

Memorandum

To	Sean Crocker
Copy	Project File
From	Jivir Vijayakesparan
Office	Hamilton
Date	8 December 2021
File/Ref	2-37928.00
Subject	Wairakei Subdivision - Water Supply

1 Introduction

Wairakei International Golf Course engaged WSP to prepare an Engineering Services Report (ESR) for a proposed hotel development at Wairakei International Golf Course.

The purpose of this Technical Memorandum is to support a ESR resource consent application for the proposed development, by outlining and providing possible engineering design solutions for Water supply.

The latest scheme plan is presented below in Figure 1-1.



Figure 1-1 : Concept plan layout

2 Development proposal

It has been assumed the development proposal has not changed and comprises of the following 31 dwellings (as shown in Figure 1-1 above), a mixture of Low and High density dwellings.

3 Water supply connection

Taupō District Council have included this development as part of their overall Master Plan (Ref 1: Wairakei International Golf Course Resort, WSP, 2019).

The conclusions from the Master Plan was:

- It is recommended to install tanks at the inlet of the new development to avoid domestic demand peaks and flatten the demand profile (restricted demand).
- The Wairakei International Golf Course demand can be supplied from the existing 150mm uPVC main along Wairakei Dr without adversely impacting the pressure of existing customers.
- No network upgrades are required to allow the development to be connected to the existing TDC water supply network.

4 Water reticulation requirements

It is understood that this development will be under restricted supply as follow:

- Restricted supply = 1.2 L/min restriction.

Note: We will need to know whether any stock watering entitlement is required for this development.

Default fire flow requirements:

- From SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice Appendix K. (For residential dwellings FW2 - 12.5 L/s).

5 Water reticulation approach

The development of a water reticulation supply network will be based on the above connection point and Codes of Practice for Development of Land and Firefighting.

The concept will be to connect off the pressurised pipeline, to storage tanks sized to cater for peak demands and fire flow.

The greater of the following:

- 2 x Average Day Demand, or
- Peak Day Demand + 20% + SNZ PAS 4509 firefighting requirements.

Reticulation pipework will be designed from the storage tank to each dwelling via reticulation pipelines and laterals. Fire Hydrants will be located at the stated requirements in the Code of Practice.

Pipe sizing will be developed to meet level of service requirements and pipe design requirements.

6 References

- 1 Wairakei DMA Masterplanning - WSP Technical Memorandum, August 2020.

- 2 Cheal Consultants Ltd (September 2017), Proposed Hotel Development - Engineering Services Report - Wairakei International Golf Course
- 3 Taupo District Council (September 2009), Code of Practice for Development of Land
- 4 Waikato Local Authority Shared Services (May 2018), Regional Infrastructure Technical Specifications (RITS)



Memorandum

To	Phil Quinn
Copy	Sean Crocker
From	Dorcas Adjei-Sasu; Kaitlyn Baker
Office	Hamilton
Date	8 December 2021
File/Ref	2-37928.00
Subject	Wairakei Stormwater Plan for Resource Consent

1 Purpose

This memorandum outlines a high-level plan for stormwater management at the proposed Wairakei International Golf Course Development to expand upon that given in the Engineering Services Report provided by Cheal Consultants Ltd in 2017. The overarching stormwater management objectives and performance criteria are also outlined, which forms the basis of the recommended stormwater management approach.

As per Policy 3e.2.3 of the Taupo District Plan, the stormwater management will aim to: “avoid, remedy or mitigate any adverse effects of the disposal of stormwater on the receiving environment”. This memorandum addresses how the development proposes to achieve this.

2 Background

The site of the proposed development is located at 1/527 Wairakei Drive, approximately 6km north of the township of Taupo. The site is zoned as 'Rural Environment' and is located within the Wairakei Tauhara Geothermal Area. The property itself is currently an international level golf course, and the applicant proposes to construct a mixed-density rural lifestyle farm park located on the peripheral of the golf course. A concept plan of the preferred layout at the time of writing is presented on the following page.



3 Objectives and Performance Criteria

3.1 Stormwater Management Objectives

The overarching objective for stormwater management is to integrate it into the development by providing landscaping, protecting natural systems, and providing an aesthetic and natural appeal that holds social, cultural, economic and environmental benefits. Taupo District Council’s stormwater objective seeks to:

“...provide and manage stormwater drainage systems so that people, property and the environment are protected from the adverse effects of flooding, erosion and water pollution.”

3.2 Stormwater Management Performance Criteria

Stormwater management for a proposed development shall adhere to the following performance criteria outlined by TDC’s Code of Practice:

- Meet the relevant standards and criteria of the District Plan and the Regional Plan.
- Implement industry best practice methodologies to manage and treat stormwater.
- Provide for the collection and/or control of stormwater, allowing for ultimate future development within the catchment or adjoining catchments.
- Meet the requirements of the TDC Comprehensive Stormwater Discharge Consent.
- Meet the requirements of any catchment management plans.
- Create a landscape where the design integrates with other aspects of site planning and provides multiple benefits
- Make use of available natural features on site wherever possible including public access, natural character, amenity, aesthetics etc.
- Result in minimal disturbance to natural water systems and receiving environments.
- Result in no increase in rate of runoff off a site in a 10% AEP event.
- Allow for the 1% AEP to be managed via overland flow paths while preventing damage to private property and minimising damage to the flow path.

- Retain pervious surfaces as far as practical.
- Allow for detention and infiltration opportunities. There is an expectation for new developments which vest in TDC to have 'open' systems of ponds with high storage volumes, rather than 'closed' systems of underground soakage areas which rely on high infiltration rates. Note: open systems are easier to maintain, provide treatment even when at capacity and reduce the reliance on high infiltration rates which experience shows are not maintained in the long term.
- Comprise of simple, non-structural, low-tech and low-cost methods.
- Be low maintenance and easily maintained
- Be designed in such a way as to minimise health and safety issues.
- Protect overland flow paths through appropriate mechanisms. Existing flow paths on downstream property shall not be altered without agreement.
- Shall not be connected to the wastewater system without specific TDC consent.

4 Stormwater Management

Council-owned reticulation devices are not available at the site, and therefore the site must utilise on-site stormwater disposal and treatment devices to address stormwater management. As an overview, it is recommended that the stormwater management approach should use a combination of soakage devices, stormwater ponds, and rain gardens to address stormwater. The concept plan shown below gives an overview for stormwater management for the site.



4.1 Soakage Chambers

A desktop assessment of the soil profile at the proposed site suggests that an on-site soakage approach is viable to dispose of stormwater. The soil is typical of that found across the Taupo District, being composed of sandy or gravelly pumice soils. Drainage of excess water is rapid in these soils, with a very low vulnerability of water logging in non-irrigated conditions. It is however recommended that on-site geotechnical investigations are undertaken prior to the design of any soakage devices to determine the permeability and soakage rate of the soils that are present.

The performance criteria given in Section 3.2 above states that the development should result in no increase in rate of runoff for a 10% AEP event. Given the rapid drainage conditions of the natural soils, it is considered suitable that a soakage chamber at each of the proposed houses will be sufficient to dispose of any stormwater generated by a 10% AEP event. Any storm event higher than 10% AEP (e.g. 1% AEP) will need to be managed by overland flow paths (refer section 4.3).

Given that the indicative house footprint covers only 26%-33% of the indicative building platform, there is sufficient space for each household to utilise a soakage chamber within the boundary of the respective property. There is also sufficient separation between parcels that these soakage devices can be implemented without interference. The figure on the following page provides an indicative location plan for soakage chambers. Please note that the location and size is only indicative and is subject to change during the design stage. The design shall also adhere to any property boundary and/or building setback requirements, and any other requirements outlined in the Regional Infrastructure Technical Specifications (RITS).

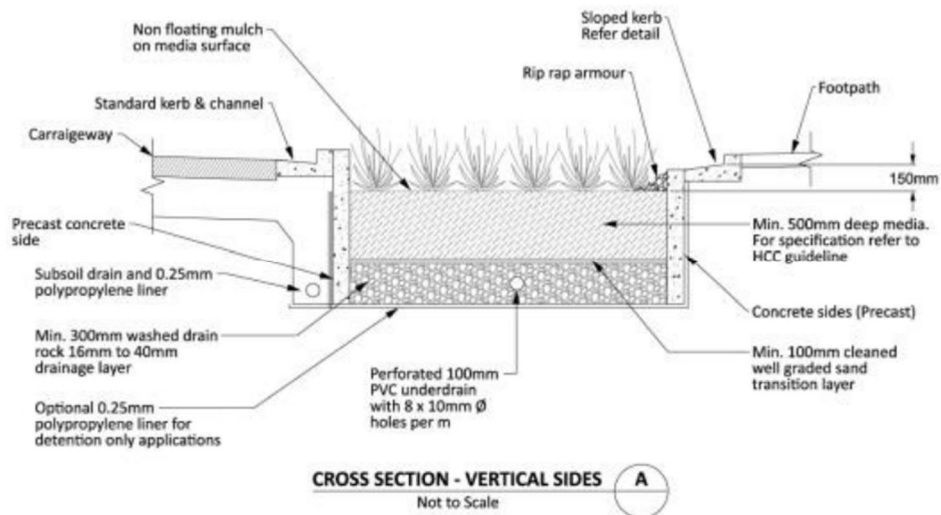


4.2 Rain Gardens

Given the overarching objective of integrated management (e.g. providing landscaping, protecting natural systems, and providing an aesthetic and natural appeal that holds social, cultural, economic and environmental benefits), it is recommended that rain gardens are used to treat and dispose of road and driveway stormwater runoff.

Road runoff will contain contaminants that cannot be directly disposed of into the natural water-cycle without proper first treatment. The rain gardens will provide both disposal and treatment of stormwater for the 10% AEP events. Bioretention media such as plants and organic soil/ mulch will provide treatment through filtration, before disposing of the stormwater through soakage into the ground beneath it. As mentioned above, the rapidly draining pumice soils are suitable for soakage to facilitate this approach. As with the soakage chambers mentioned in Section 4.1, any storm event higher than 10% AEP (e.g. 1% AEP) will need to be managed by overland flowpaths. It should be noted that in the case of a 1% AEP event, the road will be formed as the flowpath and connect to existing overland flowpaths.

Stormwater will be conveyed via a kerb and channel network to the rain gardens, disposing into these gardens through a kerb-cutdown. The exact location, size, filter medium etc. of the rain gardens will be determined during the latter design phases. There is sufficient space to incorporate rain gardens across the site (e.g. within the road median, within the berm etc.). Please note that the design is required to the requirements outlined in the Regional Infrastructure Technical Specifications (RITS). The cross-section of a typical rain garden, taken from the RITS, is presented in the figure below.



4.3 Overland Flow Paths (1% AEP Event Management)

As stated by the performance criteria in Section 3.2 above, an allowance must be made for the 1% AEP to be managed via overland flow paths whilst still preventing damage to private property and minimising damage to the flow path.

A combination of both a stormwater pond/wetland and baffles are recommended to mitigate the any effects of the 1% AEP event, however these are dependent on further investigation and design to determine if they are required.

The figure below demonstrates a rough estimation of the overland flow paths for the site at its current undeveloped state. Based on this, a provisional/ indicative location for the wetland/ pond and the baffles have been included. The location and size for both devices are indicative only and subject to change during the design stage. The design shall also adhere to any property boundary and/or building setback requirements, and any other requirements outlined in the Regional Infrastructure Technical Specifications (RITS).



4.3.1 Stormwater Wetlands or Ponds

To address these potential downstream flooding effects, a stormwater wetland or pond may be required (to be determined in the design phase). A wetland or pond will help alleviate downstream flooding by attenuating the flow. The design phase will confirm whether a wetland, 'wet pond' or 'dry pond' is necessary for this site. These ponds or wetland design can

be integrated into the overall landscape and can also provide aesthetic benefits, which fits in with the stormwater management objectives outlined in Section 3.1 above.

4.3.2 Baffles

Some of the overland flow is directed towards an existing gully, which is sloped towards the existing golf course. To reduce the potential downstream flooding effects as a result of the development, it is recommended that baffles are constructed in the gully to provide some attenuation storage and prevent erosion. As with the wetlands/ ponds, the design phase will confirm whether baffles are required for this site.

5 Conclusions and Recommendations

A low-impact design (LiD) approach should be taken when addressing the stormwater management. The section below outlines key approaches that have been recommended to address this:

- Source control measures (e.g. soakage chambers) as part of the design layout to minimise the impact of development
- LID stormwater devices incorporated into the design layout (e.g. raingardens) providing stormwater treatment and extended detention storage from driveways and roads
- Creation of natural energy-dissipating baffles to convey the 1% AEP stormwater flow through the gully. By dissipating the flow energy, erosion and scouring actions are prevented.
- Creation of a constructed wetland/ pond to provide peak attenuation if needed.
- An overland flow path network that retains the 1% AEP storm event within the road corridor and gullies.

The stormwater management system considers the values of the existing site features such as natural depressions/ gullies, permeable soils, and conveyance topography. It is intended that the management devices discussed will help minimise increases in stormwater runoff volumes, flow rates, and contaminant loads to the maximum extent practicable.

Through the incorporation of rain gardens and a wetland/ pond, the management devices are integrated into the development, providing landscaping and aesthetic and natural appeal that presents social, cultural and environmental benefits. The overarching plan satisfies TDC's Code of Practice by providing a stormwater drainage system that protects the people, property and environment from any adverse effects of flooding, erosion and water pollution.

All of the devices mentioned are subject to further design to confirm details such as location, size, inlets/outlets etc. When progressing to the design phase, the design should be in accordance with all technical specifications and guides such as the RITS, the Waikato Stormwater Management Guidelines, and any requirements provided by the Taupo District and Waikato Regional Plan. All designs must meet the requirements of the TDC Comprehensive Stormwater Discharge Consent.

6 References

Cheal Consultants Ltd (September 2017), Proposed Hotel Development - Engineering Services Report - Wairakei International Golf Course

Taupo District Council (September 2009), Code of Practice for Development of Land

Ministry of the Environment (October 2004), On-Site Stormwater Management Guideline, NZWERF

Waikato Local Authority Shared Services (May 2018), Regional Infrastructure Technical Specifications (RITS)



Memorandum

To	Phil Quinn
Copy	Sam Coxhead
From	Sean Crocker
Office	Napier
Date	8 December 2021
File/Ref	2-37928.00
Subject	Wastewater Disposal Plan for Resource Consent

1 Purpose

This memorandum outlines a high-level plan for wastewater disposal at the proposed Wairakei International Golf Course subdivision. The assessment expands upon the information previously provided in the Engineering Services Report prepared by Cheal Consultants Ltd in 2017. The overarching wastewater management objectives and performance criteria are also outlined, which forms the basis of the recommended wastewater management approach.

As per Policies 3e.2.3 and 3e.2.4 of the Taupo District Plan, wastewater will be managed on each allotment with the aim of: “avoiding, remedying or mitigating any adverse effects of the disposal on the receiving environment and on the health and wellbeing of neighbouring property owners and within allotments that are capable of supporting and maintaining appropriate on-site effluent and waste water treatment systems.” This memorandum addresses how the development proposes to achieve this.

2 Background

The site of the proposed development is located at 1/527 Wairakei Drive, approximately 6km north of the township of Taupo. The site is zoned as ‘Rural Environment’ and is located within the Wairakei Tauhara Geothermal Area. The property itself is currently an international level golf course, and the applicant proposes to construct a mixed-density rural lifestyle farm park located on the peripheral of the golf course. A concept plan of the preferred layout at the time of writing is presented on the following page.



Figure 2-1: Subdivision Concept Plan

3 Objectives and Performance Criteria

3.1 Wastewater Management Objectives

The overarching objective for waste management is to integrate onsite disposal into the development by providing systems that avoid adverse effects on the health and wellbeing of the community and the environment, maintains the amenity and privacy enjoyed in the rural environment, and avoids unanticipated discharges beyond the boundaries of the allotments that are not already provided for via easements. Taupo District Council’s wastewater objective seeks to provide:

“... reliable, affordable, sustainable and environmentally acceptable “onsite wastewater disposal systems that protect the community’s health and safety; minimises the pollution of groundwater and waterways and habitats, and provide services that are economic to build, operate and maintain.”

3.2 Wastewater Management Performance Criteria

Wastewater management for the proposed development shall adhere to the following performance criteria outlined by TDC’s Code of Practice:

- On-site systems (where required) are compatible with daily flow, waste water characteristics and soil/site conditions so that effective assimilation of pollutants without exceeding the carrying capacity of the receiving environment is achieved. Onsite systems must be capable on ongoing, sustainable owner management.
- Whether or not resource consents are required from the Regional Council for the activities they intend to undertake, and
- What conditions must be met to comply with permitted activity rules.

Any Regional Council requirements shall be noted in resource consent applications to TDC.

4 Wastewater Management

Council-owned reticulation devices are not available within an economic distance from the site. The proposed allotments will need to utilise on-site wastewater treatment and disposal devices. As an overview, it is recommended that the wastewater management approach should use a proprietary secondary treatment plant outlined in ASNZS1547 and AS/NZS1546.

4.1 Septic Tank and discharge field Chambers

The existing dwellings and facilities at the golf course are serviced for wastewater by individual onsite treatment and disposal systems, each with separate consents issued from Waikato Regional Council.

A desktop assessment of the soil profile, and a review of the Cheal Engineering Service Report (Reference: 2012-092, Dated: 11 September 2017) for the previous resource consent application suggests that an on-site soakage approach is viable to dispose of wastewater. The soil is typical of that found across the Taupo District composed of sandy or gravelly pumice soils. Drainage of excess water is rapid in these soils, with a very low vulnerability of water logging in non-irrigated conditions. It is however recommended that on-site geotechnical investigations are undertaken prior to the design of any discharge field device to determine the permeability and soakage rate of the soils that are present.

The recommended wastewater treatment method has been sized for a 10-person, five bedroom home. The permeability testing in the Cheal Report confirmed a coefficient of permeability (Ksat) of 2.89m/day. Soil permeability is not expected to differ within the wider site. The disposal field will be a pump dosed standard bed with trenches allowing for 1m spacing between each discharge pipe in accordance with AS/NZS1547. A combined discharge field (40m²) and reserve area (20m²) of 60m² will be required on each lot. The design of the disposal field is detailed below and in figure 4.1. The calculations are provided in **Appendix A** attached to this memo.

Given that the indicative house footprint covers only 26%-33% of the proposed building platform, there will be sufficient space for each household to utilise a proprietary secondary treatment plant and disposal field. There will also be space on each lot to support both wastewater and stormwater discharges to ground. However, it is important that the recommendations in any geotechnical report relating to the location and distance required between wastewater and stormwater services be adhered to. The design shall also adhere to any property boundary and/or building setback requirements, unless otherwise stated and any other requirements outlined in the Regional Infrastructure Technical Specifications (RITS).

It is noted that the applicants desire to lay the discharge field within the balance areas to support the landscaping within the farm lot. It is considered that this method of wastewater disposal is achievable provided that appropriate easements are registered across the boundaries. This will not create any issues from a building consent perspective.

There is sufficient separation between proposed allotments for the wastewater treatment systems and disposal field devices to be installed and maintained without interference or any adverse health and wellbeing effects on those surrounding neighbours.

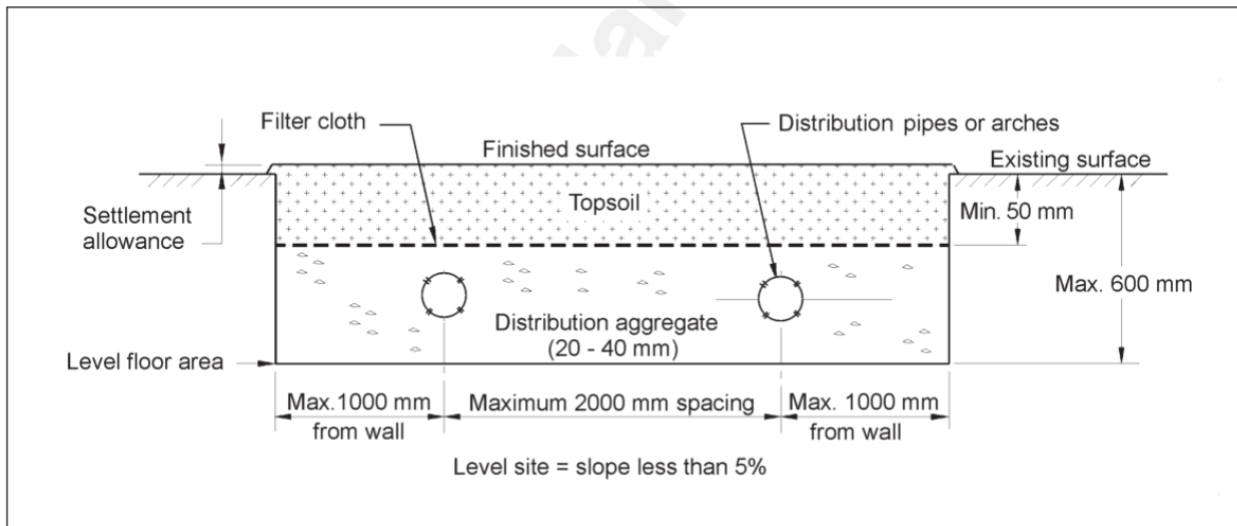


Figure 4-1: Conventional bed disposal system (Figure L5 AS/NZS 1547)

4.2 Compliance with Waikato Regional Plan

Rule 3.5.7.6 of the Waikato Regional Plan permits the discharge of domestic wastewater on allotments less than 2,500m² where the site is outside the Lake Tāupo Catchment and the disposal system complies with the following matters:

- The volume of effluent to be discharged shall not exceed three cubic metres per day averaged over any one month period.
- The design, construction, operation and maintenance of the system shall meet the following standards:
 - i. pre-treatment of effluent to a standard not to exceed concentrations of 20g/m³ of Biological Oxygen Demand and 30g/m³ of suspended solids
 - ii. during times of normal wet winter groundwater level, there shall be at least 600 millimetres separation distance between the groundwater level and the bottom of the disposal trench or 300 millimetres between the groundwater level and dripper irrigation lines, where dripper irrigation lines are used and the design loading rate for effluent disposal is less than five millimetres/day.
 - iii. there shall be no adverse change in groundwater quality as a result of the discharge, or in combination with other discharges
 - iv. there shall be no adverse change in surface water quality as a result of the discharge, or in combination with other discharges
 - v. there shall be no direct discharge of effluent into groundwater or surface water.
- The discharge shall not result in any objectionable effects from odour beyond the boundary of the subject property.
- The sewage disposal system shall not be sited within 30 metres of a Natural State Water Body or Fisheries Class Water Body as specified in the Water Management Class Maps, and 10 metres from any other surface water body.
- Written proof of compliance with this Rule shall be provided to the Waikato Regional Council on require in the form of either:
 - i. certification by a person who is qualified and experienced in the field of onsite sewage treatment and disposal that the system will consistently satisfy the above standards taking into account the relevant site constraints, or
 - ii. documentation which demonstrates achievement of the standards.
- The discharge shall not occur within 20 metres of a Significant Geothermal Feature.

The method of discharge - proprietary secondary treatment plant - is expected to comply with the matters listed above. Written proof of compliance with these provisions will be obtained as part of the detailed engineering design phase. Overall, it is considered that the method of wastewater disposal will be consistent with the discharge rules within the Waikato Regional Plan.

5 Conclusions and Recommendations

A proprietary secondary treatment plant and disposal field can be accommodated on each allotment. The method of disposal will be subject to the recommendations within a site specific geotechnical report prepared by a suitably qualified engineer. However the method of onsite wastewater treatment and disposal will avoid adverse discharge effects on neighbouring allotments and will be a permitted activity under the Waikato Regional Plan. The method of disposal will be consistent with the objectives and policies within the Taupo District Plan and AS/NZS1547.

6 References

Cheal Consultants Ltd (September 2017), *Proposed Hotel Development - Engineering Services Report - Wairakei International Golf Course*

Taupo District Council (September 2009), *Code of Practice for Development of Land*

Ministry of the Environment (October 2004), *On-Site Stormwater Management Guideline*, NZWERF

Waikato Local Authority Shared Services (May 2018), *Regional Infrastructure Technical Specifications (RITS)*

Appendix A

Wastewater Disposal Calculations

WSP Wastewater Disposal Calculations

All rates are calculated using AS/NZS1547 and AS/NZS1546.

The disposal field area is calculated using a 200 L/day/pp wastewater rate. The soil is category 2, therefore with secondary treatment you get a design loading rate of 50 mm/day.

Wastewater Rate is 10 pp x 200L = 2000L (2000L/day = 2 m³/day)

Soakage Rate of category 2 soils is 50 mm/day (0.05 m³/day)

Disposal field area is calculated as Wastewater Rate / Soakage Rate (2 m³ / 0.05 m³/day = 40 m²)

The reserve area for a secondary treated effluent field is half the treatment area, e.g., 20 m² for a 40 m² disposal field.

The primary treatment tank size is from the AS/NZS1547 standards for a 10-person home.

The disposal field will be a pump dosed standard bed as outlined in AS/NZS1547.

“The recommended treatment system is a proprietary secondary treatment plant meeting the requirements outlined in AS/NZS1547 and AS/NZS1546.”

PP/Lot	L/Day	Secondary Treatment (m ²)	Secondary Reserve (m ²)	Tank Size (L)
10 (5 Bed)	2000	40	20	4500
7 (4 Bed)	1400	28	14	3500
5 (3 Bed)	1000	20	10	3000
3 (2 Bed)	600	12	6	3000

Appendix B

Cheal Engineering Service Report

Reference: 2012-092, Dated: 11 September
2017

Wairakei International Golf Course

Proposed Hotel Development

Engineering Services Report

*2012-092
11 September 2017*

Wairakei International Golf Course

Proposed Hotel Development

Engineering Services Report

Prepared by:



Maddison Forde
Civil/Geotechnical Engineer

Reviewed by:



Catriona Eagles
Senior Planner

Reviewed and Approved
for Release by:



Phil Rielly
Director / Engineering Manager

Date: 11 September 2017
Reference: 2012-092
Status: Final
Revision: NA
Previous Revision Date: NA

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.	INTRODUCTION AND SCOPE	4
2.	SITE DESCRIPTION.....	4
2.1	Description.....	4
2.2	Geotechnical Context.....	5
3.	DEVELOPMENT PROPOSAL	5
4.	EARTHWORKS.....	6
5.	STORMWATER.....	7
6.	WATER SUPPLY	7
6.1	Existing Water Take Volumes.....	7
6.2	Proposed Water Demand.....	8
6.3	Reticulation Requirements.....	9
6.4	Fire Fighting Requirements.....	9
7.	WASTEWATER	10
8.	ROADING	12
9.	TELEPHONE AND POWER SERVICES	12
10.	DISCLAIMER.....	12

1. INTRODUCTION AND SCOPE

Wairakei International Golf Course engaged Cheal Consultants Ltd (Cheal) to prepare an Engineering Services Report (ESR) for a proposed hotel development at Wairakei International Golf Course.

The purpose of this ESR is to support a resource consent application for the proposed development, by outlining and providing possible engineering design solutions for:

- Earthworks
- Water supply
- Wastewater disposal
- Stormwater management
- Power and telecommunications services.

This report describes the site, the proposal and possible solutions for the above.

2. SITE DESCRIPTION

2.1 Description

The site of the proposed development is located at 527 Wairakei Drive, approximately 6km north of Taupo Township. Wairakei Drive was formally known as State Highway 1. A location plan is shown below:

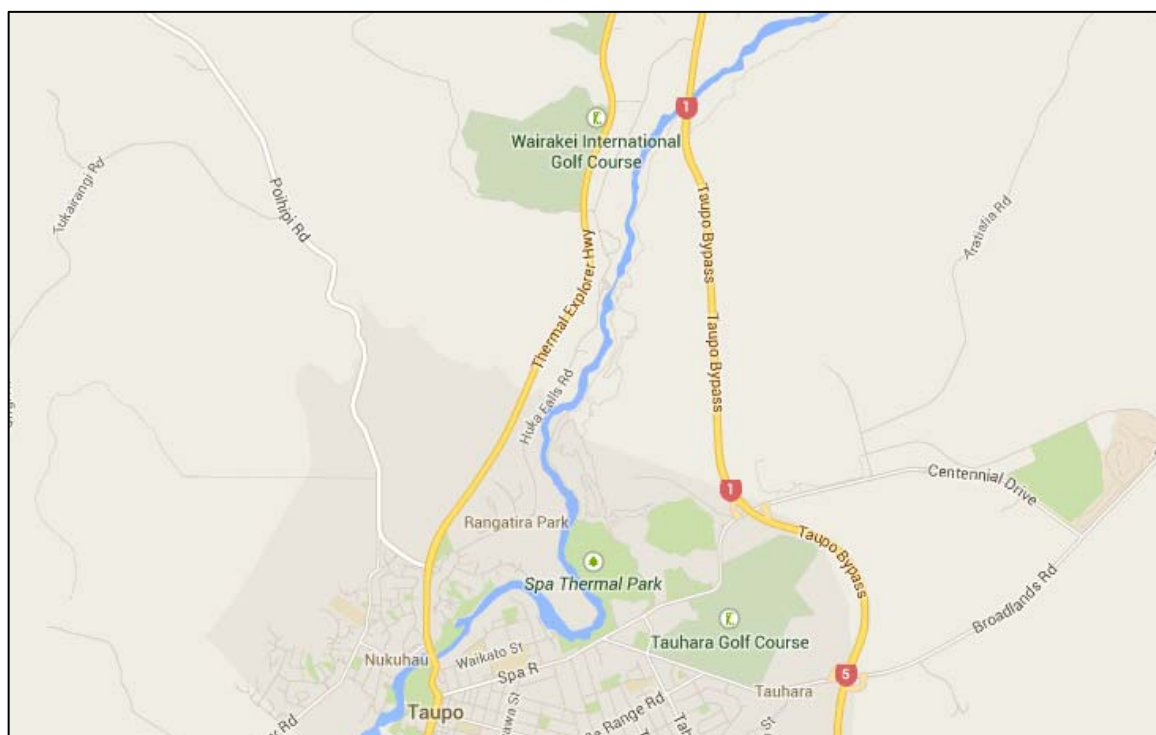


Figure 1 – Location Plan

The property is currently an international level golf course comprising:

- 18 hole golf course
- practise area and golf school
- golf shop / café
- clubhouse
- three private dwellings.

2.2 Geotechnical Context

The proposed development is situated to the north of the existing golf course facilities, and slopes gently from the north-west towards Wairakei Drive. The site is currently vegetated but was historically used for forestry activities.

From GNS Science NZ 1:250K online geological map, the regional geology is described as Oruanui Formation ignimbrite of the Taupo Volcanic Centre. No geotechnical investigations have been carried out at the proposed location of the development, however, investigations carried out in the area suggest that free draining, orthic pumice would be expected on site.

3. DEVELOPMENT PROPOSAL

The development proposes to construct a hotel complex on part of the existing Wairakei International Golf Course. The development comprises:

- 40 three-bedroom chalets, each with a spa pool;
- Hotel lodge which will contain:
 - restaurant to seat up to 150 people
 - bar/cafe area to seat up to 50 people
 - conference space to cater for up to 200 people
 - 20 one-bedroom guest rooms
 - Spa and gym facility
- Service Building
- Open air carparking for 150 cars
- Possible future development of 17 villas, consisting of nine two-bedroom villas and eight four-bedroom villas with a spa.

We have considered the possible future development of 17 villas to the west of the proposed development in order to future proof servicing on site. Estimated earthworks volumes also assume that roading for the villas will be formed during this initial stage of work.

The development plan below shows the general concept and layout of the proposed hotel complex (draft).



Figure 2 – Draft Layout Plan

4. EARTHWORKS

The site generally slopes downwards from the north-west and gently downwards from the proposed lodge location towards the existing golf course. As such, earthworks are required to form building platforms for the lodge, chalets, service building and carpark. Earthworks will also be required to form an access road to the proposed development, with a new entry off Wairakei Drive.

A detailed earthworks design model is yet to be completed and is expected to be part of the detailed design for the site at a later date. However, typical expected earthworks volumes for the hotel complex are estimated and summarised in Table 1.

Table 1 – Estimated Earthworks Volumes

	Cut (m ³) (in-situ, loose)	Fill (m ³) (in-situ, solid)
Lodge (ground floor)	2,800	-
Lodge (first floor)	1,400	-
Chalets 1 - 20	700	1,400
Chalets 21 - 30	-	1,100
Chalets 31 - 40	300	-
Terraced Carpark & Service Building	10,500	7,500
Golf cart tracks	-	-
Main access route & new entrance	8,500	3,500
TOTAL	24,200	13,500
BALANCE (allowing 60% compaction factor)	1,700 (cut, in-situ loose)	

The above values are estimates only, based on the approximate size of each building platform and the expected change in level.

Allowing for a compaction factor of 60% for Taupo pumice soils it is estimated that there will be an excess 1,700m³ of cut (in-situ loose) material. All excess cut material will be spread over other areas of the golf course, eliminating the need for any truck movements externally on or off site.

5. STORMWATER

Stormwater disposal solutions across the development site will utilise disposal to ground via soakage, as typical within the Taupo district where free draining pumice soils exist.

Road runoff will be collected via kerb and channel or roadside swales and directed to subsurface soakage pits, chambers, or ponds as determined appropriate during detailed design.

All hotel buildings will have stormwater runoff directed to in-ground soakage chambers in accordance with the Taupo District Council Code of Practice for Development of Land (**TDC CoP**), sized appropriately to cater for a 1 in 10 year storm allowing for losses to ground soakage.

6. WATER SUPPLY

6.1 Existing Water Take Volumes

Currently the golf course obtains water via a surface water take from the Waikato River, authorised by Waikato Regional Council (consent number 116454). Amongst other conditions, the consent authorises water to be taken at a maximum rate of 2,500m³/d, with a maximum volume of take over the irrigation season of 312,500m³. The irrigation season is defined as November to April inclusive.

The irrigation water is stored in a 2,500m³ surface pond on the site high above the golf course and is fed to a computer controlled network of sprinklers across the golf course, which irrigates the site during the night. The potable water is taken off the supply pipe before it reaches the irrigation storage pond and stored in three 30m³ tanks, prior to being reticulated via gravity to the existing domestic uses on the site, including three private dwellings, a club house and the entrance pro shop / café facilities. Between the storage tanks and the first potable use, the water is filtered and treated via UV.

Cheal was provided pump records for the 2012/2013 irrigation season from which to calculate the actual amount of water taken from the river for the site in its existing state. The 2012/2013 season is a good example to consider, as the Taupo district (and in fact much of the North Island) was considered to have gone through a significant drought that season.

Pump records show that at no time does the existing site use all of its daily or irrigation season water allocation allowance.

6.2 Proposed Water Demand

Water demand figures have been calculated with reference to suggested typical domestic wastewater design flow allowances contained within tables H3 and H4 in AS/NZS 1547:2012. Whilst these figures are related to wastewater flows, it is generally accepted that they provide good guidance for water demand rates also. The following tables outline the allowances made for flow rates within each category for the proposed development.

- Guests.....220 l/p/d
- Non-resident staff30 l/p/d
- Reception rooms30 l/p/d
- Café/Bar trade20 l/p/d
- Restaurant and Conference Facility.....30 l/p/d.

Allowing for the capacity of a typical spa pool at around 2,000 litres, the calculation of daily demand below is for a day on which ten spa pools on site would be filled. We consider this to be a conservative approach as it is unlikely to occur on a frequent basis.

Activity	No.	No. people	Water demand per person (litres)	Demand (litres)	Demand (m ³)
Chalets	40	6	220	52,800	52.8
Lodge Restaurant	1	150	30	4,500	4.5
Lodge Bar/Café	1	50	20	1,000	1.0
Lodge Lobby	1	5	30	150	0.2
Lodge Guest Rooms	20	2	220	8,800	8.8
Lodge Spa Facility	1	6	30	180	0.2
Lodge Gym	1	10	20	200	0.2
Conference Facility	1	200	30	6,000	6.0
Non-resident staff	-	40	30	1,200	1.2
Service Building	1	2	30	60	0.1
Villas (Two-Bedroom)	9	4	220	7,920	7.9
Villas (Four-Bedroom)	8	8	220	14,080	14.1
Spa pools (Chalets, Villas, Lodge)	10	-	2,000	20,000	20.0
Total Demand per day (m³)					117

The total water demand of 117m³ per day for the hotel complex is minor when compared to the existing irrigation use volumes. The existing demand is based on the highest demand during the 2012/2013 season.

The table below outlines the water available compared to maximum daily demand (11 March) both currently and with the proposed hotel development:

	Currently	With development
Total available	2,500 m ³	2,500 m ³
Demand	1,804 m ³	1,804 + 117 = 1,921 m ³
Additional capacity available for future requirements and emergency supply (potable and irrigation)	696 m³	579 m³

The maximum daily or seasonal take volumes are not exceeded with the additional water volumes required for the proposed development. If we consider the highly unlikely situation of all 40 spa pools on site being filled on the same day, the total water demand would be 195m³ per day, and water take volumes would still be within the consented limit.

Therefore, the existing water take consent can accommodate the extra water demand the proposed hotel will create.

6.3 Reticulation Requirements

Currently the potable water for the existing facilities on the site is fed from 3 x 30m³ water tanks. The water supply to each new chalet/villa and the hotel lodge will be reticulated from the existing water tanks via high pressure water main and will remain in private ownership once completed.

Maximum pressure head from the existing water storage tanks to the proposed:

- hotel lodge will be approximately 35m
- lowest chalet will be approximately 48m and pressure reducing valves may be required on a case by case basis
- highest chalet will be approximately 20m
- highest villa will be approximately 3m, pressure boosting will likely be required for villas at elevations with less than 15m pressure head.

6.4 Fire Fighting Requirements

SNZ PAS 4509:2008 is a Code of Practise for NZ Fire Fighting Water Supplies. It is a non mandatory code which has not formally been adopted by Taupo District Council; however, it provides a good guideline by which to assess the requirements of the proposal.

The proposed lodge will be a sprinklered structure, and all chalets and villas will be non-sprinklered. Based on SNZ PAS 4509:2008, the water supply classification for the development is:

Building	Category	Water Supply Classification
Chalets & Villas	FHC 1	FW3
Lodge	Sprinklered	FW2

Under FW3, water needs to be supplied at a rate of 25l/s within a distance of 135m from the site, with an additional 25l/s provided within a distance of 270m from the site. The flows can be provided from up to three hydrants for a reticulated supply. The domestic reticulation proposed to service the development will also be sized to provide suitable firefighting flow rates. Clusters of elevated villas with limited pressure head will require pressure boosting to meet the FW3

requirements. It is likely that a common booster pump(s) will be provided to supply domestic and firefighting water supply to elevated clusters of units as identified necessary during detailed design.

To provide a firefighting time of 60 minutes, water supply of 180m³ needs to be available. Current tank capacity is 90m³, by installing three more 30m³ tanks the water capacity on site would increase to the required 180m³ for FW3 classification. FW2 water supply requirements are less than those for the FW3 classification.

7. WASTEWATER

The existing dwellings and facilities at the golf course are serviced for wastewater by individual onsite treatment and disposal systems, each with separate consents issued from Waikato Regional Council.

Given there is no existing public wastewater reticulation within an economic distance from the site, wastewater disposal from the development is proposed to be achieved via onsite treatment and disposal systems. An area to the north of the development has been identified as being of adequate size and topography for the disposal field.

It is proposed that wastewater disposal would comprise a three step system:

- Each building will have a holding tank where primary treatment via settlement of solids will take place.
- Liquid effluent will then be pumped via small bore pipes to a communal wastewater treatment facility for secondary treatment.
- Tertiary treatment will occur via natural filtration within land disposal to ground, via a conventional disposal bed in accordance with AS/NZS 1547.

Secondary wastewater treatment will be sized for 70% occupancy, with a balancing tank to handle additional flows at peak times. The wastewater disposal field will be designed for full occupancy rates. The development could discharge up to 117m³/day of water, as per the water demand calculations in Section 5 of this report.

Permeability testing was previously undertaken close to the existing golf course facilities, which confirmed a coefficient of permeability (K_{sat}) of 2.89m/day. We do not expect the permeability of soils in the vicinity of the proposed disposal area to be significantly different from this value.

In accordance with AS/NZS 1547, the site is a soil category 2, being a massively structured Sandy Loam. For this soil category, the standard requires a Design Loading Rate (**DLR**) for conventional beds of 50mm/d, which in turn requires a bed disposal area of 2,340m² for 117m³/d disposal.

It is proposed to construct 12 trenches of 50m length and 4m width in accordance with Figure L5 of AS/NZS 1547 shown below. Allowing for 1m spacing between each bed, results in a disposal area of 100m x 29m. Disposal beds will be terraced and constructed along natural contours, however due to the topography of site, some minor earthworks to shape the disposal field may be required.

It is anticipated that each of the 12 beds would be connected to the wastewater treatment plant via Low Pressure Effluent Dosing (LPED) lines through a series of automatic sequencing valves to ensure even distribution of wastewater. The disposal field concept is shown in Figure 3 below.

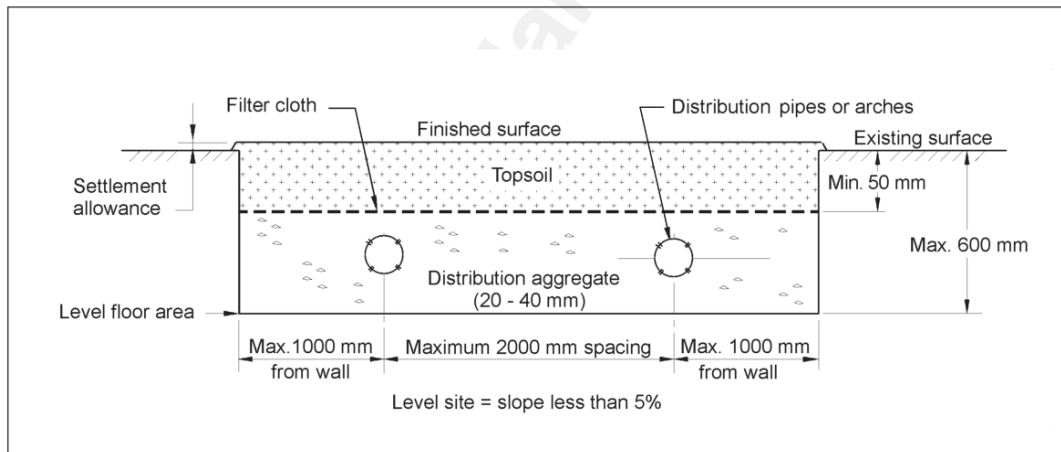


Figure 3 – Conventional Bed (Figure L5 from AS/ NZS 1547)



Figure 4 – Wastewater Disposal Field Concept (extract of Overview Site Plan)

8. ROADING

All roading to the proposed hotel development will be held in private ownership, but will be constructed in general accordance with the TDC CoP. All roads, tracks and carparking will be sealed with an impermeable surface. Carparks will be constructed in accordance with the requirements of the TDC District Plan.

A new entrance from Wairakei Drive is proposed to accommodate the additional traffic generated by the proposal. The access road from the new entrance to the hotel lodge will be 6m wide to allow for two-way traffic. The access road will likely narrow as it continues up the hill towards the proposed villas, and include pull-off bays to accommodate passing movements.

Further assessment of traffic impacts is undertaken in the Traffic Impact Assessment, prepared by Gray Matter, included in the consent application.

9. TELEPHONE AND POWER SERVICES

There are telephone and power services at the site servicing the existing buildings. These will be extended to the proposed hotel, chalet and villa buildings. Details will be confirmed with Unison and Chorus at the time of detailed design.

10. DISCLAIMER

This Report has been prepared solely for the use of our client with respect to the particular brief given to Cheal Consultants.

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.

If variations in the parameters outlined are discovered then the matter should be referred back to Cheal Consultants immediately.

CHEAL CONSULTANTS LIMITED
11 September 2017

Appendix C
Waikato Regional Plan
Section 3.5.7.6 Sewer Discharge Rules

Waikato Regional Plan

3 Water Module

3.5 Discharges

Sewage Disposal

Rule Number	Description/Rule	Compliance	Comments
3.5.7.6	Permitted Activity Rule – Discharge of Sewage from Improved On-Site Domestic Sewage Treatment and Disposal Systems		
	Except as provided for by Rule 3.5.7.5 , the discharge of domestic sewage effluent (including grey water but not including stormwater) onto or into land outside the Lake Tāupo Catchment from an on-site domestic sewage treatment and disposal system is a permitted activity subject to the following conditions:		
3.5.7.6.a.	The volume of effluent to be discharged shall not exceed three cubic metres per day averaged over any one month period.		
3.5.7.6.b.	The design, construction, operation and maintenance of the system shall meet the following standards: <ul style="list-style-type: none"> vi. pre-treatment of effluent to a standard not to exceed concentrations of 20g/m³ of Biological Oxygen Demand and 30g/m³ of suspended solids vii. during times of normal wet winter groundwater level, there shall be at least 600 millimetres separation distance between the groundwater level and the bottom of the disposal trench or 300 millimetres between the groundwater level and dripper irrigation lines, where dripper irrigation lines are used and the design loading rate for effluent disposal is less than five millimetres/day. viii. there shall be no adverse change in groundwater quality as a result of the discharge, or in combination with other discharges ix. there shall be no adverse change in surface water quality as a result of the discharge, or in combination with other discharges x. there shall be no direct discharge of effluent into groundwater or surface water. 	Complies	The proprietary secondary treatment plant proposed as part of this subdivision application will achieve the matters for consideration in Rule 3.5.7.6.
3.5.7.6.c.	The discharge shall not result in any objectionable effects from odour beyond the boundary of the subject property.		
3.5.7.6.d.	The sewage disposal system shall not be sited within 30 metres of a Natural State Water Body or Fisheries Class Water Body as specified in the Water Management Class Maps, and 10 metres from any other surface water body.		
3.5.7.6.e.	Written proof of compliance with this Rule shall be provided to the Waikato Regional Council on require in the form of either: <ul style="list-style-type: none"> iii. certification by a person who is qualified and experienced in the field of onsite sewage treatment and disposal that the system will consistently satisfy the above standards taking into account the relevant site constraints, or iv. documentation which demonstrates achievement of the standards. 		
3.5.7.6.f.	The discharge shall not occur within 20 metres of a Significant Geothermal Feature.		

Chorus New Zealand Limited

P O Box 6640

Wellesley street

Auckland 1141

7/12/2021



Quote: New Property Development

31 connection points at 1/527 Wairakei Drive, Wairakei 3384

Thank you for your enquiry about having Chorus network provided for the above development.

Chorus is pleased to advise that, as at the date of this letter, we are able to provide reticulation for this property development based upon the information that has been provided.

The total contribution we would require from you is \$205,861.50 (including GST). This fee is a contribution towards the overall cost that Chorus incurs to connect your development to our network. This quote is valid for 90 days from 07 December 2021. This quote is conditional on you signing a New Property Development Contract with us for the above development.

If you choose to have Chorus provide reticulation for your property development, please log back into your account and finalise your details. If there are any changes to the information you have supplied, please amend them online and a new quote will be generated. This quote is based on information given by you and any errors or omissions are your responsibility. We reserve the right to withdraw this quote and requote should we become aware of additional information that would impact the scope of this letter.

Once you would like to proceed with this quote and have confirmed all your details, we will provide you with the full New Property Development Contract, and upon confirmation you have accepted the terms and paid the required contribution, we will start on the design and then build.

For more information on what's involved in getting your development connected, visit our website www.chorus.co.nz/develop-with-chorus

Kind Regards

Chorus New Property Development Team