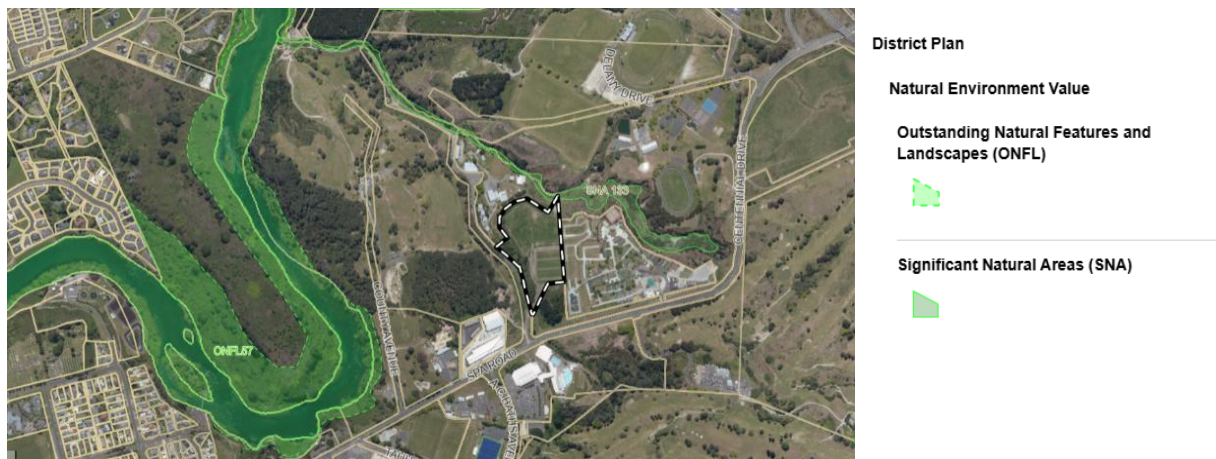


Image 5: Lake Road Site and Outstanding Natural Features and Landscapes Overlay

e) Proximity to Taupō Township

The site adjoins Taupō urban area being in a location with three waters reticulation, walking/biking trails, and arterial road proximity. It sits adjoining two accommodation activities.

f) Access from State Highway

The site does not take direct access from a State Highway, only from local roads. However it is in close proximity to State Highway 1, providing an opportunity for business enterprise on the edge of town. Accordingly, the proposal would avoid reverse sensitivity effects on state highway infrastructure and align with district-wide objectives relating to the safe and efficient functioning of nationally significant infrastructure.

g) Geothermal Systems

The site is not located within the Wairakei Tauhara or Ōhāaki Geothermal Systems shown on Map D1 (Geothermal Residential Overlay - Image 6) however is in close proximity to a known subsidence bowl which is closely monitored. There are therefore no geothermal constraints as identified by Map D1 that would preclude General Residential zoning.

The site is located within the Geothermal Subdivision Area X (Image 7) which restricts subdivision of Rural land within close proximity to Contact Energy's operations. The Area X and Y restrictions manage impacts of subdivision on Contact Energy's operations largely being reverse sensitivity. These issues are well understood by the landowner. It is considered that this site can be rezoned to residential, retaining

some provision of control similar to Area X as appropriate, to allow Contact Energy continued oversight on future subdivision and appropriate legal mechanisms.

The subsidence bowl is closely monitored by Contact Energy. This matter is well understood by the landowner and Contact Energy. Based on the low rate of subsidence occurring, the mitigation measures of structural advice for foundation and slab design are well understood and established in Taupō.



Image 6: Site and Geothermal Residential Overlay

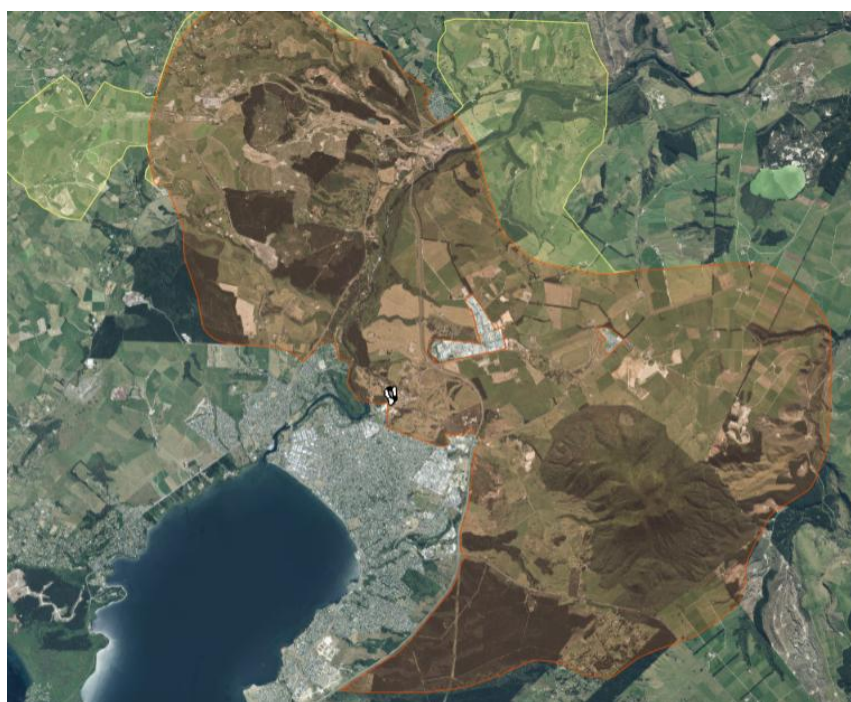


Image 7: Site and Geothermal Subdivision Overlay

h) Natural Hazard Risk

The site has a Hot Ground Overlay which relates to managing risks (soil temperature, gases, impact on construction materials) of hot ground. The Hot Ground overlay is a District Wide provision of the District Plan which requires assessment and compliance regardless of zone. Testing at the time of development on adjoining sites has shown that soil temperatures in this area are warm however often do not exceed 10C above ambient Temperature (Permitted activity – NH-R5).

It is highly unlikely in this area that soil temperature would be higher. It is noted that the NH-R6 Controlled Activity is 10C – 40C above ambient temperature and NH-R7 Restricted Discretionary Activity is 40C – 60C above ambient temperature. The consent process is able to manage the impacts of these temperatures within the matters of discretion.

Therefore the site can be demonstrated to be free of significant natural hazard risk. Any localised or site specific hazard considerations can be:

- Identified through LIM and PIM processes, and
- Appropriately managed at subdivision and building consent stages, consistent with the National Policy Statement for Natural Hazards and Council's risk based planning approach.

i) Consistency with Higher Order Planning Documents

The proposal is consistent with:

- National Policy Statement on Urban Development – enabling housing/residential use supply and well-functioning urban environments,
- Waikato Regional Policy Statement – integrated growth and infrastructure coordination,
- Taupō District Future Development Strategy – recognition of ongoing demand for residential housing and business land, and
- Proposed Plan Change 44 – broader outcomes sought in relation to housing supply, choice, and efficient urban form.

7. Section 32 Framework

Section 32 of the RMA requires that before giving effect to a proposed plan change, an evaluation must be undertaken to:

- Examine whether the objectives of the proposal are the most appropriate way to achieve the purpose of the RMA; and
- Examine whether the provisions are the most appropriate way to achieve those objectives, including:
 - Identifying reasonably practicable alternatives,
 - Assessing efficiency and effectiveness, and
 - Summarising reasons for the preferred option.

In accordance with section 32(1)(c), the level of detail contained in this evaluation reflects the scale and significance of the anticipated environmental, economic, social and cultural effects.

The proposal is an amending proposal under section 32(3), as it seeks amendment to the proposed Plan Change only. Section 32(6) clarifies that where no actual objectives are stated in the proposal, the objective is the purpose of the proposal.

a) Identification of the Issue

The core issue is the efficient use of serviced land and rezoning of the site.

As a reasonable sized site, with access to servicing, this site is able to provide residential uses or commercial uses within the urban area of Taupō, meeting an identified need in the FDS for Residential and business capacity within Taupō.

b) Taupō District Plan

This proposal does not seek to amend any Objective or Policy, accordingly the s32A tests for the proposal and amendments to the subdivision rules is whether the proposal is appropriate to achieve the existing objectives and implementing the policies. The proposal is assessed against the Taupō District Plan Strategic Directions and Objectives and Policies.

- Climate Change

The proposal works towards the climate change outcomes by enabling a development adjoining an existing urban area, and being located near an arterial road thereby reducing the pressure for rural development.

- Freshwater Quality

Similarly it supports freshwater quality objectives through the avoidance of rural activities in the Waikato Catchment thus reducing pastoral nutrient inputs, provision of reticulated wastewater, best practice stormwater management, and opportunities for native revegetation.

- Land Development

For land development, the proposal is consistent with Taupō's FDS and seeks planned and serviced urban growth through the plan change process. This submission notes that the proposal meets Council's criteria for additional land rezoning.

- Natural Environment Values

The proposal is consistent with natural environment values objectives by avoiding impacts on significant natural areas and outstanding landscapes while providing the possibility of biodiversity enhancement in the future. The future development areas are not directly beside either Otumuheke or Kathleen Streams, supporting these values.

- Urban Form

Overall this proposal supports urban form and development objectives with rezoning occurring near the existing urban area where environmental effects are managed, while achieving transport and natural hazard objectives through safe access and suitability of the land for development.

- Transport

The site's access has good visibility and the ability to be upgraded if required. Thus avoiding impact on safe and efficient use of the road network. The site is also not far from walking and biking trails, providing recreational opportunities.

- Natural Hazards

The site does have natural hazards in the form of hot ground, subsidence and possible slope instability. These hazards are known and solutions for land development on such sites is well developed, allowing them to be effectively managed through site specific design.

- Energy

The placement of residential activities in proximity to geothermal energy activities can result in reverse sensitivity conflicts placing pressure on Contact Energy's consented, permitted and legitimate activities. This proposal seeks to rezone land to residential uses within Area X and in close proximity to a known subsidence bowl. Retaining some provision of control similar to Area X may be appropriate on this site, thereby continuing to provide Contact Energy with oversight of future subdivision. Residential uses in this vein would be retirement villages, accommodation activities, as well as storage sheds, commercial activities etc.

The proposal is considered to largely achieve the respective objectives of the Taupō ODP.

c) Evaluation of Benefits and Costs

Benefits	Costs
Economic	
Supports housing/residential use supply and responds to identified demand for residential land. Generates economic activity through land development and construction, and rates Increased use of unutilised land. More efficient use of existing infrastructure networks including public transport More efficient use of wider services – medical, education Supports local economy	Development costs including infrastructure upgrades, though these are minimal. Removes rural uses as a permitted activity from this site
Social	
Increased housing choice and availability for the community Supports community growth and wellbeing Supports viability of services	Change in local amenity experienced by neighbouring residents
Cultural	
Opportunity for ecological enhancement and land management Development occurs on land with no identified sites of significance	Potential effects on unidentified cultural values

Environmental	
Consolidation of development adjacent to existing urban areas, reducing pressure for dispersed rural subdivision Opportunities to enhance indigenous biodiversity through native planting, ecological restoration More compatible use adjoining existing accommodation businesses	Increased impervious surfaces Loss of open space character.

d) Economic Growth and Employment Opportunities

The proposed rezoning of approximately 3.679ha of rural land to residential zoning in Taupō will provide for residential uses. This scale of development is consistent with the strategic growth anticipated by Taupō District Council's Future Development Strategy and will contribute positively to the economic and social wellbeing of Mangakino and the wider western Taupō District.

e) Risk of acting or not acting

There is no uncertain information or insufficient information about this proposal, therefore an assessment of risk of acting or not acting is not considered necessary.

However it is noted that not acting would fail to implement Taupō's FDS and Housing Strategy, impacting on the ability to continue to provide a competitive housing market where needed.

f) Efficiency and Effectiveness

Efficiency

The rezoning of site to Residential is considered efficient for the following reasons:

- Efficient use of land and infrastructure: The site adjoins existing urban area with close proximity to established infrastructure networks where there is either sufficient capacity or planned capacity. This avoids the need for new, standalone infrastructure systems and reducing overall capital and environmental costs to the wider community.
- Avoidance of inefficient development patterns: Although apparently incongruous with the surrounding zoning, rezoning this site to General Residential enables a planned and coordinated urban expansion, consistent with adjoining property uses and avoiding wider fragmented and ad hoc rural or industrial subdivision that would otherwise occur through the resource consent process, which is typically less efficient and results in poorer outcomes.
- Economic outcomes: Economic gains will result from the fuller utilisation of underutilised serviced land when used for residential or business purposes, resulting in economic expenditure relating to land development, infrastructure upgrades, contractor employment, and construction.
- Alignment with infrastructure funding mechanisms: Development contributions ensure that growth pays for growth, minimising fiscal burden on the wider community.

While there are costs associated with the loss of rural land, infrastructure upgrades, and potential environmental effects, these are moderate, well understood, and able to be internalised by the developer or mitigated through design and consenting mechanisms.

Effectiveness

The proposal is considered highly effective for the following reasons:

- Directly addresses housing/residential use supply issues: The proposal can provide residential capacity, likely in the form of retirement village/tourism accommodation for Taupō to meet the long term supply for this township, alternatively provide compatible commercial development. The sites are immediately adjacently to the urban area and will support its growth. This capacity will meet a demonstrated demand, provide flexibility in housing typologies and contribute modern housing for permanent and visitor population, supporting a well-functioning urban environment.
- Delivers planned urban growth: The proposal provides a structured and coordinated framework for development through the District Plan as required by the FDS, rather than relying on less certain and less integrated consent-based development pathways.
- Strong alignment with strategic objectives: The proposal can achieve climate change, freshwater, infrastructure, urban form, and natural environment objectives by enabling development in an appropriate location with manageable effects.
- Effectively manages environmental effects: The scale and nature of effects are well understood and can be avoided, remedied or mitigated through subdivision design, consent conditions, and best practice environmental management.
- Supports resilient and adaptive development: The low-density format enables site-specific responses to natural hazards, climate change, and future adaptability, increasing the long-term effectiveness of the development.
- Provides certainty and clarity: Rezoning provides a clear planning framework for landowners, Council and infrastructure providers, improving certainty and enabling better long-term planning outcomes.

g) Options considered

Option 1: Status Quo The existing Rural Zone and related provisions applying to the sites would be retained and non-complying consent would be required.	Continuing to apply Rural Zone provisions to the site will not assist in achieving the ODP's objectives relating to ensuring sufficient residential development capacity and providing for sustainable growth. Continuing the Rural zone provisions will create conflicts between uses as Permitted Rural uses are not compatible with surrounding non-rural uses. Any consent would be medium risk, with uncertainty as residential development in rural zones is not supported by the objectives and policies however surrounding uses are not rural and the decisions reflect the non-rural character of the area.
Option 2: Rezoning the sites as General Residential without the development area plan	Rezoning to General Residential is more compatible with adjoining uses being accommodation and recreation. The site has limited characteristics that require a development area plan. There is a single access

	with no need or ability to provide connectivity to adjoining sites. There are limited locations for water and wastewater connection. There are no site specific natural hazards that require spatial definition and limited locations of planting. These matters can instead be clearly identified and addressed in any resource consent application.
Option 3: Rezone the site as Light Industrial	A Light Industrial zone (GIZ) with a precinct may also be appropriate in light of surrounding uses however may have effects of noise, traffic and lighting on adjoining properties if undertaken without mitigation. Additionally this is out of scope for Plan Change 44.

h) Reason for option chosen

This submission on Council's Proposed Plan Change 44 to rezone 271 Spa Road to General Residential, without a development plan, is the most appropriate option (Option 2) because it utilises an existing and commenced statutory process specifically designed to consider residential zoning changes, ensuring timely and efficient decision-making without the need for a standalone private plan change.

As per Council's Section 32 evaluation, this submission reduces duplication of process, cost, and delay. A development plan is not considered necessary given the small 3.6ha size of the site and its topographical limitations to connect to adjoining properties - there is a single access with no need or ability to provide connectivity to adjoining sites. There are limited locations for water and wastewater connection. There are no site specific natural hazards that require spatial definition and limited locations of planting.

These matters can instead be clearly identified and addressed in any resource consent application within this submission further strengthens the proposal by demonstrating comprehensive and coordinated planning, including how infrastructure, access, and environmental constraints will be managed.

8. Assessment of Environmental Effects

Plan Change 44 Section 32 Section 8.2 outlines a set of criteria for urban development to be successfully considered for residential development. The Section 32 focusses on Low Density Residential development provision however it is used here to demonstrate that this proposal largely meets these criteria also.

a) Economic Effects

Economic gains will result from the fuller utilisation of underutilised serviced land when used for residential or business purposes, resulting in economic expenditure relating to land development, infrastructure upgrades, contractor employment, and construction. The rezoning will contribute to residential use supply and/or commercial growth in Taupō.

b) Ecological Effects

The site is largely in grass with some vegetation on the western and northern banks. Due to the significant area of grass, no detailed ecological assessment is considered warranted. Future planting may be possible when considered in conjunction with development plans.

c) Landscape Effects

As noted in Section 6, the site is not identified as an Outstanding Natural Landscape nor as a Significant Natural Area in the Taupō District Plan (Image 8). The proposal therefore avoids adverse effects on nationally or regionally significant landscapes or ecological areas. Site specific landscape or amenity effects can be mitigated by the use of edge planting, to screen the site from either Spa Road view or the adjoining properties, if assessed as required in the consent.

d) Effects on Cultural Values

No archaeological sites have been identified on NZAA Arch Site on this site (Image 8). Cultural values are associated with Otumuheke Stream. Any future development on this site will not be in this location.

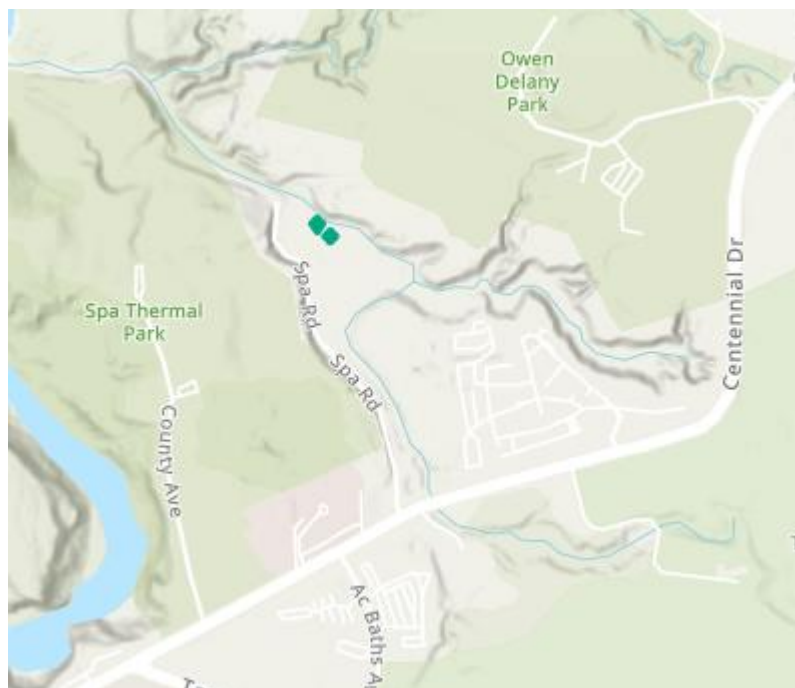


Image 8: ArchSite mapping near Site

e) Geotechnical Effects

The site has two terraces which will require geotechnical assessment at the time of development. As outlined in Section 4b, future development of the site will require geotechnical investigations and reporting. It is expected that these reports (required by Council at the time of development) will be undertaken in accordance with the risk based framework required by Policy 1 and be managed in line with the proportionate management approach anticipated by Policy 2.

The hazards identified are not unusual in Taupō, and as such can be further identified and managed at time of development with more detailed testing. Detailed geotechnical testing and future stormwater modelling will be required by Taupō Code of Practice, NZ4404 and best practice to take into account

ground conditions, likely resulting in recommendations of foundation design, setbacks from slopes and remediation of uncontrolled fill.

f) Transportation and Infrastructure Effects

As detailed in Section 6(c) & (f), the adjoining roads are arterial roads designed for high traffic volumes. The access crossing is able to be upgraded and has good visibility. The intersection of Spa and Centennial is in good condition, with good visibility. There are no limitations to upgrades if assessed as necessary in a consent application.

g) Land Contamination Effects

As detailed in Section 4(j), the site has previously been assessed under the NESCS, with works undertaken on site under specialist advice. A site validation report has been undertaken and the encapsulation has been mapped. The remainder of the site is clear of contamination.

h) Reverse Sensitivity Effects

Rezoning this site to General Residential to provide for residential uses removes a significant potential conflict between incompatible uses. As a General Rural site, permitted uses can be loud, odorous, have many traffic movements - likely to cause conflict with the amenity of the two adjoining tourism accommodation businesses. A positive effect of the rezoning would be the resulting similar nature of activities.

9. Summary

This submission has been prepared on behalf of LG & PR Lusty Trust in support of amending Proposed Plan Change 44 to rezone 271 Spa Road, Taupō from General Rural Zone to General Residential Zone, without a development plan.

The proposal to rezone the site to General Residential seeks to allow residential uses such as retirement villages or tourism accommodation, and/or commercial business uses (storage sheds, commercial tenancies) where landownership remains in a large entity. Retaining the site as General Rural Zone may create significant conflict between incompatible uses, namely adjoining accommodation activities. The proposal recognises the importance of the Geothermal Subdivision Rule for the ongoing needs of Contact Energy and the impact of the subsidence bowl in this location.

The proposal seeks to provide additional land for residential uses and/or commercial uses in Taupo to provide for economic, social, cultural wellbeing through the sustainable use of land resource to provide for the reasonably foreseeable needs of future generations.

The proposal to rezone this site represents a logical, efficient and planned extension of the Taupō's urban area. The site is surrounded by non-rural uses and is able to be fully serviced. It is an efficient use of land to have this site not in rural zoning.

No additional provisions are sought in the plan for this site to be General Residential. The normal subdivision rules and assessment criteria are applicable and suitable, with geotechnical assessment, roading design, and stormwater design at the time of subdivision further determining constraints, building platforms and lot size. Retaining some provision of control similar to Area X may be appropriate.

Solution Sought

I request that Taupō District Council rezone the property at 271 Spa Road from General Rural Zone to General Residential Zone.

The LG & PR Lusty Trust wishes to be heard in support of this submission.

Yours sincerely



CATRIONA EAGLES
TECHNICAL LEAD – PLANNING
Email: catrionae@cheal.co.nz

Appendices

1. Contact Energy Subsidence Bowl

Appendix 1

Contact Energy
Subsidence Bowl Advice

Trudy Harding

From: Matt Stulen <Matt.Stulen@contactenergy.co.nz>
Sent: Thursday, 1 August 2024 3:49 pm
To: Catriona Eagles
Subject: Re: Subsidence Bowl Rakaunui Road
Attachments: Rakaunui Rd subsidence update - 2023.pdf

Hi Catriona,

Please see the latest update that was sent to everyone who lives in and around the Rakaunui Subsidence Bowl.

We will have updated subsidence information in the next month or so from the recent survey completed this year.

Kind regards,
 Matt

Matt Stulen
 Advisor - Environment
 Corporate Affairs

M: 027-836-4517 | **E:** matt.stulen@contactenergy.co.nz



Private Bag 2001, Taupo Mail
 Centre, Taupo 3352
 Wairakei Power Station,
 Te Aro Road, Wairakei, Taupo
 3384, New Zealand

From: Catriona Eagles
Sent: Thursday, 1 August 2024 3:26 pm
To: Matt Stulen
Subject: Subsidence Bowl Rakaunui Road
 Hey Matt

Have just had a query for a property at lower Rakaunui Road.
 Any chance you could send through the uptodate subsidence bowl info for there?
 Much thanks

Ngā mihi

Catriona Eagles
Technical Lead - Planning
Cheal Consultants Ltd

DDI +64 7 376 1476 | M +64 274 226 785
 E: catrionae@cheal.co.nz
 Level 1, 4 Horomatangi Street, Taupō 3330
 Post to: PO Box 165 Taupō 3351



CAUTION!! This message contains information that is confidential and may be subject to legal privilege. If you are not the intended recipient, you must not peruse, use, disseminate, distribute or copy this message. If you have received this message in error, we apologise and ask that you notify us immediately and destroy the

message from all locations. We do not accept responsibility for any changes to this email or its attachments.

This email has been scanned by the Symantec Email Security.cloud service.
For more information please visit <http://www.symanteccloud.com>

CONTACT ENERGY GROUP NOTICE: The information contained in this transmission is confidential and may be legally privileged. It is intended for the named addressee only. If you are not the named addressee you may not copy, distribute or take any action in reliance upon this transmission.



2023

Wairakei-Tauhara Subsidence Update

As part of monitoring and managing the Rakaunui Road subsidence bowl, Contact Energy (Contact) has prepared this update for you, setting out the summary from the monitoring and surveying investigations undertaken by Contact.

Latest subsidence survey results

Background

Contact conducts surveys to understand ground deformation, also known as subsidence, around the Wairakei-Tauhara geothermal field. The subsidence bowl boundaries are reviewed every 4-years.

The Rakaunui Road subsidence bowl is surveyed every 2 years. The entire Wairakei-Tauhara field is surveyed every 4-years.

Results

The map in Figure 1-1 shows the results for the movement measured between 2017 and 2021. The 4-yearly field surveys give the best overall picture of changes within the subsidence bowls.

The numbers show vertical land movement in millimetres per year. This is the annual movement measured over the survey period to allow easy comparison between surveys. Below is an update on the Rakaunui Road subsidence bowl:

- Subsidence near Spa Park and the Rakaunui Road industrial park has decreased since the last survey in 2013-2017
- Subsidence rates near the Rakaunui Road industrial park are less than or equal to -10 mm per year.
- The Rakaunui Road industrial area is not within the 2017-2021 subsidence bowl boundary.
- At Spa Park, the subsidence rates range from 10 to 5 mm year. The park lies within the 2017-2021 subsidence bowl boundary.

Our monitoring provides a clear picture of subsidence across the Wairakei-Tauhara geothermal field. As subsidence continues, so will Contact's monitoring activities. The next survey of private land is scheduled to commence in August this year.

How does this impact your property?

Contact maintains the geothermal reservoir pressure through reinjection of geothermal fluid back underground. While the subsidence is ongoing, it is important to note that subsidence caused by deep geothermal activity occurs very slowly – over decades.

If your property is located within one of the areas of subsidence discussed and you notice effects that that could be related to subsidence, please get in touch with us so that we can work with you to determine the cause. Possible visual effects could include:

- Cracks in concrete floors and/or driveways
- Cracks in walls
- Stormwater drainage effects

Contact is reasonably confident that the observed rate of subsidence will not cause your property to become uninhabitable or unsafe in the near future. However, Contact is committed to remedying any physical damage to your property resulting from subsidence caused by our operations. Contact may also compensate you for business disruption and relocation costs if necessary, during the repair work, as a result of subsidence.

Keeping you informed

We are committed to keeping you well informed about the issue and our efforts



to better understand the geology and dynamics of the known subsidence bowls.

If you have any questions, please get in touch with Contact's Environment and Land Team by contacting Matt Stulen on matt.stulen@contactenergy.co.nz

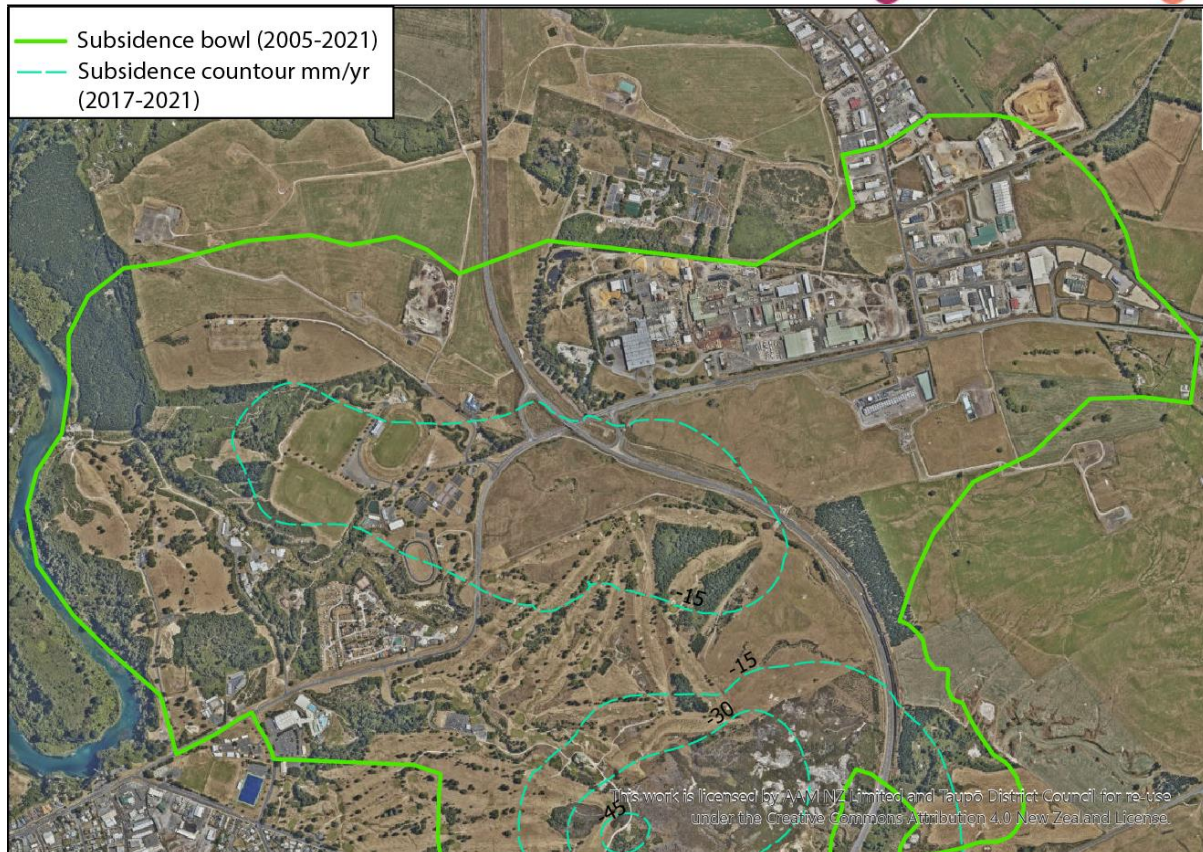


Figure 1-1 : Rakaunui Rd 2005-2021 - area of historical subsidence and subsidence contours (from 2017-2021 levelling survey)

Trudy Harding

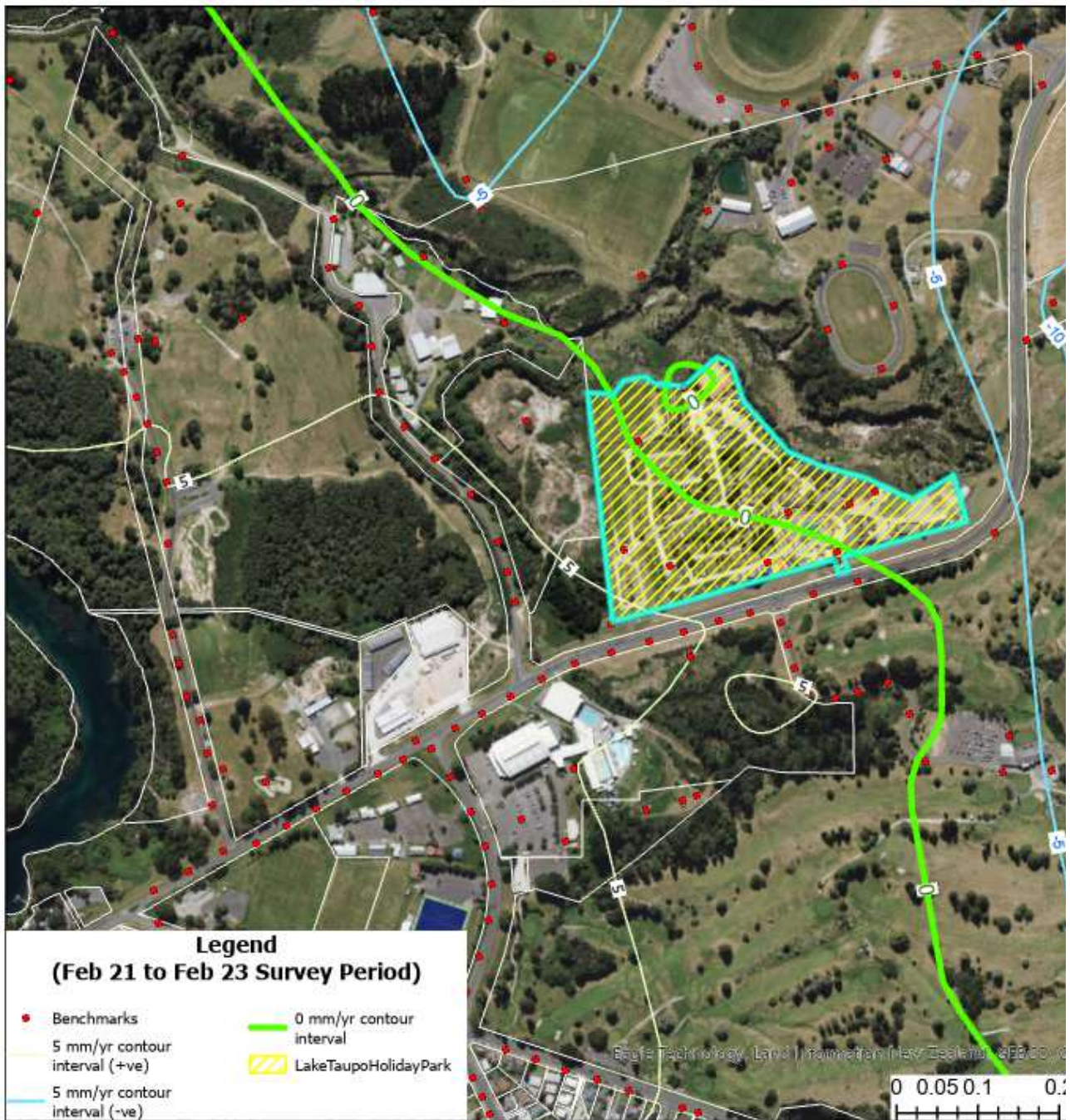
From: Matt Stulen <Matt.Stulen@contactenergy.co.nz>
Sent: Sunday, 11 February 2024 8:17 pm
To: Catriona Eagles; Jeremy Williams
Subject: RE: Spa Road Subsidence Bowl

Hi Catriona,

Please see a summary of the latest subsidence information for the area surrounding the Lake Taupō Holiday Resort.

Inserted below is a plan of the latest subsidence information for 41 Centennial Drive (Lake Taupō Holiday Park). The plan shows the average rate of subsidence in millimetres per year measured over the latest 2-yearly partial field survey period of February 2021 to February 2023.

Subsidence in this area is very low and in recent years has substantially slowed including low tilt rates as shown by widely spaced contours on the map below. An updated 4-yearly full-field survey is currently in progress that is expected to be completed by July 2024.



Ngā mihi,
Matt

Matt Stulen
Advisor - Environment
Corporate Affairs

M: 027-836-4517 | E: matt.stulen@contactenergy.co.nz



Private Bag 2001, Taupo Mail
Centre, Taupo 3352
Wairakei Power Station,
Te Aro Road, Wairakei, Taupo
3384, New Zealand

From: Catriona Eagles <CatrionaE@cheal.co.nz>
Sent: Monday, February 5, 2024 11:13 AM
To: Jeremy Williams <Jeremy.Williams@contactenergy.co.nz>; Matt Stulen <Matt.Stulen@contactenergy.co.nz>
Subject: Spa Road Subsidence Bowl

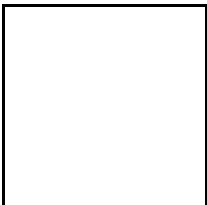
Thanks for our meeting last Friday, it was good to touch base in general and on the specific projects we discussed.

Lloyd Lust at Lake Taupō Holiday Resort and I would love to get the most recent subsidence data for the Spa Road Subsidence Bowl when you have a minute.

Ngā mihi

Catriona Eagles
Planning Manager
Cheal Consultants Ltd

DDI +64 7 376 1476 | M +64 274 226 785
E: catrionae@cheal.co.nz
Level 1, 4 Horomatangi Street, Taupō 3330
Post to: PO Box 165 Taupō 3351



CAUTION!! This message contains information that is confidential and may be subject to legal privilege. If you are not the intended recipient, you must not peruse, use, disseminate, distribute or copy this message. If you have received this message in error, we apologise and ask that you notify us immediately and destroy the message from all locations. We do not accept responsibility for any changes to this email or its attachments.

This email has been scanned by the Symantec Email Security.cloud service.
For more information please visit <http://www.symanteccloud.com>

CONTACT ENERGY GROUP NOTICE: The information contained in this transmission is confidential and may be legally privileged. It is intended for the named addressee only. If you are not the named addressee you may not copy, distribute or take any action in reliance upon this transmission.

Staff Submission : Plan Change 44 – Residential Zones

Amendments sought to Planning Maps:

