





**Te Tuhi Plan Change: Baseline
Ecology
August 2023**



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Cover Illustration: View from southern end of the peninsula, towards Lake Taupō.

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1. INTRODUCTION

1.1 Background

Te Tuhi Estate Limited engaged Bioresearches to complete an assessment of the ecology in relation to the proposed development on Te Tuhi Point, 287 Whakaroa Road, Kinloch (Figure 1). This assessment is to prepare ecological information for and participate in Taupō District Council's PC42 process, seeking to rezone the site to Rural Lifestyle Zone with site-specific provisions in a Precinct Plan; including information for lodging the subdivision and land use consent application.

The site is a 344 ha property located in a rural setting, primarily vegetated in pasture and with mixed-stock farming the current land use.

The land blocks, collectively referred to as the Te Tuhi Estate or 'the site', are comprised of the following properties:

- 287 Whakaroa Road, Kinloch
- 351 Whakaroa Road, Kinloch, and
- 387 Whakaroa Road, Kinloch.

The Te Tuhi Estate is current zoned Rural and overlooks Lake Taupō to the west – south and east. The site is bounded by Scenic Reserves to the east and south, a Recreational Reserve to the south-west, and two smaller Scenic Reserves form part of the upper north-west boundary, with the remainder of the upper north-west boundary a pastoral block. Walking and biking tracks, the W2K Trail - Great Lake Trail, meander through the Scenic and Recreational Reserves between Whakaipō Bay and Kinloch.

This report describes the existing ecological values of the terrestrial and freshwater habitats within the site, specifically in relation to the proposed development areas.



Figure 1. Map of the Te Tuhi Estate and Development Concept. Urban Acumen 2 August 2022.

1.2 Proposed Development

The proposed development is illustrated in Figure 1. This includes the construction or widening of access roads, to facilitate development into a Rural lifestyle development which will include a lodge, clustered residential development, residents shared amenities (including walking tracks to link with the wider Taupo walking network), with extensive areas of landscaping and revegetation.

2. STATUTORY CONTEXT

This section summarises the legislation, policy, plans and strategies relevant to the protection, conservation and enhancement of nature conservation interests associated with the site. The ecological values described in this report allow significant ecological issues and adverse effects to be identified as they relate the Resource Management Act 1991 (RMA). The identification of significant values and subsequent management recommendations to mitigate adverse effects are consistent with standards and objectives of the following legislative, policy statement and regional plan documents.

2.1 Legislation

2.1.1 Resource Management Act 1991 (RMA)

The purpose of the RMA is to achieve sustainable management. Important elements of this are the maintenance of indigenous biodiversity and protection of significant indigenous vegetation and habitats. The RMA provides that any adverse effects of development be avoided in the first instance, and where avoidance is not reasonably practicable, impacts should be minimised, remedied, or mitigated. These elements are given effect in Sections 5, 6 and 7, and Schedule 4 sets out the requirements for effects assessments.

2.1.2 Wildlife Act 1953

The Wildlife Act (1953) provides statutory protection for native wildlife (e.g., lizard, frog, bat, bird, and some terrestrial invertebrate species), excluding those species listed in Schedules 1–5.

2.2 National Policy Statements

The National Policy Statement for Freshwater Management 2020 (NPS-FM) (and also the National Environmental Standards for Freshwater 2020 (NES-F)) provides protection to freshwater bodies, including natural wetlands. Consequently, any works proposed within 100 m of a natural wetland are required to obtain resource consent to ensure that potential impacts to the wetlands are managed.

The National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB) provides protection to significant terrestrial vegetation and habitats, with a focus on tangata whenua as kaitiaki of species and ecosystems which are taonga to them.

2.3 Regional and District plans and Policies

The Waikato Regional Plans (including the Regional Freshwater Plan, Regional Land and Soil Plan, and proposed Natural Resources Plan) and the Taupō District Plan are the principal statutory planning documents which cover the site. These plans are prepared by Waikato Regional Council (WRC) and Taupō District Council (TDC) for the purpose of giving effect to the RMA as a regional council and/or a territorial authority.

3. ASSESSMENT APPROACH AND METHODOLOGY

3.1 EIANZ Guidelines

The overarching approach of this analysis and reporting is to ascertain the existing ecological values on the site: species, communities and systems. This values assessment generally follows the Ecological Impact Assessment (EclA) Guidelines for use in New Zealand published by the Environmental Institute of Australia and New Zealand (EIANZ) (Roper-Lindsay et al., 2018). The EclA Guidelines provide a standardised matrix framework that allows ecological effects assessments to be clear, transparent, and consistent. The EclAG framework is generally used in Ecological Impact Assessments in New Zealand as good practice, and a detailed analysis of this methodology is presented in Appendix A.

Using the EIANZ EclA framework, a simple ranking system is used to assign value to species as well as other matters of ecological importance such as species assemblages and levels of organisation. The overall ecological value is then determined on a scale of 'Negligible' to 'Very High'. In addition to this assessment, all identified ecological values were assessed for significance against the Waikato Regional Plan criteria to test ecological significant (where not already an SNA, Waikato Regional Policy Statement, Part B, 11A, Appendix E).

In addition to the values assessment this report identifies potential constraints with respect to ecology (such as watercourses, wetlands, high value vegetation and habitats), including statutory guidelines and rules where relevant to the proposed Te Tuhi Estate Precinct Plan.

3.2 Zone of Influence

The zone of influence (ZOI) of the Project relates to an area occupied by habitats and species that are adjacent to and may extend beyond the boundary of the Site. It is defined in the EIANZ Guidelines as "the areas/resources that may be affected by the biophysical changes caused by the proposed Project and associated activities."

The ZOI of the Project on different species differs depending on how the species uses their environment. For example, mobile species such as birds and long-tailed bats have large home ranges across more diverse habitats compared to lizards and threatened plant species which may be restricted to a small area or specific habitat type. This affects how a species could be impacted by the Project and was taken into consideration during the desktop review and site investigations. To reflect the likelihood of a species occurring or its potential dispersal ability, varying search distances were used depending on the species context.

3.3 Desktop Review

A desktop review of various online GIS databases was undertaken to determine the extent of ecological protection overlays (e.g., covenants, conservation land, SNAs), 'ecosystem type' classifications, and visualise historical land-use using historical aerial images. The scheduling of SNAs and classification of ecosystems provides a means for Councils to protect and maintain indigenous biodiversity within Districts and Regions. The desktop review also included a search for fauna records from various information sources.

Specifically, the following databases were reviewed:

- Department of Conservation BIOweb records for lizards and bats¹;
- iNaturalist records within approximately a 5 km radius from the Site²;
- New Zealand Bird Atlas eBird database³. Bird data is recorded in 10 km² grid squares. Grid square AW77 was accessed as this is positioned over the Site;
- Waikato Regional Council and Taupō District Council GIS maps;
- Department of Conservation Threat Classification Series⁴;
- Retrolens historic aerial imagery⁵; and
- A classification of New Zealand's terrestrial ecosystems (Singers & Rogers, 2014)⁶.

3.4 Site Investigations

Site visits were made on 19th and 20th January 2023. During the visits, additional information was gathered on terrestrial and freshwater habitats and native fauna presence within the Site. The methodologies listed for each habitat type are listed below.

3.4.1 Terrestrial Habitats

The vegetation within the site was assessed using a 'walk through' methodology. Botanic values recorded included native and exotic vascular vegetation, and notes were made on the quality and extent of vegetation present on site. No specific surveys for native plants were undertaken.

3.4.2 Freshwater habitats

The site assessment was undertaken on 19th and 20th January 2023, by an experienced ecologist. All proposed development sites (dwellings, roads, wastewater field), cut and fill areas, and proposed stormwater discharge areas from the road (indicated by blue arrows on the plans) were inspected. Envelope Engineering Plans 1671-01 Drawing Numbers 900 to 909 Revision P3 were used to identify the proposed development areas. The inspection included flow paths or low-lying areas within 100m of the development areas.

Potential aquatic habitats were assessed and described, and the proposed development areas were specifically assessed for potential wetland areas under the definitions in the NPS-FM. Photographs were taken and specific habitats were marked with a hand-held GPS. During the site assessment, the presence and extent of wetlands, streams and other freshwater habitats within the Site were noted and the quality of any freshwater habitat was visually assessed.

¹ <https://www.doc.govt.nz/our-work/monitoring-reporting/request-monitoring-data/>

² <https://inaturalist.nz/home>

³ <https://ebird.org/home>

⁴ All Department of Conservation Threat Classification Documents are listed in the below webpage. When individual reports are referenced hereafter, they are referenced in-text.

<https://www.doc.govt.nz/aboutus/science-publications/conservation-publications/nz-threat-classification-system/>

⁵ <https://retrolens.co.nz/>

⁶ <https://www.doc.govt.nz/globalassets/documents/science-and-technical/sfc325entire.pdf>

Streams

Overland flow paths were ground-truthed and classified as to their permanent, intermittent or ephemeral status in accordance with Waikato Regional Council definitions. In addition, these watercourses were assessed as to whether they were natural or artificial, using information from both the desktop review and site visit.

An ecological value was then assigned to each stream, based upon factors such as:

- The intactness of the riparian zone;
- Permanency of flow and complexity of habitat present within the stream;
- Observable water quality parameters; and
- Modifications to hydrology and catchment of the stream.

Wetlands

Potential wetland areas were assessed following the MfE wetland delineation protocols (MfE, 2020), including vegetation assessments and wetland hydrology to determine whether the areas meet the definition of a 'natural inland wetland' under the NPS-FM.

Vegetation was assessed based on the occurrence of:

- Obligate wetland vegetation (OBL) – almost always a hydrophyte, rarely in uplands;
- Facultative wetland (FACW) – usually a hydrophyte but occasionally found in uplands;
- Facultative (FAC) – commonly occurs as either a hydrophyte or non-hydrophyte;
- Facultative upland (FACU) – occasionally a hydrophyte but usually occurs in uplands; and
- Upland (UPL) – rarely a hydrophyte, almost always in uplands.

If wetlands were obviously dominated by OBL and/or FACW species, the 'rapid test' was used to classify the wetland as a natural inland wetland. If the rapid test was not able to be used, a vegetation plot was utilised and the dominance and/or prevalence tests applied to the plot results, to assess if the area was wetland or non-wetland habitat, in accordance with the methodologies listed in Clarkson, 2014. If results from these tests were unclear, hydric soils and hydrology tests were undertaken in accordance with the associated protocols (Fraser *et al.* (2018) and MfE (2021b)).

3.4.3 Fauna

No specific fauna surveys were undertaken, however any opportunistic observations of fauna during the site visits were recorded, and notes were made of areas of woody debris and deadfall which can provide habitat to herpetofauna.

4. SITE DESCRIPTION

4.1 Ecological Context and Site History

The site is located within the central volcanic plateau Taupo ecological district of the Waikato Region. The site is characterised by gently sloping rhyolitic ignimbrite and pumice alluvium landscapes with rilled erosion on the hill slopes as a result of the historic volcanic activity. Pre-human, the Taupo region would have likely supported a diverse range of forest ecosystems such as “rimu and matai forest”, beech forest and dense podocarp forest (“Taupo and Atiamuri ecological districts”). Historically, the site has been gradually cleared of indigenous vegetation since the 1960’s, with the site being utilised as agricultural land. By 1975, the site had been entirely cleared of vegetation with the exception of small fragments of vegetation on the southern and central western sides of the site.

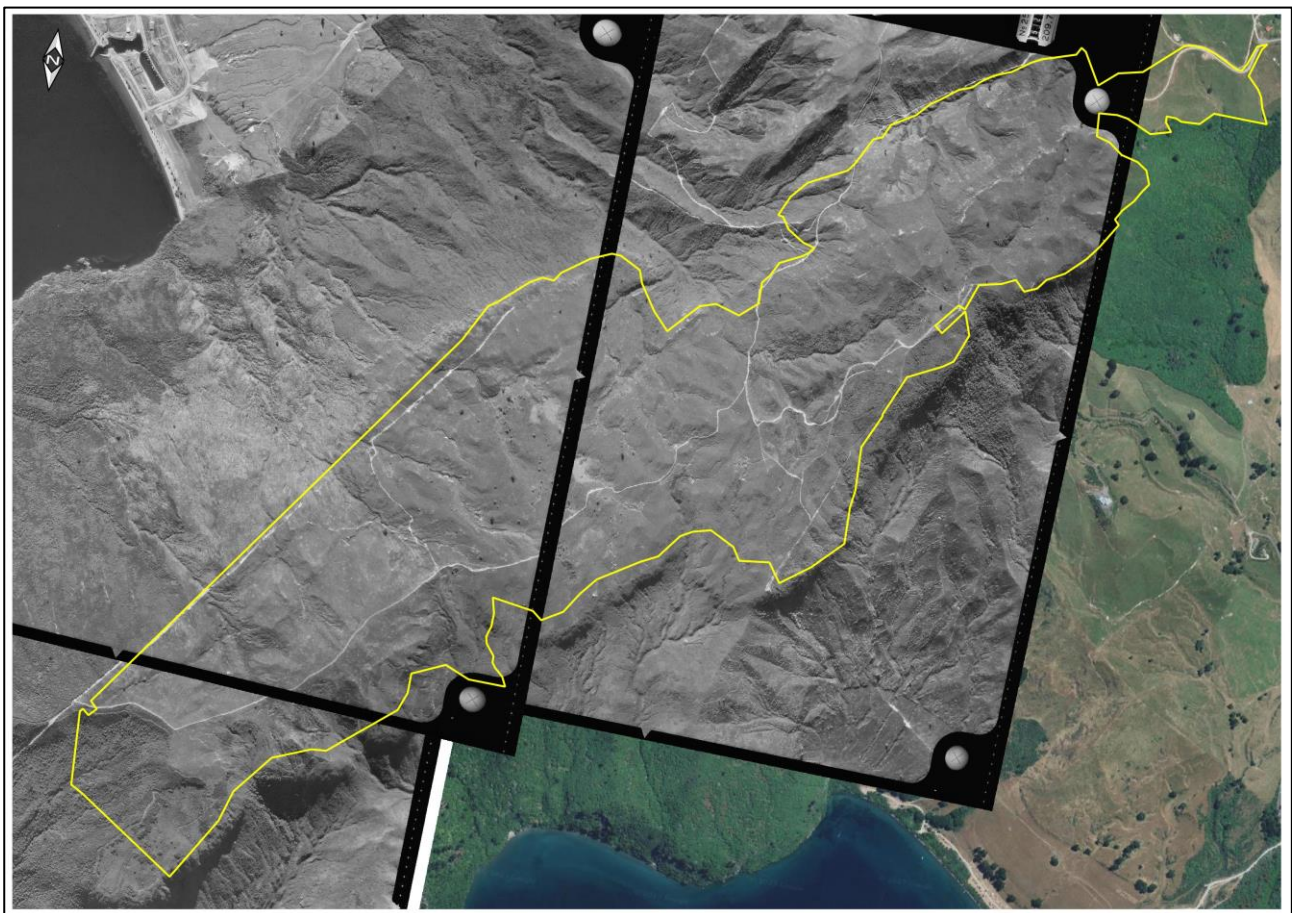


Figure 2. Historic aerial image of the site from 1963. Data sourced from Retrolens

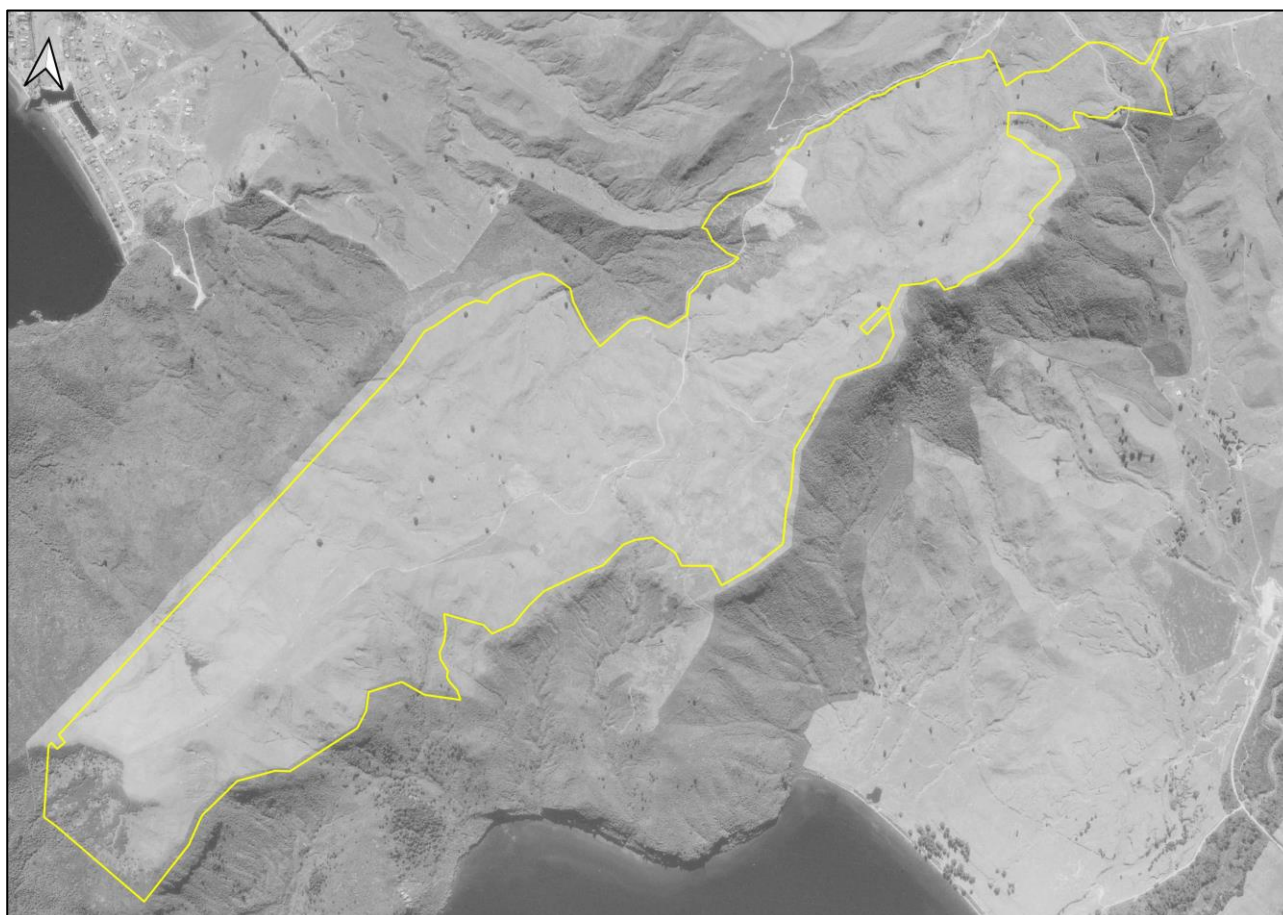


Figure 3. Historic aerial image from 1975. Data sourced from Retrolens

4.2 Present-day Site Description

4.2.1 Te Tuhi Estate

Te Tuhi Estate (287, 351 and 387 Whakaroa Road, Kinloch) is a pastural block that is currently being actively farmed with mix stock (cattle and sheep). The site is completely dominated by grazed pasture, with small patches, or isolated individuals, of mixed (mainly exotic) shade trees, and a single area of mixed native vegetation adjacent to the access road in the north of the site. (Refer Section 5). The site is bordered by indigenous vegetation, supporting Significant Natural Areas (SNA's) as defined by the Taupō District Plan

4.2.2 Surrounding Vegetation

The site is surrounded almost entirely by Department of Conservation-owned recreation reserve. To the west of the site is enclosed by Whakaroa Point Recreation Reserve; the south and east of the site is enclosed by Whakaipo Bay Scenic Reserve (Figure 4). The Headland Loop Trail, a section of the Great Lakes Trail, travels through both of these reserves. Both reserves are also used for recreational hunting.

The vegetation within these reserves has been labelled by Waikato Regional Council as primarily native, with a large section of 'Broadleaved Indigenous Hardwood' forest covering most of the area. A portion of 'Mānuka/Kānuka' forest inhabits the southern section of the point (Figure 5). Three pockets of 'Pine' forest are present within the indigenous forest, and are likely self-seeded.

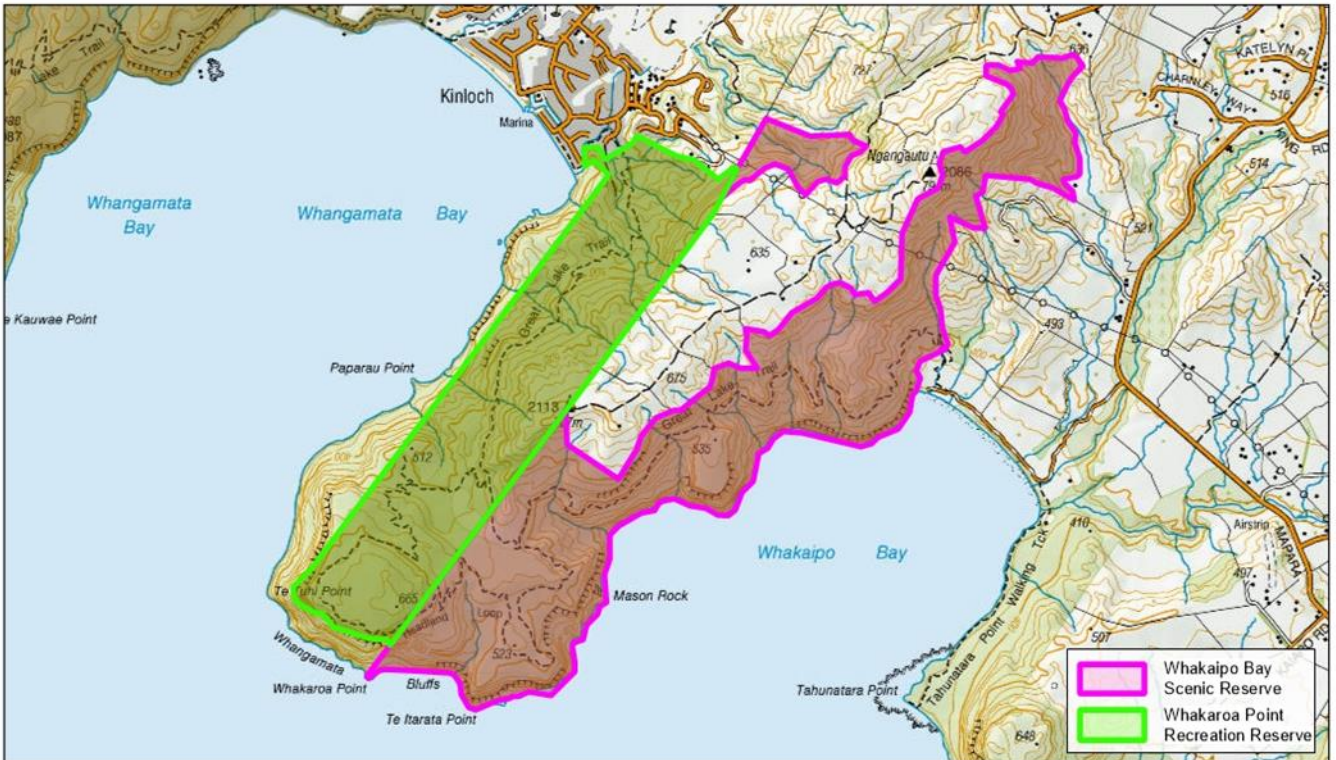


Figure 4. Map showing recreation reserves (DOC-owned) surrounding the site. Map sourced from DOC.

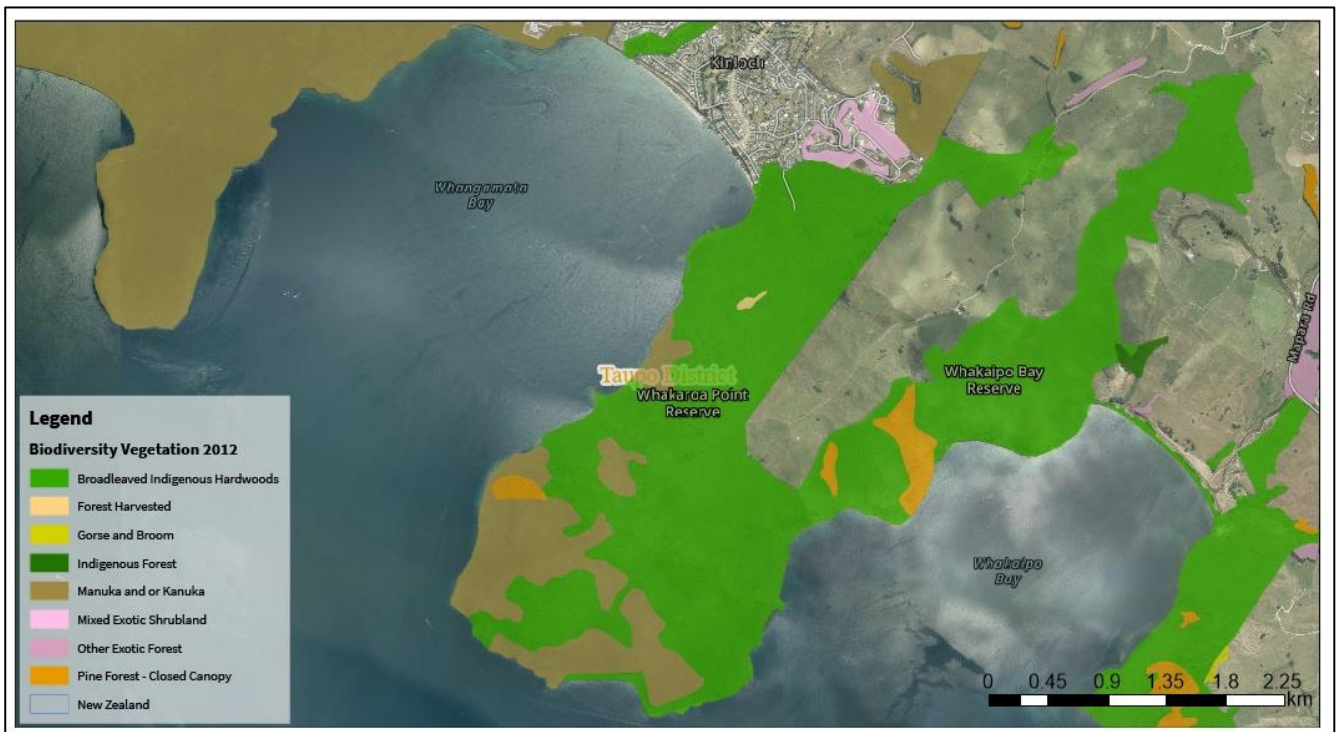


Figure 5: Vegetation Map of Te Tuhi Point. Sourced from Waikato Regional Council

The forest types have been assessed based on imagery uploaded to public-domain websites and blogs, in relation to Waikato Regional Council vegetation maps (Figure 5). Users upload geo-located imagery at

various points along the Headland Loop Trail onto adventure websites, which can be used to visualise the forest at specific points.

In general, the Broadleaved Indigenous Hardwood Forest contains a variety of native species, and is denser, and less exposed than the Manuka/Kānuka forest. Species present include but are not limited to tōtara (*Podocarpus totara* var. *totara*), whauwhaupaku (*Pseudopanax arboreus*), hangehange (*Geniostoma ligustrifolium* var. *ligustrifolium*), rewarewa (*Knightia excelsa*), koromiko (*Veronica stricta* var. *stricta*), rangiora (*Brachyglottis repanda*).

The Manuka/Kānuka forest is found in the steeper slopes on the southern end of Te Tuhi Point. This vegetation is characteristic of successional regenerating forest. Some parts of this forest type are relatively sparse, with colonising species such as bracken fern (*Pteridium esculentum*), koromiko, hangehange and mānuka (*Leptospermum scoparium*) repopulating open ground (Figure 6 and Figure 7). In some places, this was occurring underneath a mature canopy of kānuka (*Kunzea robusta*, Photo 1) indicating the successional nature of this forest type. The high-light conditions provide suitable conditions for invasion by weedy wilding pines (*Pinus* spp.), which can be seen colonising open areas in (Photo 1).



Figure 6. Photographs of Broadleaved Indigenous Hardwood forest within the recreational reserves surrounding the site (Source: TrailForks.com)



Figure 7. Photographs of kānuka/mānuka forest within the recreational reserves surrounding the site. Left: Open ground re-colonised by native and exotic scrub; Right: native sub-canopy establishing under kānuka canopy (Source: TrailForks.com).



Photo 1. Dense manuka forest along the edge of Te Tuhi Point (Source: TrailForks.com)

5. EXISTING ENVIRONMENT AND ECOLOGICAL VALUE ASSESSMENT

5.1 Terrestrial Habitats

The vegetation assessment involved both a desktop exercise and field visits to broadly determine the diversity of plant species present on-site and establish the value of the vegetation in the context of the surrounding landscape.

5.1.1 Desktop Assessment

No reserves or protected natural areas were identified on site. The site shown from historic and current aerial photography to be dominantly grassland with occasional patches of native bush and exotic trees.

The site is almost completely surrounded by Scenic and Recreational Reserves (refer Section 4).

5.2 Vegetation Descriptions

Terrestrial vegetation units identified onsite (Figure 8) can be categorised in to four categories:

- Exotic grassland;
- Exotic trees
- Early stage native restoration planting / regenerating shrubland; and
- Regenerating native broadleaf forest

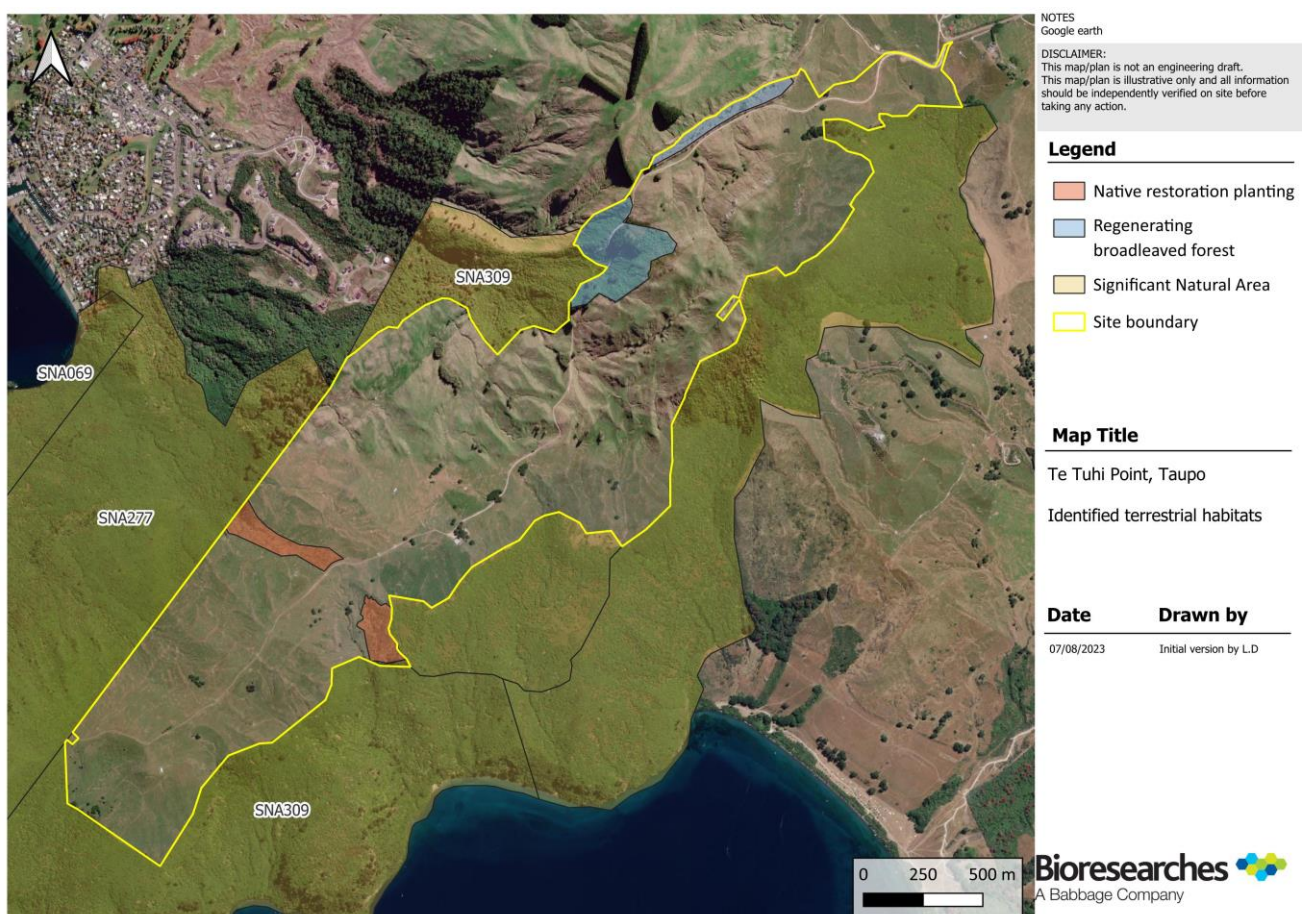


Figure 8. Te Tuhi Estate - Terrestrial Habitats

5.2.1 Exotic Grassland

The exotic grassland habitat included common, exotic grasses and pasture species such as perennial rye grass (*Lolium perenne*), brown top (*Agrostis capillaris*), brome species (*Bromus* spp.), prairie grass (*Bromus willdenowii*) crested dogs tail, (*Cynosurus cristatus*), sweet vernal (*Anthoxanthum odoratum*) with occasional yarrow (*Achillea millefolium*), and patches of thistles (*Cirsium vulgare*, *Cirsium arvense*). Most of the grassland within the site is actively farmed and had been recently grazed and, consequently, there was limited biomass within much of this habitat unit (Photo 2 and Photo 3).

The exotic grassland is not representative of any naturally occurring habitat type. As this habitat contained no or very low incidences of native plant species, and was not representative of a naturally occurring habitat type, it was considered to have **Negligible** botanic value.

In its current grazed state, the grassland has very limited ecological value, is continuously disturbed by stock, and is therefore unlikely to be used for nesting by native birds. New Zealand pipit (*Anthus novaeseelandiae novaeseelandiae*, At risk, declining) have been recorded in the vicinity of the site, and could use the areas of rough pasture as habitat.

Considering the negligible botanical value of the habitat, in combination with the fact that the poor representativeness and the fact that the habitat only is known to support Not Threatened species for more than occasional foraging, the exotic grassland habitat was assigned a **Negligible** ecological value.



Photo 2. Example of exotic grassland habitat within the site.



Photo 3. Example of exotic grassland within the site.

5.2.2 Exotic Trees

The isolated patches of exotic trees occurred as individuals or clusters throughout the site. The trees were mostly well established and appeared mainly to be for amenity or stock shade. The trees were dominated by alders, occasionally with eucalyptus, macrocarpa and radiata pines.

The exotic trees are not representative of any naturally occurring habitat type. Consequently, this habitat is considered to have **Negligible** botanic value.

The trees may occasionally provide some habitat value for native fauna. Alders are exotic, wind-pollinated trees, and would be of very limited value to fauna, other than roosting habitat for native bird species (as with pines, macrocarpa and eucalypts). While bats also favour large trees for roosting, the lack of bat recordings surrounding the site suggests a low probability that these trees would be used by bats (see section 5.5 – Bats (pekapeka)).

Considering the botanical value of the vegetation and its ability to provide habitat for native fauna, the ecological value of this habitat is considered to be **Low**.



Photo 4. Solitary alder in pasture.



Photo 5. Exotic amenity trees around farm buildings.

5.2.3 Early Stage Native Restoration Planting / Regenerating Shrubland

In the centre of the site, running approximately west to east, are two areas of sparsely planted or early regeneration / restoration native bush, totalling 6.7 ha. Both areas are fenced from stock and the western area, although dominated by long pasture, has sparsely planted native trees and shrubs scattered throughout the area. This planted native vegetation was comprised of kanuka (*Kunzea tenuicaulis* variety), mingimingi (*Coprosma propinqua*), manatu (*Plagianthus regius*), *Olearia lineata*, cabbage tree (*Cordyline australis*) and koromiko (*Veronica stricta*); with the edge shrubland to the east also including species such as tall mingimingi (*Leucopogon fasciculatus*), māhoe (*Melicytus ramiflorus*), kamahi (*Pterophylla racemosa*), black matipo (*Pittosporum tenuifolium*), five finger (*Pseudopanax arboreus*), rangiora (*Brachyglottis repanda*), stinging nettle (*Urtica incisa*), tutu (*Coriaria arborea* var. *arborea*).

The botanical value of the low density restoration planted areas are assessed as **Low**, whereas the long grasses in the early stage native restoration planting area have the potential to support native skinks, and is therefore assessed as **Moderate** value.



Photo 6. Western restoration planting area.



Photo 7. Vegetation in restoration planting area.

5.2.4 Regenerating Native Broadleaf Forest

Approximately 1 km and 1.7 km from the entrance to the site, a 3.7 ha and an 8.4 ha block of mixed regenerating broadleaf native vegetation are present (Figure 8). The smaller block is isolated in a gully to the west of the access road, but the access road bisects the larger block. The larger block is continuous with the native vegetation blocks to the west. These areas were bare of trees in 1975 (refer Figure 3), and the trees and shrubs have been allowed to regenerate at some stage since then. The vegetation is comprised of a mix of species similar to the early stage restoration plantings in the centre of the site i.e. māhoe, five finger, rangiora, tutu; with ground cover ferns, including bracken and hounds tongue (*Zealandia pustulata* subsp. *pustulata*).

The botanical and habitat values of the regenerating native broadleaf forest were assessed as **Moderate** (refer to native fauna assessment below).



Photo 8. Middle section of road through native vegetation block.

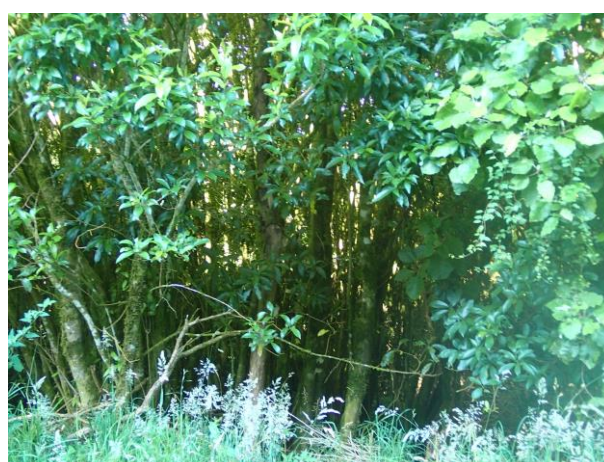


Photo 9. Māhoe and five-finger saplings on edge of native vegetation block

5.3 Avifauna (manu)

The avifauna of the site and surrounding landscape was investigated through a desktop assessment involving a review of historic records of birds within 5 km of the site held in online databases (e.g., *ebird.org*; *iNaturalist.org*), and birds recorded during the site visit. The primary aim of the avifauna investigation was to determine the presence of ‘Threatened’ or ‘At Risk’ bird species (Robertson *et al.*, 2021) and assess the significance of native bird habitat features within the site.

5.3.1 Desktop Study

Table 1 lists the avifauna recorded by desktop databases, with a threat status of ‘At-Risk’ or higher. Avifauna recorded with a threat status of ‘Not Threatened’ can be found in Appendix D.

Table 1. At Risk or Threatened native avifauna identified from the desktop study, corresponding conservation status (Robertson *et al.*, 2021) and likelihood of presence within the site.

Conservation Status	Common Name	Scientific Name	Record Source	Likely Present On-Site
Threatened - Nationally Vulnerable	Long-Tailed Cuckoo	<i>Eudynamys taitensis</i>	New Zealand Bird Atlas	Yes
Threatened - Nationally Increasing	NZ Dabchick	<i>Poliiocephalus rufopectus</i>	New Zealand Bird Atlas	No
At Risk - Declining	Silver Gull	<i>Chroicocephalus novaehollandiae</i>	New Zealand Bird Atlas	No
	Black-Billed Gull	<i>Chroicocephalus bulleri</i>	New Zealand Bird Atlas, iNaturalist	No
	Pīhoihoi, NZ Pipit	<i>Anthus novaeseelandiae novaeseelandiae</i>	iNaturalist	Yes
	Toutouwai, NI Robin	<i>Petroica longipes</i>	iNaturalist	No
At Risk - Recovering	NZ falcon, Kārearea	<i>Falco novaeseelandiae</i>	New Zealand Bird Atlas	Yes
At Risk - Relict	Black Shag	<i>Phalacrocorax carbo novaehollandiae</i>	New Zealand Bird Atlas	No
	Little Shag	<i>Microcarbo melanoleucos melanoleucos</i>	New Zealand Bird Atlas, iNaturalist	No
At Risk - Naturally Uncommon	Australian Coot	<i>Fulica atra australis</i>	New Zealand Bird Atlas	No

Most of the species found within 5 km of the site, with a threat status of ‘At-Risk’ or higher, were pond or lake-dwelling birds. These species have been included in the desktop survey, as, while it is very unlikely, pond or lake dwelling species may use upland areas for shelter, roosting or foraging, particularly in storm conditions. However, given the extensive surrounding forest and habitat opportunities between the site and the lake, the likelihood of these species using the site is very low.

Two forest birds were found within 5 km of the site; the North Island Robin (At Risk – Declining), which was located in a forest remnant approximately 3.5 km north-west of the site, and the long-tailed cuckoo (Threatened – Nationally Vulnerable), which was found in the east of the Whakaroa Point Recreation Reserve forest.

The North Island Robin prefers mature forest habitat. Therefore, the probability of finding this species on-site is low.

The Long-tailed cuckoo is a migratory species that requires the nests of 'Not-Threatened' whitehead (*Mohoua albicilla*) for breeding (this species is a brood parasite). Whitehead records occur along the western side of Lake Taupo and are potentially present within indigenous forests within the project site. Therefore, long-tailed cuckoo may also be present on a seasonal basis (spring-summer), but limited to the regenerating native broadleaf forest habitat.

The New Zealand falcon (karearea) – At Risk, Recovering, was not identified within the 5 km site radius according to New Zealand Bird Atlas or iNaturalist, but was recorded within 10 km of the site (New Zealand Bird Atlas). The New Zealand falcon is listed as a 'highly mobile species' (NPSIB) and has been recorded from similar habitats within the Taupō region, therefore is potentially present within the project site, using open farmland and forests for hunting.

The pīhoihoi, or New Zealand pipit (At Risk – Declining), was sighted within 5 km of the site. Pipits are often found in open habitats, such as grassland, tussock land, and alpine or coastal shrub land. They are known to inhabit and nest on farmland, preferring rough pasture with patches of fern or un-grazed grass. There is a possibility that the pipit may use the site for foraging and nesting.

5.3.2 Opportunistic Sightings On-Site

Although several exotic bird species were observed on site (magpie, sparrows, variety of finches), the only native bird recorded was a swamp harrier (*Circus approximans* – not threatened).

5.3.3 Ecological Value for Avifauna

The site provides habitat for Not-Threatened common native birds, one 'At Risk-Declining' native bird (the pipit), and one 'Threatened – Nationally Vulnerable' native bird (the long-tailed cuckoo). For some of these species, such as the pipit, this will include habitat for breeding and nesting. In general, bird habitat on-site is limited to sporadic native and exotic trees, in otherwise open farmland. The regenerating mixed native broadleaf forest is likely to provide habitat and food resources for common native birds such as the whitehead, which may in turn host the threatened long-tailed cuckoo. Considering these factors, the site is considered to have a **Moderate** ecological value for avifauna.

5.4 Herpetofauna

Herpetofauna (reptiles and amphibians) comprise a significant component of New Zealand’s terrestrial fauna. One hundred and twenty-nine (129) terrestrial taxa are currently recognised (van Winkel *et al.*, 2018; Hitchmough *et al.*, 2021) and over 85% of these are considered ‘Threatened’ or ‘At Risk’ of extinction (Hitchmough *et al.*, 2021; Burns *et al.*, 2018).

All native reptiles and amphibians are legally protected under the Wildlife Act 1953, and its subsequent amendments, and vegetation and landscape features that provide significant habitat for native herpetofauna are protected by the RMA 1991. Exotic (i.e., ‘Introduced and naturalised’) species are not afforded legal protection and therefore, there are no statutory requirements to manage or mitigate for adverse ecological effects on exotic herpetofauna.

No formal herpetofauna surveys were undertaken as part of this assessment. A review of historic lizard records from within 5 km of the Te Tuhi Estate site are listed in Table 2, sourced from the Department of Conservation herpetofauna database and iNaturalist records. Only one native lizard was recorded within 5 km of the site, the Crenulate Skink (*Oligosoma robinsoni* – At Risk - Declining). Within 10 km of the site, only one other lizard was recorded, an unidentified *Naultinus* spp. on the outermost edge of the 10km radius. No native herpetofauna were recorded within 5 km of the site on iNaturalist, although a crenulate skink was found within the 10 km radius.

Table 2. Terrestrial herpetofauna recorded within 5 km of the site and corresponding New Zealand Threat Status

Common Name	Species Name	NZ Threat Status*
Crenulate Skink	<i>Oligosoma robinsoni</i>	At Risk - Declining
Green and Golden Bell Frog	<i>Litoria aurea</i>	Introduced and Naturalised

** Hitchmough *et al.* (2021)

Overall, the value of the site as it pertains to native herpetofauna is considered **Moderate**, due to the lack of observations within 5 km of the site, but the presence of habitat that may suit the ‘At Risk – Declining’ crenulate skink.

5.5 Bats (pekapeka)

Two endemic species of bats (pekapeka) are found in New Zealand, including the long-tailed bat (LTB; *Chalinolobus tuberculatus*) and short-tailed bat (STB; *Mystacina tuberculata*); the latter is represented by three subspecies (O’Donnell *et al.*, 2018). Both species are listed as ‘Threatened’ or ‘At Risk’ under the New Zealand threat classification system (i.e., LTB - ‘Nationally Critical’ and Southern STB – ‘At Risk – Recovering’) (Townsend *et al.*, 2008; O’Donnell *et al.*, 2018). Their threat statuses reflect the drastic and ongoing decline in populations across much of New Zealand, due to the loss and fragmentation of habitats and adverse impacts of pest mammals (e.g., rodents, cats), with some population recovery from conservation management apparent in Southern STB populations.

5.5.1 Desktop Assessment

Department of Conservation bat records were assessed within the vicinity of the site (Figure 9). No bats were recorded within five km of the site - the closest records were long-tailed bats, 25 km to the east and north of the site. Both long-tailed bats and short-tailed bats have been recorded in forest regions surrounding Lake

Taupō. However, the highly urbanised area within which the site falls, north of the lake, has no recorded bat data.

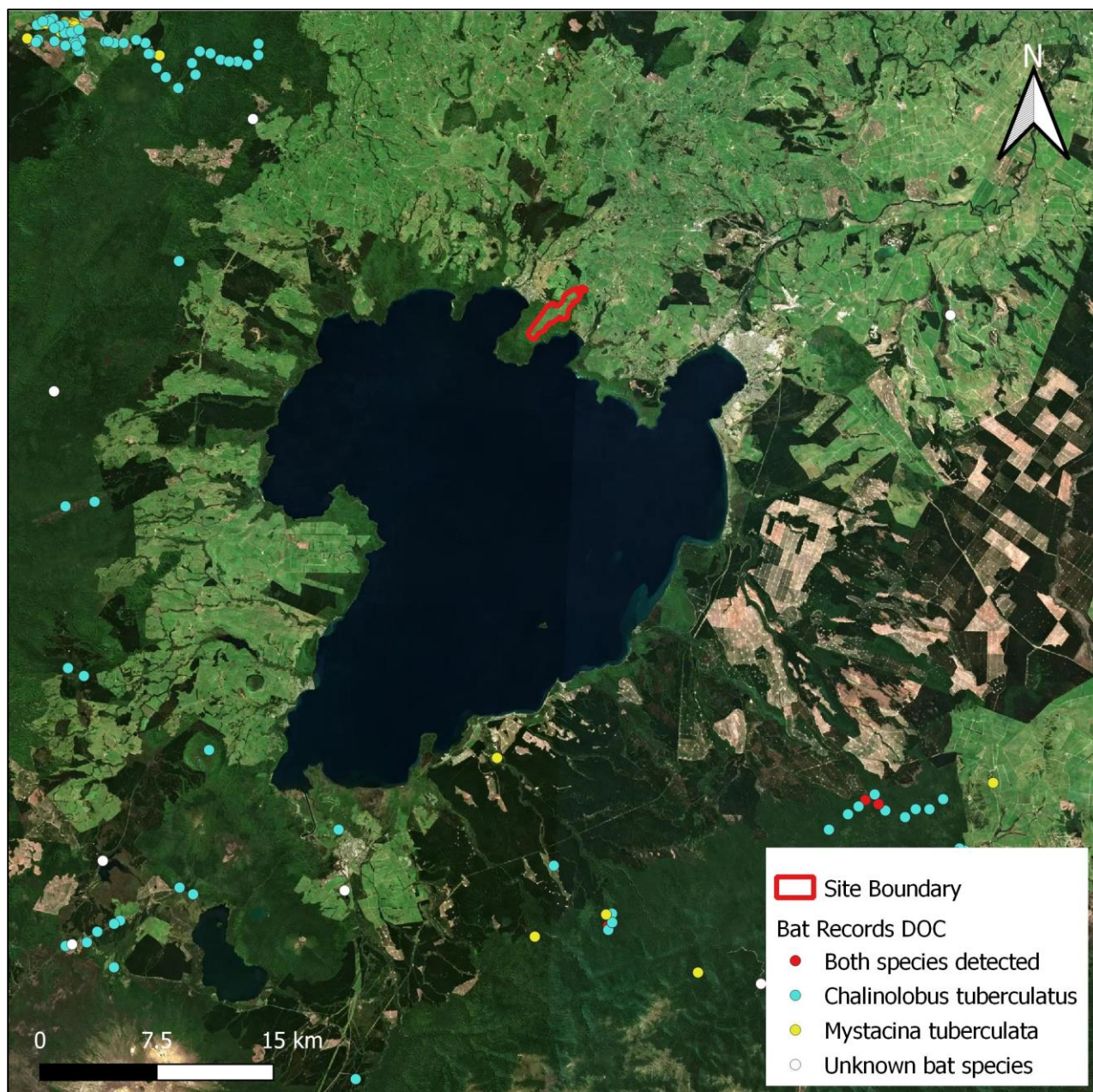


Figure 9: Map showing distribution of bat locations within the wider vicinity of the site

5.5.2 Ecological Value for Bats

Bats generally prefer forest environments for roosting and feeding. However, large, mature trees on open land are known to be utilised by bats, especially as native forests become smaller and fragmented. Mature trees provide cavities that can be used for roosting. The site generally lacked mature trees, with the exception of a few large and isolated exotics and the possibly some trees in the regenerating mixed native broadleaf forest. The regenerating mixed broadleaf forest may provide suitable bat habitat, and is more likely to support roosting due to the closed canopy than the isolated exotic trees. However, due to the lack of bats within a 25 km radius of the site, the ecological value of the site in relation to bats is considered **Low**.

5.6 Terrestrial Values Overview of Te Tuhi Estate

Table 3 provides a summary of the terrestrial values of the Te Tuhi Estate against representativeness, rarity/distinctiveness, diversity and pattern, and ecological context.

Table 3. Assessment against the four ecological ‘matters’: representativeness, rarity/ distinctiveness, diversity and pattern, and ecological context.

Matter	Score and justification
Representativeness	<p>Low</p> <p>Vegetation within the site is not representative of the ecological district, or historic ecosystem extents. The majority of the vegetation is grazed and with the exception of one area bisected by the road, areas of established trees lack functional understory and groundcover tiers, with the ecological integrity compromised by browse pressure.</p> <p>Fauna diversity is not high and predominantly consists of exotic or common ‘Not Threatened’ indigenous fauna.</p>
Rarity/distinctiveness	<p>Moderate</p> <p>No naturally uncommon or rare flora species are present within the site. With the exception of the northern patch of regenerating native forest, the diversity of indigenous flora is very low and includes common ‘Not Threatened’ species.</p> <p>Fauna values generally considered to be moderate. The diversity of avifauna is typical of common or exotic species, but there is the potential for use of the site by ‘at-risk’ or threatened avifauna species. There is the potential presence of ‘At Risk’ terrestrial fauna species (crenulate skink), often associated with edge and regenerating ecosystems.</p>
Diversity and pattern	<p>Low</p> <p>Floral diversity and pattern are low due to the lack of the expected range and abundances of species within all vegetation tiers. Vegetation within the site is predominantly mixed pasture. Indigenous vegetation are either sparsely planted areas, or comparatively small areas within the context of the site, but they provide good connectivity to the surrounding native bush reserves and wider ecological area.</p> <p>The general lack of fruiting and flowering species that would provide a year-round food source that would attract a wide diversity of native avifauna is low.</p>
Ecological context	<p>Low</p> <p>The majority of the vegetation is actively managed pasture for farming, therefore ecosystem integrity, form, function and resilience is very low. The pasture does not provide for ecological networks, linkages or steeping stone habitat within the local or wider landscape context or buffering to indigenous areas of vegetation or pathways between wider environment. The patch of indigenous vegetation either side of the entrance road provides for ecological networks and buffering and raises the value from very low to low.</p>

Ecological value of the terrestrial areas of the site are assessed as **Low** when combining the scoring for the four ecological matters (EclA Guidelines) (Appendix 1, Table 6)

5.7 Freshwater Habitats

5.7.1 Desktop Assessment

The proposed development areas are located in elevated positions on the Te Puhi Point peninsula. The land is excellently maintained pasture on deep, well drained, loam over sand soils (<https://smap.landcareresearch.co.nz/maps-and-tools/app/>). The site slopes steeply from the main ridgeline to Whangamata Bay (and Kinloch) to the west and Whakaipo Bay to the east.

The region had received abnormally high rainfall in the month prior to the site visit with data from the WRC monitoring site 'Tihoi - Hingarae Road - Pumice Soil – Rainfall' showing over 92mm of rainfall in the month prior, and 24mm of rainfall within 10 days of the site visit.

Analysis of the Waikato Regional Council GIS Maps (Drainage and Water Classification) indicate seventeen watercourses to be present throughout the site (Figure 10), mostly flowing away from the central ridgeline.

5.7.2 Ground truthed flow paths

The seventeen marked flow paths, plus numerous other flow paths in gully systems, were ground truthed and classified during the site assessment as to their artificial, intermittent or permanent classification. These predicted watercourses within the Te Tuhi Estate were found to be largely absent, consisting of overland flow paths, vegetated with pasture grass (Figure 10).

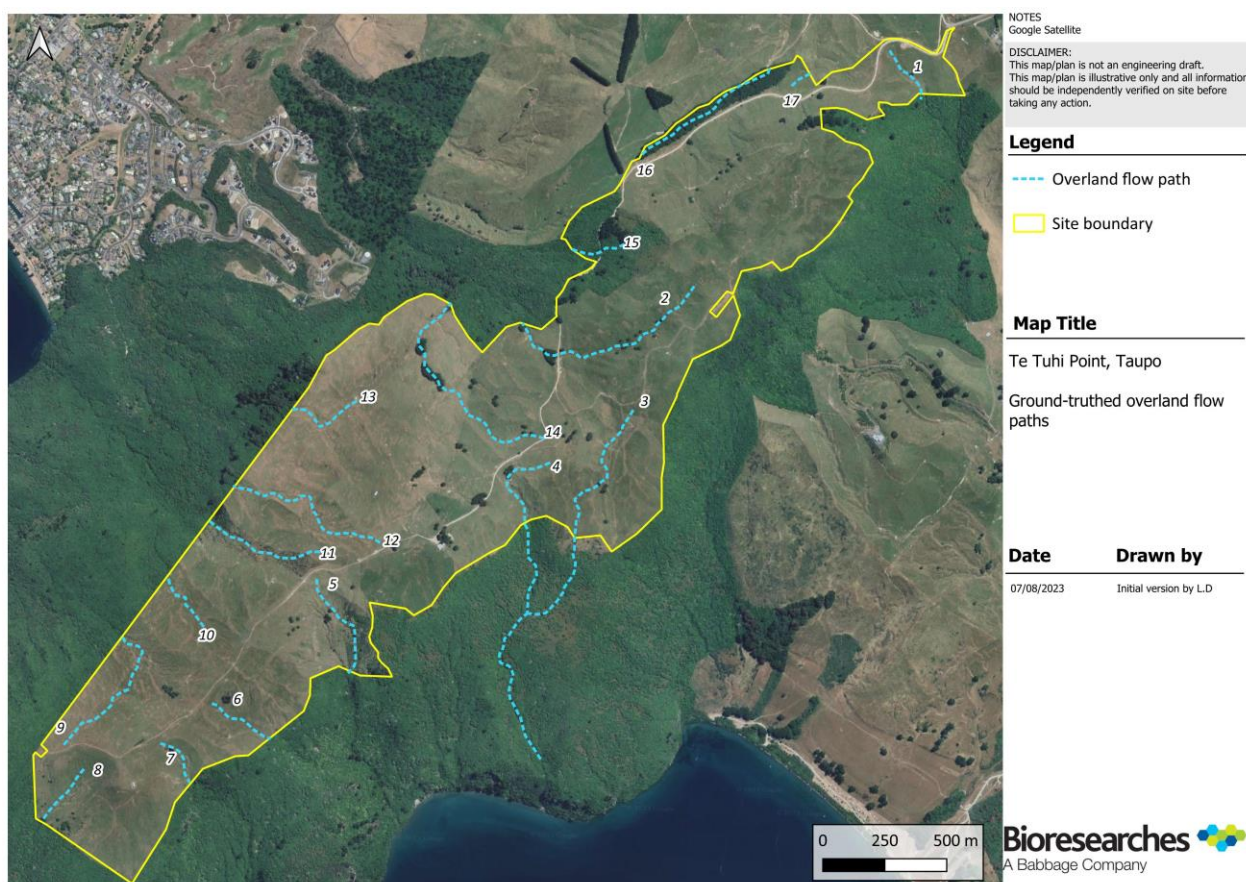


Figure 10. Waikato Maps Water Classification (WRC Maps).



Photo 10. Typical grass flowpath



Photo 11. Flow paths, no streams.

With the exception of a stream located in the base of the gully in the regenerating broadleaf forest area north west of the entrance road, there were no streams identified within the proposed development sites and/or within 100m of the proposed development areas. The analysis and photographs of flow paths 1 – 17 are presented in Appendix B.

5.7.3 Wetlands

The site was assessed via a desktop review and site visit with emphasis on any potential wetlands in the vicinity of the development areas (lodge & chalets, dwelling sites, wastewater field etc). Aquatic habitats were classified in accordance with the National Policy Statement for Freshwater Management 2020 (NPS-FM). The desktop assessment included a review of the Preliminary Concept for Council August 2022, proposed engineering and landscape plans; noted factors such as changes in vegetation on current and historical images; and review of data such as freshwater ecosystem services, drainage and contours on Waikato Regional Councils Waikato Maps was undertaken.

Vegetation was specifically identified in a fenced area south-west of proposed Road 11 (Photo 6) that had undergone some planting in the centre of the site, as this was identified by the client’s representative as an area that needed specific attention. The site was assessed in two areas for plants indicative of wetland vegetation. The first area surveyed in the vegetation near the upper proposed works areas (primarily roading).

There were no wetland indicator species present, with the only FAC vegetation, rare and obviously planted as part of the planting mix (Photo 7).

A vegetation plot to determine wetland status was carried out lower in the fenced area, immediately uphill of an access way that has the potential to result in ponded wetland and approximately 120m from Site 99 (Photo 12 and Photo 13).

The species lists (and wetland indicator status) of the vegetation in the upper part of the fenced site is and results of the plots are presented in Appendix C. Both show that neither area is a wetland.

No other natural inland wetlands or potential wetlands were present within 100m of the works areas proposed for Te Tuhi Point, and there were no indicators (based on desk top and the site visit) for wetlands in the wider site.



Photo 12. Grass access bund running across planted area – vegetative plot on photo left.



Photo 13. Vegetative plot, in low point in fenced planted area SW of Road 11 and Site 99.

5.7.4 Freshwater Values Overview of Te Tuhi Estate

Matter	Score and justification
Representativeness	Negligible No wetlands, with the only freshwater habitats on the main part of the site, an ephemeral stream, which is likely dry for much of the year; and occasional stock ponds.
Rarity/distinctiveness	Negligible The ephemeral stream would provide very limited and temporary aquatic habitat, and the use of the site by 'At Risk' species such as longfin eel is highly unlikely.
Diversity and pattern	Negligible Very low natural diversity in stream morphology with the watercourse consisting of partial channel. Low natural diversity of aquatic fauna due to the temporary nature of the watercourse. Low complexity in in-stream habitats and stream morphology.
Ecological context	Negligible Stock ponds and ephemeral stream providing limited, poor instream habitat, consisting Riparian margins are moderate, and consist of native shrubs and exotic trees. Single stream within the site provide a low connectivity to the wider catchment

Ecological value of the freshwater habitats of the site are assessed as **Negligible** when combining the scoring for the four ecological matters (EclA Guidelines) (Appendix 1, Table 6)

6. POTENTIAL ECOLOGICAL CONSTRAINTS AND LIMITATIONS AND BENEFITS

6.1 Terrestrial Ecology

The site generally consists of low-negligible value exotic vegetation, consisting of grasslands and sporadic trees, with areas of higher value regenerating native broadleaf forest. The site itself is subject to no ecological overlays, and has been classed as 'Rural Environment' according to the Taupō District Plan. The DOC reserves surrounding the site however are described as SNAs (SNA 277 and SNA 309, Figure 8).

Based on the desktop assessment results and field observations, the potential presence of native lizards (e.g. crenulate skink) and the long-tailed cuckoo cannot be dismissed. As such, it is recommended a lizard survey is carried out across the site prior to the commencement of the development to determine the presence or otherwise of these species.

To reduce impacts on potentially-present long-tailed cuckoo, vegetation clearance should be avoided within bird nesting season, which occurs from September to February. Where this cannot be avoided, a pre-vegetation clearance bird nesting survey should be undertaken to ensure nesting native birds, their chicks or eggs are not destroyed during vegetation removal. These nest surveys must occur no more than 24-48h prior to tree removal. Due to the lack of bat recordings within 25 km of the site, and the recordings within the wider vicinity being restricted to dense forest habitats, the probability of bats being within the site are low.

In general, the extensive revegetation that is to accompany the development of the site provides numerous ecological benefits, including connection to the wider landscape, food resources and habitat for native fauna. The native vegetation cover of the site will greatly increase, from its current position as predominantly sparse farmland. The surrounding native forest within the DOC reserves neighbouring the site will also receive ecological benefits, due to the buffering effect of the planting along the site's boundaries.

6.2 Freshwater Ecology

The current ecological values of freshwater ecosystems within Te Tuhi were assessed to be negligible due to the lack of permanent or intermittent habitat within the site. Freshwater features observed included ephemeral overland flow paths. No natural inland wetlands, per the NPS-FM were identified within the site.

7. REFERENCES

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.

O'Donnell, C.F.J.; Borkin, K.M.; Christie, J.E.; Lloyd, B.; Parsons, S.; Hitchmough, R.A. (2018)

Conservation status of New Zealand bats, 2017. *New Zealand Threat Classification Series 21*. Department of Conservation, Wellington. 4 p.

O'Donnell, C. F. (2001).

Home range and use of space by *Chalinolobus tuberculatus*, a temperate rainforest bat from New Zealand. *Journal of Zoology*, 253, (2), 253–264.

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.

Singers N.J.D. and Rogers, G.M. (2014)

A classification of New Zealand's terrestrial ecosystems. Department of Conservation. Science for Conservation 325.

Townsend, A.J.; de Lange, P.J.; Duffy, C.A.J.; Miskelly, C.M.; Molloy, J.; Norton, D.A. (2008).

New Zealand Threat Classification System manual. Department of Conservation, Wellington. 35 p.

8. APPENDICES

Appendix A – Ecological Values and Impact Assessment Methodology

Using the EIANZ EclAG framework, a simple ranking system is used to assign value to species as well as other matters of ecological importance such as species assemblages and levels of organisation.

The overall ecological value is then determined on a scale of ‘Negligible’ to ‘Very High’. In addition to this assessment, all identified ecological values were assessed for significance against the Waikato Regional Plan criteria to test ecological significant (where not already an SEA).

Table 4. Factors to be considered in assigning value to species (Roper-Lindsay et al. 2018).

Determining factors	Value
Nationally threatened species, found in the ZOI ⁷ either permanently or seasonally	Very High
Species listed as ‘At-Risk’ – declining, found in the ZOI, either permanently or seasonally	High
Species listed as any other category of ‘At-Risk’ found in the ZOI either permanently or seasonally	Moderate
Locally (ED) uncommon or distinctive species	Moderate
Nationally and locally common indigenous species	Low
Exotic species, including pests, species having recreational value	Negligible

Table 5: Attributes to be considered when assigning ecological value or importance to a site or area of vegetation / habitat / community (Roper-Lindsay et al. 2018).

Matters	Attributes to be considered
Representativeness	<p><i>Criteria for representative vegetation and aquatic habitats:</i></p> <ul style="list-style-type: none"> • Typical structure and composition • Indigenous species dominate • Expected species and tiers are present • Thresholds may need to be lowered where all examples of a type are strongly modified. <p><i>Criteria for representative species and species habitats:</i></p> <ul style="list-style-type: none"> • Species assemblages that are typical of the habitat • Indigenous species that occur in most of the guilds expected for the habitat type
Rarity/distinctiveness	<p><i>Criteria for rare/distinctive vegetation and habitats:</i></p> <ul style="list-style-type: none"> • Naturally uncommon or induced scarcity • Amount of habitat or vegetation remaining • Distinctive ecological features • National Priority for Protection <p><i>Criteria for rare/distinctive species or species assemblages:</i></p> <ul style="list-style-type: none"> • Habitat supporting nationally threatened or At-Risk species, or locally uncommon species • Regional or national distribution limits of species or communities • Unusual species or assemblages • Endemism

⁷ ZOI (Zone of Influence) in Roper-Lindsay et al. (2018) defines the Zone of Influence as “the areas/resources that may be affected by the biophysical changes caused by the proposed project and associated activities.”

Diversity and Pattern	<ul style="list-style-type: none"> • Level of natural diversity, abundance and distribution • Biodiversity reflecting underlying diversity • Biogeographical considerations- pattern, complexity • Temporal considerations, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilisation
Ecological context	<ul style="list-style-type: none"> • Site history and local environment conditions which have influenced the development of habitats and communities • The essential characteristics that determine an ecosystems integrity, form, functioning and resilience (from 'intrinsic value' as defined in RMA) • Size, shape and buffering • Condition and sensitivity to change • Contribution of the site to ecological networks, linkages, pathways and the protection and exchange of genetic material • Species role in ecosystem functioning - high level, key species identification, habitat as proxy

Table 6. Assigning value to areas (Roper-Lindsay et al. 2018)

Value	Determining Factors
Very High	Area rates 'High' for at least three of the assessment matters of Representativeness, Rarity/distinctiveness, Diversity and Pattern, and Ecological Context. Likely to be nationally important and recognised as such.
High	Area rates 'High' for two of the assessment matters, and 'Moderate' and 'Low' for the remainder OR area rates 'High' for one of the assessment matters and 'Moderate' for the remainder. Likely to be regionally significant and recognised as such.
Moderate	Area rates 'High' for one of the assessment matters, 'Moderate' or 'Low' for the remainder OR area rates as 'Moderate' for at least two of the assessment matters and 'Low' or 'Very Low' for the remainder. Likely to be important at the level of the Ecological District.
Low	Area rates 'Low' or 'Very Low' for majority of assessment matters, and 'Moderate' for one. Limited ecological value other than as local habitat for tolerant native species.
Negligible	Area rates 'Very Low' for three assessment matters and 'Moderate', 'Low' or 'Very Low' for the remainder.

For ecological impacts assessment the level of ecological impact effect is then determined by determining the magnitude (Table 2) and combining the value of the ecological feature/attribute with the score or rating for magnitude of effect to create a criterion for describing the level of effects (Table 3). The cells in Table 3 italics in represent a 'significant' effect under the EIANZ 2018 guidelines.

Cells with low or very low levels of effect represent low risk to ecological values rather than low ecological values *per se*. A moderate level of effect requires careful assessment and analysis of the individual case. For moderate levels of effects or above, measures are expected to be introduced to avoid through design, or appropriate mitigation needs to be addressed (Roper-Lindsay et al. 2018).

Table 7. Criteria for describing the magnitude of effects (EIANZ 2018)

Magnitude	Description
Very High	Total loss of, or a very major alteration to, key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature.
High	Major loss of major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature.
Low	Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances and patterns; AND/OR Having minor effect on the known population or range of the element/feature.
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation; AND/OR Having negligible effect on the known population or range of the element/feature.

Table 8. Criteria for describing the level of effects (EIANZ 2018). Where text is italicised, it indicates 'significant effects' where mitigation is required.

Magnitude of Effect	Ecological Value				
	Very High	High	Moderate	Low	Negligible
Very High	<i>Very High</i>	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	Low
High	<i>Very High</i>	<i>Very High</i>	<i>Moderate</i>	Low	Very Low
Moderate	<i>High</i>	<i>High</i>	<i>Moderate</i>	Low	Very Low
Low	<i>Moderate</i>	Low	Low	Very Low	Very Low
Negligible	Low	Very Low	Very Low	Very Low	Very Low
Positive	Net Gain	Net Gain	Net Gain	Net Gain	Net Gain

Appendix B – Te Tuhi Point Flow Path 1 to 17: photos



Photo 14. Flow path 1 – view towards road



Photo 15. Flow path 1 – view towards road



Photo 16. Flow path 1 downhill view



Photo 17. Flow path 2 – upper section (top of catchment)



Photo 18. Flow path 2 – upper section.



Photo 19. Flow path 2 – midpoint of upper catchment



Photo 20. Flowpath 2 – from road in lower catchment (no stream).



Photo 21. Flow path 2 view up from road

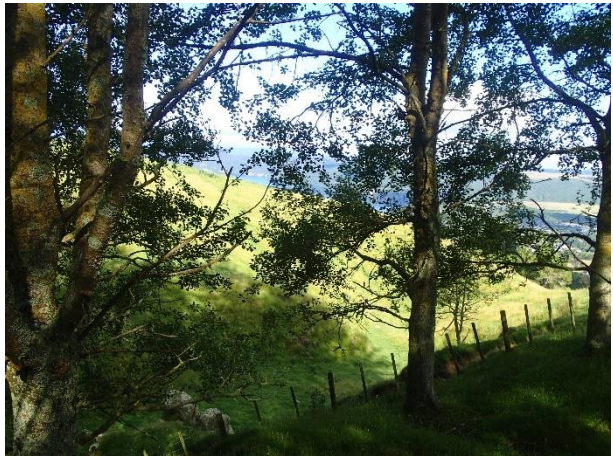


Photo 22. Flow path 2 – view from down the road.



Photo 23. Flow path 3



Photo 24. Flow path 4



Photo 25. Flow path 4



Photo 26. Flow path 5 upper view



Photo 27. Flow path 5 lower view



Photo 28. Flow path 6 upper catchment



Photo 29. Flow path 6 lower catchment



Photo 30. Flow path 7 upper catchment



Photo 31. Flow path 7 lower catchment (no stream).



Photo 32. Flow path 8 upper catchment



Photo 33. Flow path 8 lower catchment



Photo 34. Flow path 9 upper catchment



Photo 35. Flow path 9 middle catchment



Photo 36. Flow path 9 lower catchment



Photo 37. Flow path 9 lower catchment



Photo 38. Flow path 10



Photo 39. Flow path 10



Photo 40. Flow path 11 upper catchment



Photo 41. Flow path 11 lower catchment (no stream, no wetland)



Photo 42. Flow path 12 upper catchment



Photo 43. Flow path 12 lower catchment



Photo 44. Flow path 13



Photo 45. Flow path 14



Photo 46. Flow path 15 (across road).



Photo 47. Flow path 16 – ephemeral stream



Photo 48. Flow path 17 – upper catchment just before crosses road.

Appendix C – Species lists and Vegetative plot data for potential wetland site.

Table 9. Vegetation List for Upper Section of Western Fenced Restoration Planting Area

Common name	Species name	Status
Cocksfoot	<i>Dactylis glomerata</i>	FACU
Yarrow	<i>Achillea millefolium</i>	FACU
Kanuka	<i>Kunzea tenuicaulis</i> variety	FACU
Yorkshire fog	<i>Holcus lanatus</i>	FAC
Chickweed	<i>Stellaria media</i>	FACU
White clover	<i>Trifolium repens</i>	FACU
Narrow leaved plantain	<i>Plantago lanceolata</i>	FACU
Cleavers	<i>Galium aparine</i>	FACU
Perennial rye grass	<i>Lolium perenne</i>	FACU
Californian Thistle	<i>Cirsium arvense</i>	FACU
Sweet vernal	<i>Anthoxanthum odoratum</i>	FACU
Mingimingi	<i>Coprosma propinqua</i>	FAC
Manatu	<i>Plagianthus regius</i>	FACU
Olearia	<i>Olearia lineata</i>	FACU
Ti kōuka / cabbage tree	<i>Cordyline australis</i>	FAC
Birdsfoot trefoil	<i>Lotus corniculatus</i>	FACU
Brown top	<i>Agrostis capillaris</i>	FACU
Koromiko	<i>Veronica stricta</i>	FACU

Table 10. Vegetation Plot (2mx2m) at low point in Fenced Planted Area.

Common name	Species name	Status	% cover	Dominant
Cocksfoot	<i>Dactylis glomerata</i>	FACU	15	Yes
Yarrow	<i>Achillea millefolium</i>	FACU	10	Yes
Yorkshire fog	<i>Holcus lanatus</i>	FAC	20	Yes
Chickweed	<i>Stellaria media</i>	FACU	10	Yes
White clover	<i>Trifolium repens</i>	FACU	5	
Cleavers	<i>Galium aparine</i>	FACU	5	
Perennial rye grass	<i>Lolium perenne</i>	FACU	5	
Thistle	<i>Cirsium arvense</i>	FACU	10	Yes
Prairie grass	<i>Bromus willdenowii</i>	UPL	10	Yes
Browntop	<i>Agrostis capillaris</i>	FACU	10	Yes
Cats ear	<i>Hypochaeris radicata</i>	FACU	2	
Dominance Test:	Dominance test: greater than 50% dominants OBL, FACW, FAC.		14%	Fail
Prevalence Index:	Prevalence index: ≤ 3.0		3.9	Fail
Conclusion: Not a wetland				

Appendix D – Not Threatened bird species found within 5 km of the site

Latin Name	Common Name
<i>Aythya novaeseelandiae</i>	NZ scaup, pāpango
<i>Prothemadera novaeseelandiae novaeseelandiae</i>	tūi
<i>Gerygone igata</i>	grey warbler, riroriro
<i>Rhipidura fuliginosa</i>	NZ fantail, pīwakawaka
<i>Anthornis melanura</i>	bellbird, korimako
<i>Cygnus atratus</i>	kakiānau, black swan
<i>Mohoua albicilla</i>	whitehead, pōpokotea * within shrub in Whakaroa Point Recreation Reserve
<i>Hirundo neoxena</i>	welcome swallow, warou
<i>Zosterops lateralis</i>	silveryeye, tauhou
<i>Circus approximans</i>	swamp harrier, kāhu
<i>Hemiphaga novaeseelandiae</i>	NZ pigeon, kererū
<i>Porphyrio melanotus</i>	pūkeko
<i>Todiramphus sanctus</i>	sacred kingfisher, kōtare
<i>Chrysococcyx lucidus</i>	shining cuckoo, pīpīwharauoa
<i>Ninox novaeseelandiae</i>	ruru, morepork
<i>Petroica macrocephala</i>	tomtit, miromiro

Appendix E – Waikato Regional Policy Statement Criteria

Regional Policy Statement Criteria (Chapter 11A, Table 11-1)	
1	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.
2	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.
3	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: <ul style="list-style-type: none"> • classed as threatened or at risk, or • endemic to the Waikato region, or • at the limit of their natural range.
4	It is indigenous vegetation, habitat or ecosystem type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.
5	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.
6	It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with: <ul style="list-style-type: none"> • waste treatment; • wastewater renovation; • hydro-electric power lakes (excluding Lake Taupō); • water storage for irrigation; or • water supply storage; unless in those instances they meet the criteria in Whaley et al. (1995).
7	It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato Region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example only in the Waikato region of any habitat type.
8	It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self-sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context “critical” means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.

<p>9</p>	<p>It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because:</p> <ul style="list-style-type: none"> • Its structure, composition, and ecological processes are largely intact; and • If protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.
<p>10</p>	<p>It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type.</p>
<p>11</p>	<p>It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.</p>