REPORT

Tonkin+Taylor

[redacted]

Road - Groundwater Take

Resource Consent Application and Assessment of Environmental Effects

Prepared for

[redacted]

Prepared by

Tonkin & Taylor Ltd

Date

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30/08/18	1	Resource consent application and AEE report	S Lochhead/ J Bould	T Ensor/ P Cochrane	P Cochrane
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[redacted]	1 copy
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Schedule 4 Requirements

Schedule 4 of the RMA sets out the information required in an application for a resource consent. All relevant matters required to be included have been addressed in the assessments and descriptions in this AEE. The following table provides a summary of the information required in Schedule 4 and a quick reference to its location in this report.

Schedule 4 Item	Location within report
A description of the activity.	4
A description of the site at which the activity is to occur.	2
The full name and address of each owner or occupier of the site.	1.2
A description of any other activities that are part of the proposal to which the application relates.	N/A
A description of any other resource consents required for the proposal to which the application relates.	N/A
An assessment of the activity against the matters set out in Part 2.	7.1.1
An assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b). This must include: • Any relevant objectives, policies, or rules in a document. • Any other relevant requirements in a document (for example, in a national environmental standard or other regulations).	7.1 7.1.6 - 7.1.9
An assessment of the activity's effects on the environment that includes the following information: • An assessment of the actual or potential effect on the environment of the activity. • A description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect.	6 6 6
• Identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted.	7.3
An assessment of the activity's effects on the environment that addresses the following matters: • Any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects. • Any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity. • Any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations.	 6 6 6

1 Introduction

1.1 Overview and background of proposed works

[redacted]"the applicant" at[redacted]is seeking resource consent from the Bay of Plenty Regional Council (BOPRC) to take up to 380 m^3/d of groundwater at a maximum rate of 10.5 L/s from a proposed production bore[redacted] The take is for the purposes of irrigation and frost protection of their gold kiwifruit orchards on their property at[redacted] Further details of the proposed groundwater take in terms of duration of take, season and maximum volume, are provided in Section 2 of this report.

This report sets out the results of Tonkin & Taylor Ltd's (T+T) analysis of a pumping test carried out in April 2018 by Steve Miller Rural Services Ltd for the applicant on[redacted]and provides an assessment of environmental effects to support the resource consent application for the groundwater take.

This report has been prepared in fulfilment of section 88 of the Resource Management Act 1991 (RMA), and in accordance with T+T letter of engagement dated 14 May 2018.

1.2 Applicant and property details

Table 1.1: Applicant and property details

Applicant	[redacted]
Owner of application site	[redacted]
Site address / map reference	[redacted]
Legal description	[redacted]
Certificate of Title reference	[redacted]
Regional Council / Plans	Bay of Plenty Regional Council / Bay of Plenty Regional Natural Resources Plan
Address for service during consent processing	Jess Bould Tonkin & Taylor Ltd PO Box 13055 Christchurch 8141 03 361 0313 JBould@tonkintaylor.co.nz
Address for service during consent implementation and invoicing	[redacted]

We attach copies of the application forms in **Appendix A**, and a copy of the relevant Certificate of Title in **Appendix B**.

1.3 Overview of resource consent requirements

The Bay of Plenty Regional Natural Resources Plan (RNRP) is currently undergoing review and therefore proposed Plan Change 9 to the RNRP (PC9) is of relevance to this proposal. Under section 86B of the RMA, rules in a proposed plan have immediate legal effect where the proposed rule relates to the protection of water. PC9 is intended to improve the rules for water quality and quantity management in the Bay of Plenty and contains rules and regulations that are designed to strengthen water allocation limits and management. PC9 has been through the notification, submission and hearing process. A recommendation has been prepared for consideration by Council and is due to be presented on 21 August 2018.

Resource Consent is sought from Bay of Plenty Regional Council under the following provision of the RNRP.

- Rule 43/ WQ R11 Discretionary – Take and use of groundwater which exceeds 35 cubic metres per day.

1.4 Consent duration

Resource consent is sought for a duration of 15 years.

2 Description of Proposed Activity

2.1 Proposed activity

The applicant proposes to apply for a resource consent to take groundwater for frost protection and irrigation of their kiwifruit orchards on their property which cover 6.19 canopy hectares comprising 3.54 ha of gold kiwifruit and 2.26 ha green kiwifruit.

The applicant proposes to use the groundwater for the purposes of frost protection and irrigation. The activities will use water at different times of the year at varying intervals, as shown in Table 2.1.

Table 2.1: Proposed groundwater take volumes from the applicant's bore.

Groundwater use	Duration of take	Season	Maximum volume of take (per day)	Annual volume
Frost protection of kiwifruit	Up to 10 hours/day	15 days between May - November	380 m^3	5,700 m^3
Horticultural irrigation of gold and green kiwifruit	Up to 10 hours/day	October - April	380 m^3	33,860 m^3

3 Environmental Setting

3.1 Site location

[redacted] covers an area of 10.46 ha comprising [redacted] The property extends 900 m west [redacted] along a private right of way and includes two residential properties, a large shed and kiwifruit orchards. The area of orchards to be irrigated comprises 6.19 canopy hectares of gold (3.54 ha) and green (2.26 ha) kiwifruit orchards planted in several blocks, shown on Figure 3.1 with the western part of the orchard further illustrated in Appendix C. The orchards are situated on [redacted]

The subject bore [redacted] is located at [redacted] Details of the [redacted] are not shown on the BOPRC database, therefore no BOPRC reference number is assigned to this bore. [redacted] s located at or about map reference [redacted] at an elevation of approximately 22 metres above mean sea level (m amsl), as shown on Figure 3.1.

[redacted]. *(Source: Google Earth 2018).*

3.2 Site description

The applicant's property is located approximately [redacted] The property sits on the edge of a plateau that falls towards a valley to the south and west. The elevation of the property is 4 m amsl in the west rising to 28 m amsl in the east, with a relatively level plateau to the north and east at an elevation of between 22 and 24 m amsl. The plateau rises up to 30 m to the north beyond the property boundary before falling toward the [redacted] approximately 1 km distant. The property is surrounded by horticultural land comprising orchards of kiwifruit and avocados and rural lifestyle blocks. The local terrain is generally undulating with peninsulas extending into Tauranga Harbour. Hills of the Kaimai Range rise to the southwest of the property.

An unnamed water course with ponds lie to the south of the property [redacted] which flows west into the Oturu Creek. The Oturu Creek forms the property boundary on the west side and flows north into the [redacted] which ultimately drains into Tauranga Harbour. The property is in the secondary surface catchment of the Oturu Creek surface catchment.

3.2.1 Production bore

The production bore [redacted] was drilled in May 2004, to a depth of 318 m below ground level (bgl). The bore is 150 mm in diameter reducing to 100 mm in diameter and is cased to a depth of 130 m bgl. Groundwater is taken from between 130 and 318 m bgl. A static groundwater level

measured in May 2004 recorded the water level to be at 21.3 m bgl and a recent water level of 16.4 m bgl was recorded in 26 April 2018. The pump is currently set at 78 m bgl.

3.2.2 Surrounding bores

Data provided by the BOPRC indicates that there are 14 bores within a 1 km radius of the production bore (Figure 3.1). This list includes bores that have consents to take or use groundwater including geothermal water and also includes another bore owned by the applicant [redacted] located 411 m east of the [redacted]

Table 3.1 provides details of the 14 bores within 1 km of the applicant's production bore. We have identified 10 neighbouring bores that could potentially be affected by the proposed groundwater abstraction by virtue of their depth, location and geology. These 10 bores have screen depths which coincide with the Applicant's bore intake zone of between 130 and 318 m. These bores are shaded blue and are considered in the assessment of effects, as described in Section 6 of this report.

Table 3.1: Details of surrounding bores within 1 km of the applicant's production bore (source: BOPRC, April 2018).

Record ID	Bore Depth (m bgl)	Casing Depth (m bgl)	Screen length (m bgl)	Static water level (SWL) (m bgl)	Theoretical available drawdown[1] (m)	Distance from applicant's bore (m)	Comments
[redacted]	**318**	**130**	**188**	**16.4**	**166.6**	**0**	**Rhyolite**
[redacted]	460	123.5	336.5	15.8	315.7	240	Rhyolite, geothermal
[redacted]	114					411	**Applicants bore**
[redacted]	400	144	256	26	225	566	Rhyolite/ignimbrite, geothermal
[redacted]	213.36					795	
[redacted]	259	156.6	102.4	35.36	62.04	814	Rhyolite
[redacted]	230.4	131.06	99.34	20.73	73.61	822	Rhyolite/Ignimbrite
[redacted]	213.36					825	
[redacted]	97.54	48.77	48.77	18.29	25.48	826	
[redacted]	179.8	103.9	75.9	29.9	41	829	Rhyolite/Ignimbrite
[redacted]	285	153	132	23	104	887	Rhyolite
[redacted]	203	125.5	77.5	11.27	61.23	911	Rhyolite
[redacted]	274.5	91.5	183			944	Rhyolite
[redacted]	533.4			45.72		961	Geothermal
[redacted]	530.4	383.13	147.27	12.2	130.07	993	Rhyolite/Ignimbrite, geothermal

Note: blank spaces are where no data has been recorded.

[1] Distance between static water level and base of casing, minus 5 m (to allow for submersible pump).

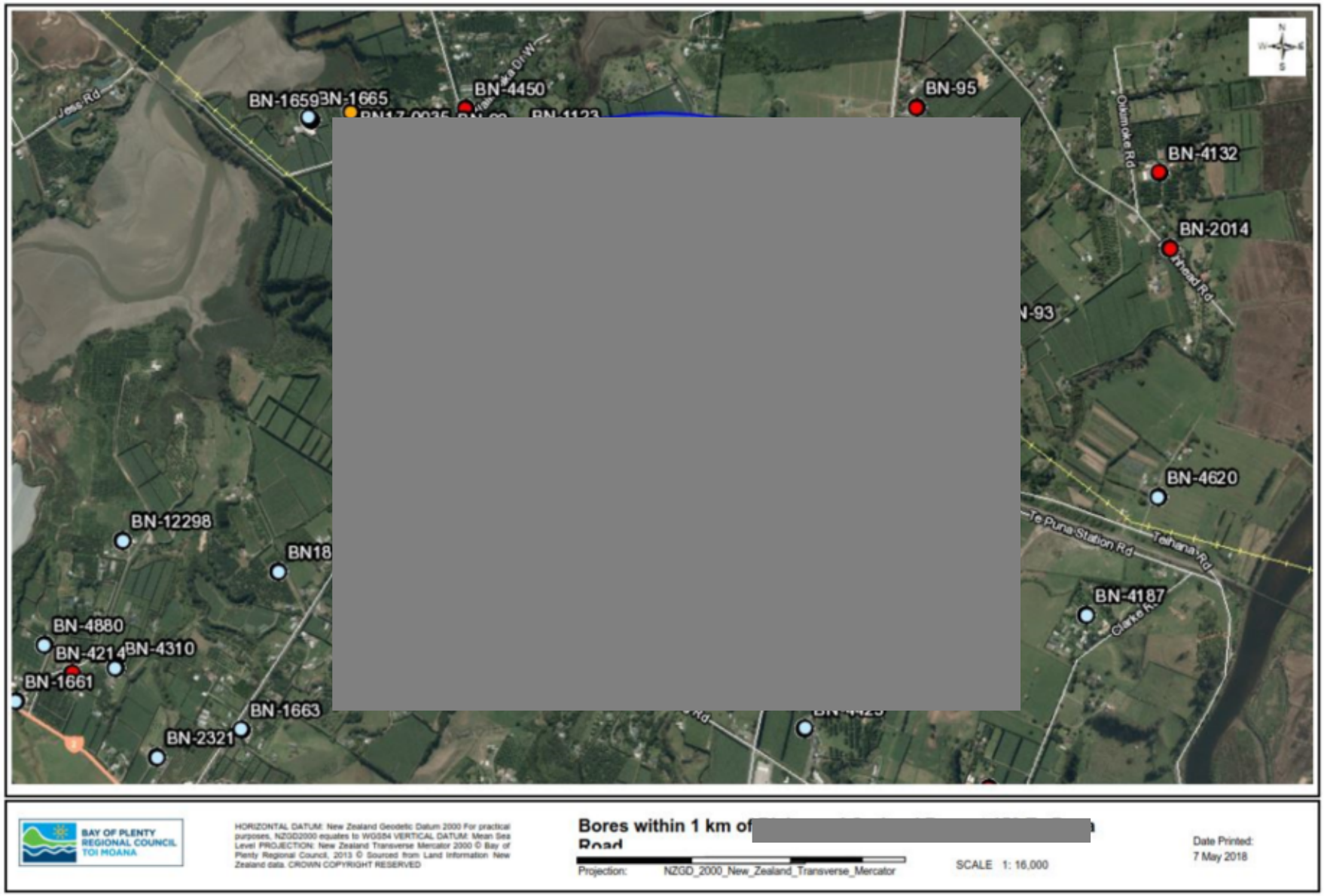


Figure 3.2: Well locations within a 1 km radius of the [redacted] *(source: BOPRC, May 2018).*

3.2.3 Geology

The geological map[2] shows the site to be underlain by Late Pleistocene age alluvium of the Tauranga Group. This overlies Late Pliocene volcanics comprising rhyolite in the form of a dome of the Minden Rhyolite Subgroup and welded dacite ignimbrite of the Waiteariki Formation.

The outcrop of rhyolite (Minden Rhyolite Subgroup) is localised, being one of many isolated rhyolitic lava domes in the area[3]. Mapping the extent of the rhyolite surface outcrop is difficult to determine because the rhyolite has been modified by erosion and buried by later pyroclastic flows[3]. The ignimbrite (Waiteariki Formation) is more widespread, being extensively exposed on the elevated Whakamarama Plateau and along the eastern foothills of the Kaimai Range[3]. The Waiteariki Formation dips to the east beneath the Tauranga sediments and is noted to have flowed over and around the Minden Rhyolite Subgroup. The Aongatete Ignimbrite comprising unwelded ignimbrite underlies the Waiteariki Formation, typically at depths greater than 300 m in the vicinity of Te Puna[4]. It is also inferred that the Rhyolite domes have a flat base on the Aongatete Ignimbrite[3].

Local boreholes[5] record the thickness of the alluvium of the Tauranga Group to be typically between 70 and 140 m thick. This is underlain by rhyolite and/or ignimbrite of variable thickness.

No driller's log is available for the [redacted] and the other bore [redacted] owned by the applicant. The driller's log for the closest neighbouring bore [redacted] located approximately 240 m north of the [redacted] and at an elevation of 22.5 m amsl, shows alluvium was encountered to a depth of 70 m, underlain by 390 m of rhyolite until the final bore depth of 460 m. The geology is described as ignimbrite/rhyolite layers between 240 and 410 m bgl. This bore is noted to be a geothermal bore.

It is inferred that the geology of the applicant's bore is likely to be similar to this description and penetrating the same volcanics, most likely the rhyolite of the Minden Rhyolite Subgroup and ignimbrite of the Waiteariki Formation. Although, due to the bore depth, this bore is not a geothermal bore.

The driller's log for another bore [redacted] 910 m further north of the [redacted] shows that alluvium was encountered to 140 m depth, underlain by rhyolite to 248 m depth and ignimbrite to 400 m depth. This bore is also noted to be a geothermal bore.

3.2.4 Hydrogeology

A general overview of the hydrogeology of the area comprises shallow unconfined to semi-unconfined aquifer(s) in the Tauranga Group alluvium overlying deeper confined aquifer(s) in the Minden Rhyolite, Waiteariki Ignimbrite and Aongatete Ignimbrite[3]. Based on bore logs of nearby bores, the GNS stratigraphic column and the regional mapped geology, the inferred aquifer that the [redacted] penetrates is most likely the Waiteariki Ignimbrite aquifer although partial penetration of the Minden Rhyolite aquifer is not discounted. These aquifers are located in the WAI2 Ignimbrite deep groundwater allocation zone[6].

[2] Leonard G.S., Begg J.G., Wilson C.J.N. (compilers) 2010 Geology of the Rotorua area IGNS 1:250 000 geological map 5 1 sheet + 102 p. Lower Hutt, NZ GNS Science.

[3] White P.A et al. (2009) Groundwater resource investigations of the Western Bay of Plenty area stage 1 – conceptual geological and hydrogeological models and preliminary allocation assessment. GNS Science Consultancy Report 2008/240. 232p.

[4] GNS – Geological Model Cross section obtained from http://data.gns.cri.nz/ebof/findSections.jsp on 23 May 2018.

[5] Bay Of Plenty Regional Council Bore Records Search (provided on 08 May 2018).

[6] Kroon, G., October 2016, Assessment of water availability and estimates of current allocation levels October 2016, BOPRC, version 1.1, pp. 50-51.

The applicant's property is located in the low temperature system geothermal area of the Tauranga Geothermal System (known as the Geothermal Management Group 5 in the Bay of Plenty Geothermal field). However, the [redacted] is not consider as a geothermal bore.

The shallow unconfined groundwater system is likely to be recharged by rainfall with discharge to streams and the Tauranga Harbour. The regional shallow groundwater flow direction is inferred to be toward the north beneath the Bay of Plenty.

The source of groundwater recharge in the Minden Rhyolite is not clearly understood[7]. Where rhyolite domes have large surface expressions, recharge is most likely dominated by surface infiltration via secondary fracture flow. Deep groundwater discharge from the Minden Rhyolite occurs into the Waitеariki Ignimbrite[3].

Groundwater in the deeper underlying Waitеariki and Aongatete Ignimbrite aquifers are most likely recharged by infiltration on the Whakamarama Plateau and Kaimai Range, as supported by the findings of isotopic and geochemical studies[7]. Additional recharge is derived from leakage of the adjoining Formations[7].

Groundwater flow is predominantly via secondary fracture flow because primary porosity hydraulic conductivity is generally low in the ignimbrite.

Low-transmissivity zones within unwelded ignimbrite, common in the Aongatete Ignimbrite, can create flow boundaries and result in large drawdowns[7]. Low-transmissivity zones in unwelded rhyolite would also result in a similar effect.

Published data for the Minden Rhyolite reports[3] a range of aquifer transmissivities of 500 m^2/d to 1,400 m^2/d. The same publication reports ignimbrite aquifers to have a range of typical aquifer transmissivities[3] of between 10 m^2/d to 170 m^2/d. Storativity values[7] for the Minden Rhyolite range from 1.7×10^{-3} to 6.0×10^{-5} and the Waitеariki Ignimbrite aquifer range from 2.0×10^{-4} to 1.03×10^{-6}.

4 Pumping Test

A constant rate pumping test was carried out on the [redacted] by Steve Miller Rural Services Ltd on 26 and 27 April 2018. Data from this test are included in Appendix D.

The pumping test was run over a 24 hour period, with recovery monitored for a further 24 hours immediately following cessation of the pumping. The bore was pumped at a rate of 10.5 L/s, resulting in a total volume of 907.2 m^3/d being taken. This instantaneous rate is the same as that sought in this consent application, although the daily volume is greater than the daily volume sought of 380 m^3/d.

Water levels during the pumping test and during recovery were recorded using a solinst level logger. No observation bores were available for monitoring during this test. The discharge rate was measured manually during the test. Discharge water was taken through Block B (as shown Appendix C) located to the southwest of the [redacted] where the ground slopes toward a bank, then slopes south toward the top of a gully at an elevation of 12 m amsl and 70 m distant of the pumped bore. The discharge water soaks to ground.

The weather was dry during the period of the pumping test, with heavy rainfall four days prior to the test. Although intense periods of rainfall were recorded at some locations in the area such as Te Puke with 133 mm on 15 April, extended periods of calm weather meant that the April rainfall in Tauranga was recorded at near normal levels (99%) for the month[8].

[7] Rosen, M.R. & White, P.A. (eds.) (2001) Groundwaters of New Zealand. NZ Hydrological Society Inc., Wellington.
[8] NIWA, 3 May 2018, National Climate Centre, National Climate Summary – April 2018.

4.1 Methods and assumptions

Aquifer and well parameters were determined using AquiferTest Pro[9] software to analyse the recorded data from the constant rate discharge test. A copy of the AquiferTest Pro analysis is attached in Appendix E. Published values of aquifer storativity have been used for the analysis.

The data have been analysed as per the methods of Cooper-Jacob[10] to determine the aquifer transmissivity. These methods assume the aquifer:

- Is confined.
- Has infinite areal extent.
- Is homogenous, isotropic and of uniform thickness over the area of influence.
- Has a horizontal piezometric surface over the area of test influence.
- Is pumped at a constant rate.

The methods also assume that the bore penetrates the entire thickness of the aquifer and therefore receives water by horizontal flow.

Drawdown of groundwater levels in selected nearby bores (identified in Table 3.1) were assessed using the Theis equation. The results of these analyses are presented in Appendix F.

4.2 Production bore results

Pumping of the production bore [redacted] commenced at 11:53 on 26 April 2018 and ceased at 11:53 on 27 April 2018, after 1440 minutes (24 hours) of pumping. It is understood the pump rate was maintained at approximately 10.5 L/s throughout the test. Recovery of groundwater levels were monitored for a further 24 hours. The initial static groundwater level in the production bore prior to the test was 16.4 m bgl. The maximum measured water temperature during the test was 28.8°C.

The overall results of the pumping and recovery test are shown in Figure 4.1. This shows a fairly typical drawdown curve of a confined aquifer with rapid initial drawdown, followed by a gradual increase in drawdown with groundwater levels nearing steady-state conditions toward the end of the pumping test. There is some fluctuation in the amount of drawdown throughout the test with variations of around 0.5 m. This fluctuation could be a result of slight variations in the pumping rate. The pumping test resulted in a maximum drawdown of 25.6 m after 24 hours of pumping. A rapid recovery occurred upon cessation of the pumping, recovering 23.7 m in the first 10 minutes. Groundwater levels in the bore recovered to 99.3% of the initial static groundwater level at the end of the test with the final water level measured at 16.573 m bgl.

Drawdown plotted against the log of time shows a rapid initial drawdown of 22.1 m after 10 minutes of pumping. The rate of change reduces to approximately 1.1 m per log cycle between 10 and 100 minutes and 2.3 m per log cycle between 100 and 1000 minutes.

[9] Waterloo Hydrogeologic (2016) AquiferTest Pro, version 2016.1.

[10] Kruseman, G. P. and de Ridder, N. A., 1994, Analysis and evaluation of pumping test data, International Institute for Land Reclamation and Improvement, The Netherlands.

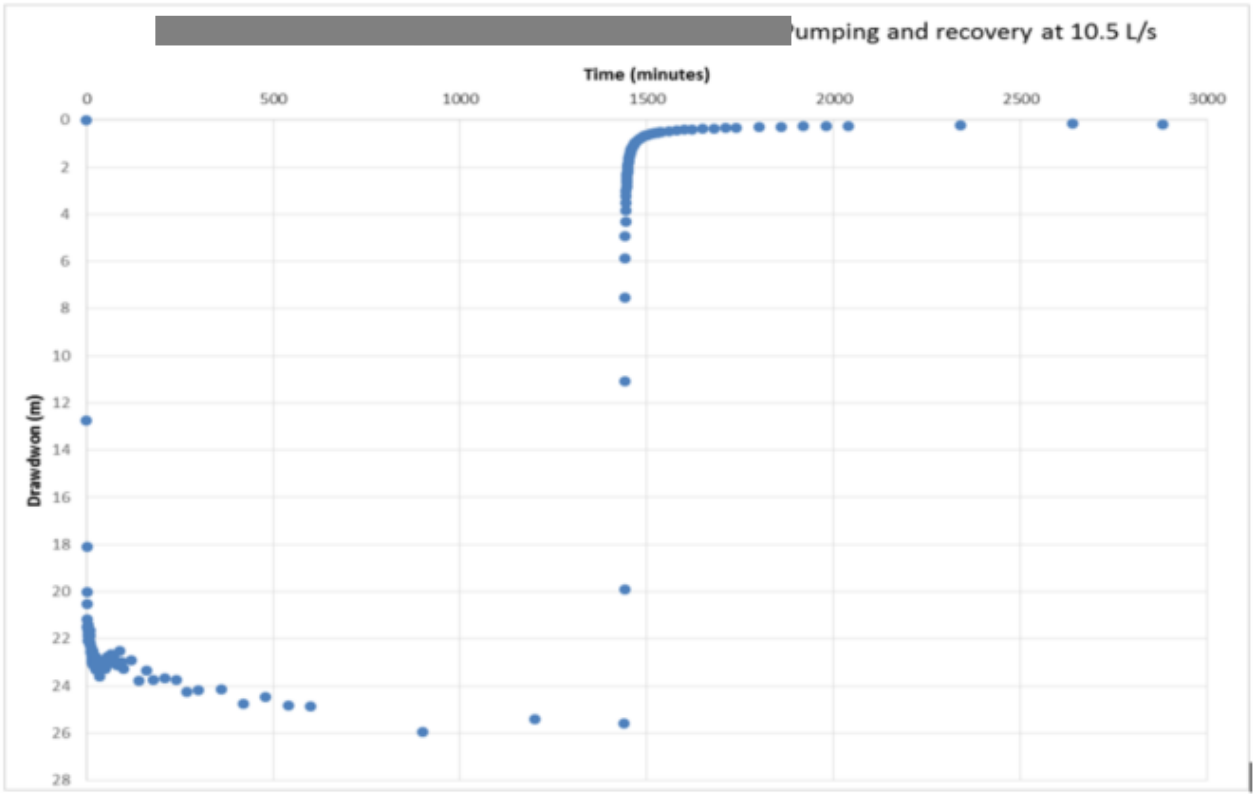


Figure 4.1: Overall test results showing the 24 hour period of pumping and recovery in the [redacted]

Calculated aquifer transmissivity using the Copper-Jacob method for the drawdown data provides a range of aquifer transmissivity between approximately 90 and 120 m^2/day. The transmissivity calculated from the recovery data provides a lower transmissivity of approximately 70 m^2/day.

4.3 Analysis

The results of the pumping test show the rapid initial drawdown in the pumped bore is due to well storage. Storage and transmissivity values have been calculated after the early stages of pumping.

The current available drawdown calculated in this bore is 56.6 m based on the existing pump depth set at 78 m bgl. The rate of observed drawdown in the bore was moderate with 25.6 m of drawdown recorded over the duration of the test. When compared to the available drawdown, this total drawdown represents approximately 45% of the available drawdown. This indicates that the moderate abstraction rate of 10.5 L/s may not be sustainable for long periods (>1 year) of continuous abstraction in this bore without any recovery. However, this available drawdown is based on the current pump depth and there is a further 100 m of potential drawdown available should the pump be set at the maximum depth available. This amount of drawdown is fairly typical in the volcanic aquifers and has been observed in other bores in the area when pumping at a similar rate.

Post-test recovery data reveals a rapid recharge of the bore with near full recovery of the bore (99.3% recovery) achieved by the end of the post-test monitoring, 24 hours following cessation of pumping.

The calculated aquifer transmissivity in the range of 70 to 120 m^2/d, which is low when compared with the published values for the Minden Rhyolite aquifer, but well within the general range for volcanic aquifers. It is mostly likely that the[redacted]e takes water from the Waitea[redacted]riki ignimbrite aquifer and possibly the Minden Rhyolite, as interpreted by the GNS geological section.

A storativity value has been calculated using the Hazel[11] approximation based on an assumed aquifer thickness being equal to the length of the open hole between the base of the casing and base of the hole which gives a storativity of approximately 5 x 10^{-6} per unit of aquifer thickness. On this basis, with the aquifer thickness in the [redacted] taken to be 188 m, this provides a storativity estimate of 9.4 x 10^{-4}. This value is within the published range[7] for storativity values for the Waitiariki Ignimbrite aquifer range from 2.0 x 10^{-4} to 1.03 x 10^{-6}. An approximate mid-range storativity value of 1 x 10^{-5} has been used in this assessment.

5 Resource Consent Requirements

The requirements for resource consents are determined by the rules in the RNRP. The rules which apply are determined by the zoning of the site, any identified notations in the plan and the nature of the activities proposed.

5.1 Regional Natural Resources Plan

Table 5.1: Resource consents required

Proposed activity	Rule reference / description	Activity status
Take and use of groundwater.	Rule 38 (RNRP) The take and use of groundwater with a temperature of less than 30 degrees Celsius, where the quantity of water taken does not exceed 35 cubic metres per day per property, is a permitted activity.	The proposed activity has a daily volume of greater than 35 cubic meters of water per day. The permitted activity rule will not be met.
	Rule 43(RNRP) Take and use of surface water or groundwater that: 1 Is not permitted by a rule in this regional plan; and 2 Is not a controlled activity under a rule in this regional plan, and 3 Is not prohibited by Rule 49.	Discretionary. The take of groundwater does not meet the permitted activity conditions and is not a controlled activity. The take is not prohibited by Rule 49.
	WQ R11 (Plan Change 9) Until NPSEM locally specific limits are established under WQ P2(e) and (f), the take and use of surface water or groundwater that: 1 Is not a permitted, controlled or restricted discretionary activity under a rule in this regional plan; and ~~2 Is not a controlled activity under a rule in this regional plan; and~~ 3 Is not prohibited by Rule 49.	Discretionary activity The take of groundwater meets the conditions of Rule WQ R11 as the take is not provided for as a permitted, controlled or restricted discretionary activity and is not prohibited by Rule 49.

The proposed activity is considered to be a discretionary activity under the RNRP, as more than 35 cubic metres per day is sought.

[11] Hazel, C.P. (1975); Lectures presented by C.P. Hazel of the irrigation and water supply commission, Queensland, to the Australian Water Resources Council's Groundwater School, Adelaide.

6 Assessment of Effects on the Environment

6.1 Introduction

The following assessment identifies and assesses the types of effects that may arise from the proposed works. This assessment also outlines the measures that the applicant proposes to avoid, remedy or mitigate any potential adverse effects on the environment.

Actual and potential effects on the environment have been identified as including:

- Positive effects.
- Groundwater and surface water quantity.
- Groundwater and surface water quality.
- Cultural effects.

6.2 Positive effects

The groundwater take will enable the applicant to irrigate, and provide frost protection to their gold and green kiwifruit orchard at [redacted] The provision of adequate irrigation and frost protection provides for healthy yields of fruit. In particular, frosts can reduce fruit development during bud burst by damaging blossoms.

As such, the proposal provides for the economic well-being of the applicant and kiwifruit industry in terms of providing healthy kiwifruit yields. Increased yields of kiwifruit provides for jobs within the industry.

6.3 Groundwater quantity effects

6.3.1 Proposed groundwater take

The drawdown recorded during the pumping test was moderate compared to the available drawdown, which indicates that the moderate abstraction rate of 10.5 L/s may not be sustainable for this bore if pumped continuously for long periods of time (> 1 year) without any periods of recovery. However, the duration of pumping for both irrigation and frost control will be less than 24 hours per day. In addition, the existing available drawdown is controlled by the depth at which the pump is set. There is a further 100 m of potential drawdown available should the pump be set at the maximum depth available in this bore. This means that the available drawdown in the [redacted] can be increased by the alteration of the pump depth.

For frost protection measures, pumping of up to 10 hours per night for a maximum of 15 days[12] between the months of May and mid -November is proposed. We do not expect these days to be consecutive, which will allow for recovery of the water levels in the bore in between periods of pumping. Similarly, the proposed irrigation will take place for up to 10 hours per day, allowing for recovery of the bore between irrigation periods.

Overall, we consider that while the drawdown in the bore is moderate, the way that groundwater will be used is unlikely to significantly adversely affect the ability of the bore to sustainably provide sufficient water to meet the Applicant's water demands.

[12] Bay of Plenty Regional Council standard allocation of frost days equates to 15 days per year.

6.3.2 Effects on groundwater users

The drawdown effects on neighbouring bores are estimated using the Theis equation for both the frost protection and irrigation activities. The results of these analyses are presented in Appendix F and summarised in Tables 6.1 to 6.4 and represent the proposed maximum daily 380 m^3/d abstraction volume for frost protection and horticultural irrigation, as sought by the Applicant.

To assess the effects of frost protection and irrigation activities, the drawdown effects are based on a continuous abstraction rate, assuming a continuous 24 hour pumping period over a range of rates to represent the way the water is taken from the [redacted]. This range of assessments show the drawdown effects calculated over a 1, 3, 7, 11 and 15 day frost protection period and calculated over a 1, 7, 30 and 100 day irrigation period. These assessments are based on the following abstraction rates:

- 1.1 L/s continuously for 365 days representing the total annual volume of 33,860 m^3/a for both frost protection and irrigation sought by the applicant taken over the entire year.
- 4.4 L/s for up to 100 days representing the total irrigation volume of 28,160 m^3/a sought by the applicant taken continuously over the irrigation season.
- 3.3 L/s for up to 100 days representing the maximum daily volume of 380 m^3/d sought by the applicant taken continuously over the irrigation season to provide a conservative upper bound assessment.
- 4.4 L/s for up to 15 days representing the total frost protection volume of 5,700 m^3/a sought by the applicant taken over the maximum continuous frost protection period identified by the BOPRC[13].

The estimated effect on drawdown in neighbouring wells has been calculated for the five selected bores identified in Table 3.1, that represent bores that may intercept the same volcanic rock aquifer, at a similar depth to the [redacted]. The distances of these neighbouring bores from the production bore range from 240 m to 944 m which includes the closest deep bore that is considered to penetrate the same aquifer as the [redacted]

The aquifer transmissivity value used in this assessment of effects is the more conservative value (ie at the lower end of the range) obtained from the pumping test analysis of 70 m^2/d. A storativity value of 1 x 10^{-5} has been selected from published values for the Waitetariki Ignimbrite aquifer (mid-range value). The drawdown effects are calculated based on abstraction from the [redacted] only and do not include effects of any other groundwater abstraction in this area.

Table 6.1: Estimated drawdown in neighbouring bores based on an abstraction rate of 1.1 L/s, representing the total annual volume sought by the applicant, taken over the entire year for both activities.

Well number	Distance from subject bore (m)	Depth of bore (m)	Drawdown (m) at 1.1 L/s for:		
			30 days	150 days	365 days
[redacted]	240	460	0.98	1.15	1.24
[redacted]	566	400	0.79	0.96	1.06
[redacted]	814	259	0.71	0.88	0.98
[redacted]	887	285	0.69	0.87	0.96
[redacted]	944	274.5	0.68	0.85	0.95

[13] Bay of Plenty Regional Council standard allocation of frost days equates to 15 days per year.

Table 6.2: Estimated drawdown in neighbouring bores based on an abstraction rate of 4.4 L/s, representing the total irrigation volume sought by the applicant, taken over the irrigation season.

Well number	Distance from subject bore (m)	Depth of bore (m)	Drawdown (m) at 4.4 L/s for:			
			1 day	7 days	30 days	100 days
[redacted]	240	460	2.43	3.27	3.89	4.41
[redacted]	566	400	1.69	2.52	3.15	3.67
[redacted]	814	259	1.38	2.21	2.84	3.35
[redacted]	887	285	1.31	2.18	2.77	3.29
[redacted]	944	274.5	1.25	2.08	2.71	3.23

Table 6.3: Estimated drawdown in neighbouring bores based on an abstraction rate of 3.3 L/s, representing the maximum daily irrigation volume sought by the applicant, taken over the irrigation season.

Well number	Distance from subject bore (m)	Depth of bore (m)	Drawdown (m) at 3.3 L/s for:			
			1 day	7 days	30 days	100 days
[redacted]	240	460	1.82	2.45	2.92	3.31
[redacted]	566	400	1.27	1.89	2.36	2.76
[redacted]	814	259	1.03	1.66	2.13	2.52
[redacted]	887	285	0.98	1.60	2.07	2.88
[redacted]	944	274.5	0.94	1.56	2.03	2.42

Table 6.4: Estimated drawdown in neighbouring bores based on an abstraction rate of 4.4 L/s, representing the total frost protection volume sought by the applicant, taken over the maximum continuous frost protection period.

Well number	Distance from subject bore (m)	Depth of bore (m)	Drawdown (m) at 4.4 L/s for:			
			1 day	7 days	11 days	15 days
[redacted]	240	460	2.43	3.27	3.46	3.60
[redacted]	566	400	1.69	2.52	2.72	2.85
[redacted]	814	259	1.38	2.21	2.41	2.54
[redacted]	887	285	1.31	2.18	2.33	2.47
[redacted]	944	274.5	1.25	2.08	2.28	2.41

The maximum projected drawdown from the proposed abstraction in the [redacted] is after 15 days of continuous abstraction at an equivalent rate of 4.4 L/s. This would result in a drawdown of 3.6 m in the closest bore, [redacted] as shown in Table 6.4 and represents a reduction in the available drawdown in that bore of approximately 1 % which is less than a minor effect. The drawdown effects in the other bores are less than the projected drawdown in [redacted] This predicted drawdown is an overly conservative estimate, because the frost protection activities are expected to be intermittent during the late winter and spring months and are unlikely to actually result in 15 continuous frost days.

The maximum projected drawdown after 100 days of irrigation at a rate of 380 m^3/d, representing a continuous abstraction at a rate of 4.4 L/s from the [redacted] would result in a drawdown of

4.41 m in the closest bore, [redacted] as shown in Table 6.3. This, again, represents a reduction in available drawdown in that bore of approximately 1.4 % which is less than a minor effect.

The maximum projected drawdown after 365 days of combined frost protection and irrigation, representing a continuous abstraction at a rate of 1.1 L/s from the [redacted] would result in a drawdown of 1.24 m in the closest bore, [redacted] as shown in Table 6.1. This represents a reduction in available drawdown in that bore of less than 0.5 % which is a negligible effect. In addition, it is not expected that the proposed abstractions for the frost protection measures or the horticultural irrigation would be continuous for either purpose.

6.3.3 Effects on regional groundwater quantity

The applicant's bore is inferred to be taking groundwater from the Waitеariki Ignimbrite aquifer and is located in the WAI2 Ignimbrite groundwater zone[6]. This zone has been identified by BOPRC to be a deep groundwater allocation zone. Table 6.5 summarises the available allocation flow of groundwater in the WAI3 Ignimbrite groundwater zone as at October 2016 and the impact on the allocation if the applicant is consented to take the proposed maximum rate of 10.5 L/s.

Table 6.5: Deep groundwater allocation for the WAI3 Ignimbrite groundwater zone[6] and the impact on allocation flow from the proposed take by the applicant.

Groundwater zone	Annual average recharge (L/s)	Allocable flow (L/s)	Allocated flow (L/s) 2016	Remaining allocation (L/s)	Annual rate sort by applicant (L/s)	Remaining allocation (L/s)
WAI2 Ignimbrite	2753	963.6	163.8	799.8	1.07	798.7

There is available allocation in terms of groundwater resources based on the proposed annual volume of 33,860 m^3. Overall any adverse effects of the groundwater take and use on groundwater quantity is expected to be no more than minor.

6.3.4 Effects on shallow ground and surface water resources

The source of the groundwater abstraction is from a confined aquifer[7]. Shallow groundwater and surface water resources are separated from the deeper confined aquifer by a significant thickness of overlying strata. Therefore, it is considered that there is no direct hydraulic connection between the shallow groundwater and surface water resources and the deeper aquifer. Surface waterbodies comprising a nearby unnamed watercourse and the Oturu Creek which flow at the along the southern and western property boundaries of [redacted] are therefore unlikely to be affected by pumping from the deep aquifer.

6.4 Surface water quality

The groundwater is taken from a depth of between 130 m and 318 m depth. As outlined above, the nearest surface water body is a nearby unnamed watercourse and the Oturu Creek which flow at the along the southern and western property boundaries of [redacted] It is considered that there is no direct hydraulic connection between the surface water resources and the deeper aquifer, therefore the surface water quality of the Oturu Creek will not be adversely affected as a result of the groundwater take.

6.5 Saline intrusion

Saline intrusion occurs when groundwater in an aquifer near the coast is replaced by seawater from the ocean. The Ghyben-Herzberg relation predicts that the depth below sea level to the saline interface is approximately 40 times the height of the freshwater table above sea level. This height is based on the assumption that the density of freshwater is 1,000 kg/m^3 and 1,025 kg/m^3 for seawater. This relation can be applied to confined aquifers by substituting the water table for the piezometric surface[14] and therefore is applicable to screening the potential for saline intrusion from pumping at the [redacted]

The [redacted] is located at an approximate elevation of 22 m amsl and the reported static groundwater level in this bore is 16.4 m below ground level (bgl). The nearest coastline, the [redacted] Estuary in Tauranga Harbour, is located approximately 1.2 km to the north of the [redacted] at the closest point.

By applying the simplified Ghyben-Herzberg approximation: $z = 40h$

Where z is the depth to the sea water interface and h is the head of water above mean sea level (5.6 m in this case), we estimate that the sea water interface to be 224 m below mean sea level i.e. approximately 246 m bgl at the [redacted] Groundwater in the [redacted] is taken from 130 m to 318 m bgl, therefore, this screened zone straddles the depth at which sea water interface is calculated and therefore, there is limited potential for saline intrusion to occur and sea water to migrate into the aquifer.

This assessment is supported by studies on the coastal groundwater around New Zealand[15]. The impacts of saline intrusion undertaken in the last 10 years have identified that (up to 2011) most of the evidence of saline intrusion has been limited to the shallow unconfined aquifers. The deepest bore impacted by saline intrusion is reported[15] to be 125 m depth.

Given the degree of hydraulic connection between the saline water of the Tauranga Harbour and the confined ignimbrite aquifer is limited on the basis of the significant thickness of separation between the two water bodies by the volcanic geology, the confined nature of the aquifer and the piezometric head reported to be above sea level, we consider saline intrusion is unlikely.

6.6 Cultural effects

Water is an important and valued natural resource and requires protection to maintain the intrinsic life force or mauri. The RNRP provides direction as to the requirement to main the biological and physical aspects of the mauri or life force of water under objective KT O6 and policy KT P11, in addition to direction to avoid, remedy or mitigate effects on water in policy KT P18 and engaging with tangata whenua in regard to resource use under objectives KT O4 and KT O16 and policies KT P5, KT P20, KT P13 and KT P14.

Tangata Whenua have been engaged with in regards to this application (email correspondence attached at Appendix G). The subject site is located within Pirirakau's rohe and therefore they have an interest in the area that is greater than other Tangata Whenua's interest. Therefore, we purposefully engaged with Pirirakau before any other Tangata Whenua to get an appreciation of the cultural effects of the proposal from their perspective. Pirirakau provided feedback on how cultural effects can be mitigated, and outlined that provided the mitigation measures are accepted and

[14] Hiscock, K.M. (2005). Hydrogeology – Principles and Practice.

[15] Pattle Delamore Partners Ltd (June 2011) New Zealand Guidelines for the monitoring and management of sea water intrusion risk on groundwater. Report ref: C02085500.

implemented as conditions of consent as a kaitiaki based mechanism they have no further comment in respect of the proposal.

The two mitigation measures suggested by Pirirakau in relation to the abstraction of water include measuring the volume taken (i.e. installation of a water meter) and implementing restrictions when the aquifer drops below unsustainable levels (i.e. trigger and response management).

In relation to this application, a water meter to measure the volume of water abstracted is already in place at the property, and ongoing water use monitoring is offered as a condition of consent by the applicant. Plan Change 9 identifies the use of triggers for water allocation restrictions as a management tool through Policy WQ P2(l), however, restrictions are not currently in place. A trigger and response condition is not considered to be appropriate in this instance as environmental trigger levels have not yet been set for the water management unit. There are inherent issues with applying a water level trigger restriction on a consent by consent basis. Primarily, there are fairness issues in requiring only some water abstractors to reduce their take based on a trigger while others are able to continue to abstract unimpeded. This ad hoc approach is also unlikely to meet overall water management objectives sought by BOPRC. Policy WQ P2 is not yet operative and further input is required from BOPRC to set appropriate triggers if this management option is taken forward.

Following engagement with Pirirakau, and agreement with their suggested mitigation measures, the balance of the Tangata Whenua that the BOPRC advised may have an interest in the application were engaged with. Ngati Maru, Ngati Pukenga, Ngati Ranginui, Ngati Tamatera, Ngai Te Rangi and Ngati Hinerangi were sent an email summarising the proposal, as well as the mitigation measures agreed with Pirirakau on the 5 July 2018 to seek their feedback, specifically to see if they wished to comment on the mitigation agreed with Pirirakau and/or any cultural effects in general.

Ngati Maru replied and outlined that they are not opposed to the application, and Ngati Pukenga replied and stated that the site is outside of their rohe. Ngati Ranginui, Ngati Tamatera, Ngai Te Rangi and Ngati Hinerangi have not responded to date (30/10/2018). The Tauranga Moana iwi (Ngati Ranginui and Ngai Te Rangi) who have not responded to date will not have done so as there is an understanding that Pirirakau have the greatest interest in the area, and will be handling the cultural effects of interest. Further, Ngati Ranginui are Pirirakau's iwi and there is a BOPRC approved Hapu Management Plan for Pirirakau that states Ngati Ranginui will not be involved in RMA issues in Pirirakau's rohe.

The Hauraki Tangata Whenua (Ngati Tamatera) that have not responded will not have done so as their interests lie with Te Awanui (Tauranga Harbour) (which is the foundation of their raupatu claim) rather than land and groundwater in the district. Ngati Hinerangi are a Tainui iwi and we assume that they are satisfied that Pirirakau have addressed the cultural effects.

The proposed water take is within the groundwater allocation limits set by the BOPRC. The proposed activity is not located within a waahi tapu area or site of significance to tangata whenua.

Given the above, and as the volume of water abstracted will be recorded it is considered that the cultural effects of the proposal have been identified and can be addressed through conditions of consent and BOPRC plan preparation processes. Any cultural effects of the proposal are therefore considered to be less than minor.

7 Statutory Assessment

7.1 RMA assessment

Section 104 of the RMA sets out the matters to which a consent authority must have regard to, subject to Part 2 of the RMA, when considering an application for resource consent. These are:

- Any actual and potential effects on the environment of allowing the activity (refer Section 6).
- Any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity.
- Any relevant provisions of:
  - A regional policy statement or proposed regional policy statement.
  - A plan or proposed plan.
- Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

7.1.1 Part 2 of the RMA

Part 2 of the RMA sets out the purpose and principles of the Act. The purpose of the RMA is to promote the sustainable management of natural and physical resources.

7.1.2 Section 5

Overall, the proposed groundwater take is considered to be a sustainable use of natural resources. While the drawdown in the bore is moderate, the way that groundwater will be used (i.e. discontinuous use) is unlikely to significantly adversely affect the ability of the bore to sustainably provide sufficient water to meet the applicant's demands.

The groundwater take will provide for the economic well-being of the applicant and kiwifruit industry. As such, the proposal accords with the purpose of the RMA.

7.1.3 Section 6

Regard has been given to:

- The relationship of Maori and their culture and traditions with ancestral land, water, waahi tapu and other taonga.
- The applicant has engaged with Tangata Whenua. Pirirakau have indicated two conditions in relation to measuring the volume of water being taken and a trigger and response condition is applied.

Cultural effects are discussed in Section 6.6. Email correspondence undertaken has been attached at Appendix G.

7.1.4 Section 7

Regard has been given to:

- The efficient use and development of natural and physical resources.
- The intrinsic values of ecosystems.
- Any finite characteristics of natural and physical resources.

Matters relating to the allocation of natural resource, surface water quality and the finite characteristics of natural resources are addressed through the objectives, policies and rules of the RNRP. Assessment of the potential drawdown effects on the groundwater resource have been considered in relation to the proposed activity.

7.1.5 Section 8

There is nothing encompassed within the proposal which is contrary to the principles of Te Tiriti o Waitangi.

7.1.6 NES for Sources of Human Drinking Water

The National Environmental Standard for Sources of Human Drinking Water (NES Drinking Water) came into effect on 20 June 2008. This NES is intended to reduce the risk of contaminating drinking water sources such as rivers and groundwater. It sets out to achieve this by requiring regional councils to consider the effects of activities on drinking water sources in their decision making. Before the NES came in to effect, there was no explicit legislative requirement to consider the effects of activities on sources of human drinking water. The gap in legislation, which left community water sources potentially vulnerable to contamination, is being filled by the NES Drinking Water.

The standards under the NES apply to activities that have the potential to affect registered drinking water supplies. This application is to take groundwater only (no discharge) therefore the risk of contamination of groundwater and subsequent effects on drinking water is low. On this basis potential effects of the proposed change of conditions on registered drinking water supplies in no more than minor.

7.1.7 National Policy Statement for Freshwater Management

The NPS for Freshwater Management came into effect in August 2014 and was updated in August 2017 to incorporate amendments from the *National Policy Statement for Freshwater Amendment Order 2017*. It contains objectives and policies relating to the management of the water quality of freshwater. It directs regional councils to establish objectives and set quality and quantity limits for freshwater management units and identify values that the communities hold for the water in those areas.

The relevant objectives and policies of the NPS in regards to the proposed change of conditions are assessed in Table 7.1.

Table 7.1: Objectives and policies assessment (NPS Freshwater)

Objective / Policy	Comment
Objective B2 *To avoid any further over-allocation of fresh water and phase out existing over-allocation.*	The proposed groundwater take is within the existing allocation limits for the area. The groundwater catchment is not over allocated. A duration of 15 years is sought. The proposed take is an efficient allocation based on a calculated irrigation application. Groundwater is taken on an intermittent basis when required during the consented period for irrigation and frost protection use. The proposed abstraction will enable a productive economic opportunity to continue, which has positive implications for the applicant community and local economy.
Objective B3 *To improve and maximise the efficient allocation and efficient use of water.*	
Objective B5 *To enable communities to provide for their economic well-being, including productive economic opportunities, in sustainably managing fresh water quantity, within limits.*	

Based on our assessment above, it is considered that the proposed works are consistent with the objectives of the NPS Freshwater Management.

7.1.8 Bay of Plenty Regional Policy Statement

The Bay of Plenty Regional Policy Statement (RPS) is a strategic document which provides an overview of the major resource management issues and set out the direction for managing the use, development and protection of the natural and physical resources of the region.

Objective	Policy	Comment
Objective 15 Water, land, coastal and geothermal resource management decisions have regard to iwi and hapu resource management planning documents.	Policy IW 4B Taking into account iwi and hapu resource management plans. Policy IW 6B Encouraging tangata whenua to identify measures to avoid, remedy or mitigate adverse cultural effects.	As outlined within Section 7.2.1 the proposal is considered to be consistent with the objectives in the relevant iwi and resource management plans.
Objective 17 : The mauri of water, land, air and geothermal resources is safeguarded and where it is degraded, where appropriate, it is enhanced over time.	Policy IW 5B Adverse effects on matters of significance to Maori. Policy IW 6B Encouraging tangata whenua to identify measures to avoid, remedy or mitigate adverse cultural effects. Policy IW 2B Recognising matters of significance to Maori. Policy WQ 3B Allocating water.	Water is acknowledged as taonga and of holding importance to tangata whenua. As outlined within Section 6.6 Tangata Whenua have been engaged with regarding the proposal. In so far as tangata whenua are concerned, Pirirakau have the greatest interest in the area. Feedback from Pirirakau was that cultural effects can be mitigated through the installation of a water meter to record the water take. As abovementioned, the applicant has a water meter in place already, and ongoing water monitoring is offered by the applicant as a condition of consent. As discussed, further development by the BOPRC is required in relation to trigger and response conditions. We then summarised the proposal and the mitigation measures agreed on with Pirirakau to the other Tangata Whenua who BOPRC advised may have an interest in the application to seek their feedback. No other cultural effects or mitigation measures were raised. Given the above, Tangata Whenua have been involved with identifying any cultural effects or matters of significance to them in regards to the proposal and

		identifying mitigation measures to address these effects.
Objective 30: The quantity of available water: (a) Provides for a range of uses and values. (b) Is allocated and used efficiently. (c) Safeguards the mauri and life supporting capacity of water bodies. (d) Meets the reasonably foreseeable needs of future generations.	Policy GR 3A: Providing for the sustainable use of geothermal resources: Provide for the sustainable use of geothermal systems, by requiring that development and use within a geothermal system: (a) May occur only if: (i) Such use is consistent with the management purposes for each system defined in the Bay of Plenty Regional Council geothermal system classification described in Table 12. (ii) The system is operated under a system management plan covering the entire geothermal system where the cumulative abstractive development uses 1000 tonnes or more geothermal water per day; and (b) Has regard to: … (v) Demonstrating efficiency of use of the geothermal energy and water resource.	The proposed abstraction is within the limits set by BOPRC. The testing carried out is based on continuous use and is considered to be conservative. The actual use will be for frost protection and irrigation on an as required basis. Overall the proposed abstraction is considered to meet Objective 30 and Policy WQ2A of the RPS.

Overall, the proposed activity is consistent with the objectives and policies of the Bay of Plenty Regional Policy Statement.

7.1.9 Regional Natural Resources Plan assessment

An assessment of the proposal against the relevant objectives and policies contained within the Regional Natural Resource Plan is provided in Table 7.2. This assessment incorporates changes under PC9 as all plan changes affecting water quality have effect when notified under Section 86B of the Resource Management Act. PC9 was notified October 2016.

The proposal is considered to be consistent with the relevant objectives and policies of the Regional Natural Resources Plan.

Table 7.2: Regional Natural Resources Plan and Plan Change 9 objectives and policies assessment

Objective/Policy	Comment
Objective 43 Abstraction of groundwater at a volume and rate that does not: (a) Permanently or unsustainably lower water levels or decrease groundwater quality in aquifer systems.	The groundwater allocation regime set by the RNRP takes into account the sustainability of groundwater. The allocation regime and recharge capability supports the proposed groundwater take without having adverse effects on groundwater levels. Shallow groundwater and surface water resources are separated from the deeper confined aquifer by a significant thickness of overlying strata. Therefore, it

Objective/Policy	Comment
(b) Permanently or unsustainably lower water levels in streams or rivers where groundwater and surface water bodies are linked.	is considered that there is no direct hydraulic connection between the shallow groundwater and surface water and the deeper aquifer.
<u>*Objective WQ O4*</u> *Manage the allocation and abstraction of groundwater at a volume and rate that does not:* *(a) Result in a sustained decline in groundwater levels.* *(b) Permanently or unsustainably lower water levels in streams or rivers where groundwater and surface water bodies are linked to an extent that is contrary to WQ O3.* *(c) Adversely affect groundwater quality in aquifer systems, including taking into account the risk of saltwater intrusion.* *(d) Cause the mixing of water between different aquifers where those aquifers are not naturally connected.*	The allocation regime takes into account available groundwater and hydraulically connected surface water catchment. The proposed abstraction volume is within the existing allocation amount and the deep confined groundwater is not considered to be hydraulically connected with the surface water. Saline intrusion is unlikely to pose an issue due to confining layers and separation depth. The proposed abstraction will not result in the mixing of water between aquifers that are not naturally connected.
<u>Objective 45</u> Water abstractions account for water availability limitations during drought events. <u>*Objective WQ O6*</u> *The potential adverse effects of water abstraction during low surface flows or low aquifer levels are avoided or mitigated to an acceptable level.*	The allocation regime allows for the proposed groundwater take without having adverse effect on groundwater levels.
<u>Objective 46</u> Adequate flows are restored to rivers, streams including individual reaches where allocation or diversion causes water flow to be at or below the Instream Minimum Flow Requirements set in Schedule 7. <u>*WQ O8*</u> *Decision-making and allocation of freshwater water resources in the Bay of Plenty recognises the:* *(a) Social benefits from the use of water for domestic, marae, or municipal water supply, including in particular essential drinking and sanitation requirements.* *(b) Social, economic and cultural benefits that existing water takes contribute, which is often associated with significant investment.* *(c) Social, economic and cultural benefits that new water takes can provide.* <u>*Policy WQ P9*</u> *To integrate the management of groundwater and surface water resources to:*	The proposed abstraction is not hydraulically connected to surface water. The proposed consent will allow the applicant to continue the operation of the kiwifruit orchard, thus providing for the social and economic wellbeing of the applicant and local community through ongoing income and employment. The proposed abstraction also links to significant investment made by the kiwifruit industry which flows into positive outcomes on a social and economic level. Shallow groundwater and surface water resources are separated from the deeper confined aquifer by a

Objective/Policy	Comment
(a) Recognise the interrelationship between adjoining bodies of water. *(b) Manage abstraction from aquifers that have a direct or partial connection to surface water.* *(c) Avoid adverse impacts from the abstraction of groundwater on associated values and uses of linked surface water.* *(d) Support freshwater accounting.*	significant thickness of overlying strata. Therefore, it is considered that there is no direct hydraulic connection between the shallow groundwater and surface water and the deeper aquifer.
KT O6 *Maintain the biological and physical aspects of the mauri of water, land and geothermal resources; and where practicable achieve the ongoing improvement of the biological and physical aspects of the mauri where it has been degraded, as it relates to:* *(a) Water quality meeting the specified water quality classifications.* *(b) Water flows not breaching the instream minimum flow requirements.* *…* *KT P11* *To recognise and provide for the mauri of water, land and geothermal resources when assessing resource consent applications.*	The biological and physical aspects of the mauri of water are to be maintained. The groundwater take is not a geothermal resource from the [redacted] and the deeper aquifer is sufficiently separated through the presence of a confining strata layer. Therefore, it is considered there is no hydraulic connection between the proposed abstraction and nearby surface water bodies (unnamed tributary to the Oturu Creek and the Oturu Creek). These surface water bodies are unlikely to be affected by pumping from the deep aquifer. The proposed activity meets Objective KT O6 and Policy KT P11.
KT O4 *The water, land and geothermal concerns of tangata whenua are taken into account and addressed as part of resource management processes, while recognising that different iwi and hapu may have different concerns or practices.* *KT P5* *To ensure that resource management issues of concern to tangata whenua are taken into account and addressed, where these concerns are relevant and within the functions of the Regional Council.*	As outlined within Section 6.6 Tangata Whenua have been engaged with regarding the proposal. Pirirakau have the greatest interest in the area, and therefore we firstly engaged with Pirirakau. Feedback from Pirirakau was that cultural effects can be mitigated through the installation of a water meter to record the water take, and water take volumes are reduced in the event groundwater drops below unsustainable levels (i.e. a trigger and response condition is applied). As abovementioned, the applicant has a water meter in place already, and ongoing water monitoring is offered by the applicant as a condition of consent. We then summarised the proposal and the mitigation measures agreed on with Pirirakau to the other Tangata Whenua who BOPRC advised may have an interest in the application to seek their feedback. No other cultural effects or mitigation measures were raised. Given the above, Tangata Whenua have been involved with identifying any cultural effects or matters of significance to them in regards to the proposal and identifying mitigation measures to address these effects.

Objective/Policy	Comment
KT O7 *The extent of the spiritual, cultural and historical values of water, land and geothermal resources (including waahi tapu, taonga and sites of traditional activities) to tangata whenua are identified.* *KT O16 (Objective 16)* *To recognise that different iwi and hapu may have different water, land and geothermal resource management concerns, practices and management methods.* *KT P18* *To avoid, remedy or mitigate adverse effects on water, land and geothermal resources or sites of spiritual, cultural or historical significance to tangata whenua, where these resources and sites have been identified by tangata whenua.* *KT P20* *To assess effects of proposed development activities on the cultural and historic values and sites of water, land and geothermal resources in consultation with tangata whenua.*	Tangata Whenua have not identified any waahi tapu, taonga or sites of traditional activities at the subject site. See comments in response to KT O4 and KT P5 above.
KT I5 *Consultation with tangata whenua on water, land and geothermal issues may not be occurring to the extent tangata whenua consider necessary to recognise and provide for the status Maori have under the Act.* *KT P13 (Policy 13)* *To advise and encourage resource consent applicants to consult directly with tangata whenua where it is necessary to identify their relationships of Maori and their culture and traditions with their ancestral lands, waters, sites, waahi tapu and other taonga, and the actual and potential adverse effects of proposed activities on that relationship.* *KT P14 (Policy 14)* *To consult tangata whenua on water, land and geothermal resource management issues according to the requirements of the Act, tikanga Maori methods of consultation, and in a manner consistent with case law*	Tangata whenua whose rohe the application site is located within (Pirirakau) as well as other Tangata Whenua who may have an interest in the application as advised by BOPRC have been engaged during the preparation of this application and feedback sought in relation to the proposed activity. See comments in response to KT O4 and KT P5 above.

7.1.10 Regulations

The Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 apply to resource consents allowing fresh water to be taken at a rate of 5 L/s or more. Given that the maximum rate of abstraction sought is 10.5 L/s, these regulations will apply and monitoring of water use through the course of the consent, if granted, will be undertaken.

7.2 Other matters

7.2.1 Iwi management plans

The Iwi Management Plans relevant to the site are:

- Pirirakau Hapu Management Plan.
- Ngati Pukenga Iwi Ki Tauranga Trust Iwi Management Plan.

The proposal is considered to be consistent with the relevant objectives of the Pirirakau Hapu Management Plan and Ngati Pukenga Iwi Ki Tauranga Trust Iwi Management Plan as the mauri of the groundwater aquifer will be maintained as far as possible within [redacted] and Pirirakau and Ngati Pukenga have been engaged with and involved in the resource management process. Their relationship to the land and groundwater resource has been acknowledged through the RNRP and PC9.

7.3 Notification assessment

7.3.1 Public notification

Section 95A identifies a four step process as outlined in Table 7.2. Based on this assessment, we consider that this proposal meets the tests of the RMA to be processed without public notification

Table 7.2: Section 95A public notification steps

Step	Section 95A	Comment
Step 1 - mandatory public notification pursuant to section 95A(2):	The application meets the criteria set out in section 95A(3): (a) The applicant does not request public notification of the application. (b) n/a. (c) The application is/is not made jointly with an application to exchange recreation reserve land.	Public notification is not mandatory under Step 1.
Step 2 - public notification precluded pursuant to section 95A(4):	Rule 43 of the Regional Natural Resources Plan does not preclude public notification of the groundwater take activity.	Public notification is not precluded under Step 2.

Step	Section 95A	Comment
Step 3 - public notification required pursuant to section 95A(7):	The application meets the criteria set out in section 95A(8): (a) There is no rule or national environmental standard that requires public notification of this application. (b) An assessment of effects on the environment is provided in Section 6 of this AEE report. This assessment concludes that the adverse effects on the environment are likely to be minor.	Public notification is not required under Step 3.
Step 4 - public notification in special circumstances pursuant to section 95A(9)	No special circumstances are considered to exist in relation to the application.	In accordance with section 95A(9)(b), the application should not be publicly notified. Limited notification under section 95B is considered in Section 7.2.3.

7.3.2 Limited notification

For applications that are not publicly notified, under section 95B, the consent authority must determine whether to give limited notification of an application to any affected parties. Section 95B identifies a four step process. Comment against each of these steps is made in Table 7.3 below.

Table 7.3: Section 95B limited notification steps

Step	Section 95B	Comment
Step 1: certain affected groups and affected persons must be notified	The application is not for an accommodated activity and there are no affected customary marine title groups (the activity is land based).	Limited notification is not required under step 1.
Step 2: if not required by step 1, limited notification precluded in certain circumstances	Rule 43 of the Regional Natural Resources Plan does not preclude limited notification of the groundwater take activity.	Limited notification is not precluded under Step 2.
Step 3: if not precluded by step 2, certain other affected persons must be notified.	Section 95E states that a consent authority must consider a person to be an affected person if the activity's adverse effects on the person are minor or more than minor. Having regard to the above requirements, the following persons are considered to be potentially adversely affected by the application: Tangata Whenua.	A consent authority must not consider a person affected if they have provided written approval to the activity. Accordingly, the applicant has canvassed the potentially adversely affected parties to seek their feedback on the proposal. Therefore, limited notification is not required under Step 3.
Step 4: further notification in special circumstances	No special circumstances are considered to exist in relation to the application.	Limited notification is not required under Step 4.

7.3.3 Section 95 conclusions

The activity is likely to have less than minor adverse effects on the environment and Tangata Whenua are being engaged with in regards to the proposal. Consultation has occurred with Pirirakau and the iwi/hapu identified in Section 6.6. Feedback received to date has been provided in Appendix G. Any further feedback received will be provided to BOPRC. The assessment against Section 95 in relation to notification tests indicate the application is not required to be publicly or limited notified.

8 Conclusion

In summary, the proposed take and use of the groundwater for irrigation and frost protection for the applicant's kiwifruit orchard is considered to be an appropriate and efficient use of groundwater.

This AEE report draws the following conclusions;

- The works are consistent with Part 2 of the Resource Management Act 1991.
- The works are consistent with the relevant objectives and policies of the Bay of Plenty Regional Policy Statement and Regional Natural Resources Plan.
- Effects on other users are no more than minor, based on the drawdown effect.
- Cumulative effects are no more than minor, given the intermittent use proposed and the available allocation within the groundwater zone.
- The production bore takes water from the confined aquifer. Surface water and shallow groundwater are separated by a significant thickness of overlying strata. It is considered that there is no direct hydraulic connection between the shallow groundwater and surface water and the deeper aquifer. Any potential effects on surface water are likely to be less than minor.

Accordingly, we respectfully request that this resource consent application be granted on a non-notified basis, subject to fair and reasonable conditions. We would appreciate the opportunity to comment on draft conditions prior to any consent being granted.

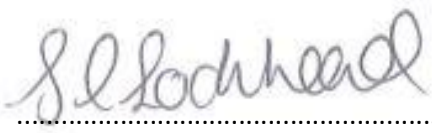
9 Applicability

This report has been prepared for the exclusive use of our client [redacted] with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



.....

Sally Lochhead
Hydrogeologist

.....

Jess Bould
Planner

Authorised for Tonkin & Taylor Ltd by:

.....

Peter Cochrane
Project Director

8-Nov-18

[redacted]

Appendix A: Consent Application Forms

BAY OF PLENTY REGIONAL COUNCIL
TOI MOANA

PO Box 364, Whakatāne 3158
0800 884 880
0800 884 882
info@boprc.govt.nz
www.boprc.govt.nz

File ref:			
	SEEN		SEEN
Office use only			

Application for a Resource Consent – Resource Management Act 1991 (s.88)

5B Water Consent Application (s.14) - Take Groundwater

Before you make an application it is recommended that you talk or meet with a Consents Officer to discuss it. A Consents Officer may also be able to undertake a site visit to provide further advice.

If you would like to arrange this, please phone 0800 884 880.

If you are applying for more than one activity and you have already completed the basic details in Part 1 on another form, go straight to Part 2 of this form.

See notes to Applicant (last pages of form) before proceeding with application form.

Water take, diversion and/or damming activities are subject to rules in the Regional Water and Land Plan. In addition activities within the Tarawera River Catchment may be subject to the Tarawera River Catchment Plan.

These plans can be found on our website http://www.boprc.govt.nz/knowledge-centre/plans/.

Please be aware that Plan Change 9 to the Regional Water and Land Plan has been notified. This plan change relates to the policies and rules which govern the allocation of water and now has legal effect when considering applications to take and use water.

Proposed policy WQ P10 directs Council to **generally decline** applications to take and use surface water or groundwater, where the water resource is allocated above the limits identified in, WQ P5 unless the application is:

(a) A renewal of an existing authorised take that is:

(i) At the same or lesser rate and volume of take; and

(ii) Assessed as a reasonable and efficient rate and volume of take; or

(b) For the harvesting of surface water under WQ P6; or

(c) For secondary allocable flow under WQ P8(a); or

(d) Supported by a detailed assessment of environmental effects which demonstrates:

(i) That the proposed take is reasonable, efficient and will meet WQ O3 or WQ O4;

(ii) Consideration has been given to alternative water supplies, rates of take and timing of take;

(iii) Water conservation measures are proposed for times of low water flows or aquifer levels; and

(iv) The extent to which the proposed take will result in social, economic, cultural or ecological benefits.

The plan change can be found on our website;
http://www.boprc.govt.nz/environment/water/freshwater-futures/water-quantity-plan-change/

Please contact a Consent Officer to determine the allocation status which applies to your location and discuss the information requirements which apply to your application.

Reviewing and understanding the rules and assessment criteria applicable to your activity will assist you with preparation of your assessment of environmental effects.

Which rules of the above plan(s) are applicable for your activity?

What is the activity status of your consent application?

☐ Controlled

☐ Restricted Discretionary

✓ Discretionary

If you need assistance determining which rules and activity statuses are applicable for your activity please call 0800 884 880 and ask to speak to the Duty Consents Officer for guidance.

Under Section 88 of the Resource Management Act 1991, the undersigned makes this application for resource consent(s).

PART 1

1 **Full name of applicant(s)** *(the name that will be on the consent)*

Surname:

First names:

OR

If the application is being made on behalf of a trust, the Trustees must be named.

Trust name:

Trustees' name:

OR

Appendix B: Certificate of Title

Appendix C: [redacted]

Appendix D: Pumping Test Data

Appendix E: Pumping Test Analysis

Tonkin & Taylor Ltd
105 Carlton Gore Road
Newmarket
Auckland 1033

Pumping Test - Water Level Data

Project: [redacted]

Number: 1006981

Client: SMRS Ltd

Location: [redacted]	Pumping Test: Pumping Test 1	Pumping Well: [redacted]
Test Conducted by: SMRS Ltd	Test Date: 21/05/2018	Discharge: variable, average rate 907.2 [m³/d]
Observation Well: [redacted]	Static Water Level [m]: 16.40	Radial Distance to PW [m]: -

	Time [s]	Water Level [m]	Drawdown [m]
1	0	16.40	0.00
2	0.5	29.142	12.742
3	1	34.505	18.105
4	1.5	36.43	20.03
5	2	36.906	20.506
6	2.5	37.583	21.183
7	3	37.913	21.513
8	3.5	38.469	22.069
9	4	38.072	21.672
10	4.5	37.839	21.439
11	5	37.815	21.415
12	5.5	38.256	21.856
13	6	38.103	21.703
14	6.5	38.40	22.00
15	7	38.222	21.822
16	7.5	38.222	21.822
17	8	38.488	22.088
18	8.5	38.275	21.875
19	9	38.032	21.632
20	9.5	38.556	22.156
21	10	38.677	22.277
22	11	38.909	22.509
23	12	38.717	22.317
24	13	38.969	22.569
25	14	39.373	22.973
26	15	39.105	22.705
27	16	39.233	22.833
28	17	39.484	23.084
29	18	38.90	22.50
30	19	39.379	22.979
31	20	39.527	23.127
32	22	39.579	23.179
33	24	39.177	22.777
34	26	39.703	23.303
35	28	39.621	23.221
36	30	39.581	23.181
37	35	40.005	23.605
38	40	39.502	23.102
39	45	39.357	22.957
40	50	39.659	23.259
41	55	39.155	22.755
42	60	39.412	23.012
43	65	39.048	22.648
44	70	39.356	22.956
45	75	39.251	22.851
46	80	39.504	23.104
47	85	39.537	23.137
48	90	38.928	22.528
49	95	39.382	22.982
50	100	39.66	23.26
51	120	39.305	22.905
52	140	40.164	23.764
53	160	39.752	23.352
54	180	40.149	23.749
55	210	40.069	23.669
56	240	40.131	23.731
57	270	40.652	24.252

Tonkin & Taylor Ltd
105 Carlton Gore Road
Newmarket
Auckland 1033

Pumping Test - Water Level Data

Project: [redacted]

Number: 1006981

Client: SMRS Ltd

	Time [s]	Water Level [m]	Drawdown [m]
58	300	40.573	24.173
59	360	40.527	24.127
60	420	41.149	24.749
61	480	40.876	24.476
62	540	41.233	24.833
63	600	41.277	24.877
64	900	42.361	25.961
65	1200	41.819	25.419
66	1440	41.987	25.587

Tonkin & Taylor Ltd
105 Carlton Gore Road
Newmarket
Auckland 1033

Pumping Test - Discharge Data

Project: [redacted]

Number: 1006981

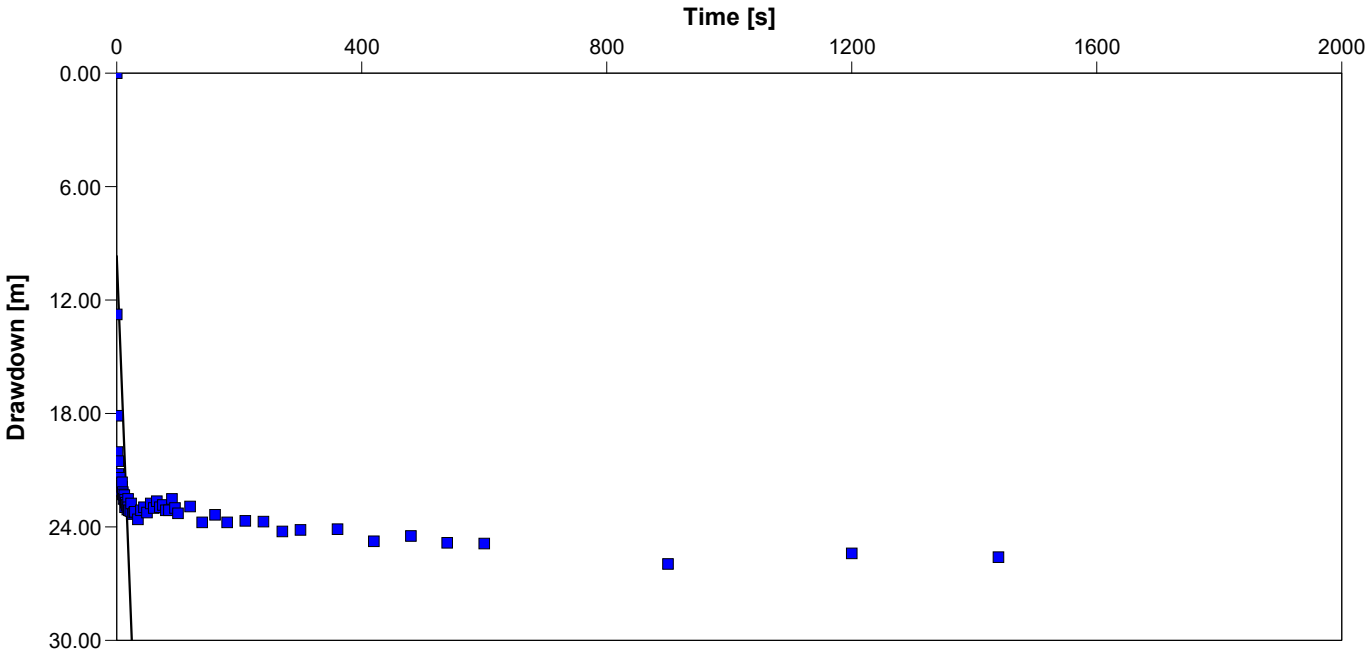
Client: SMRS Ltd

Location: [redacted]	Pumping Test: Pumping Test 1	Pumping Well: [redacted]
Test Conducted by: SMRS Ltd	Test Date: 21/05/2018	Discharge: variable, average rate 907.2 [m³/d]
Observation Well: [redacted]		Radial Distance to PW [m]: -

	Time [s]	Discharge [m³/d]
1	1440	907.20
2	2880	0.00

Tonkin & Taylor Ltd 105 Carlton Gore Road Newmarket Auckland 1033	**Pumping Test Analysis Report** Project: [redacted] Number: 1006981 Client: SMRS Ltd

Location: [redacted]	Pumping Test: Pumping Test 1	Pumping Well: [redacted]
Test Conducted by: SMRS Ltd		Test Date: 21/05/2018
Analysis Performed by:	Excludes first 5 mins	Analysis Date: 21/05/2018
Aquifer Thickness:	Discharge: variable, average rate 907.2 [m³/d]	

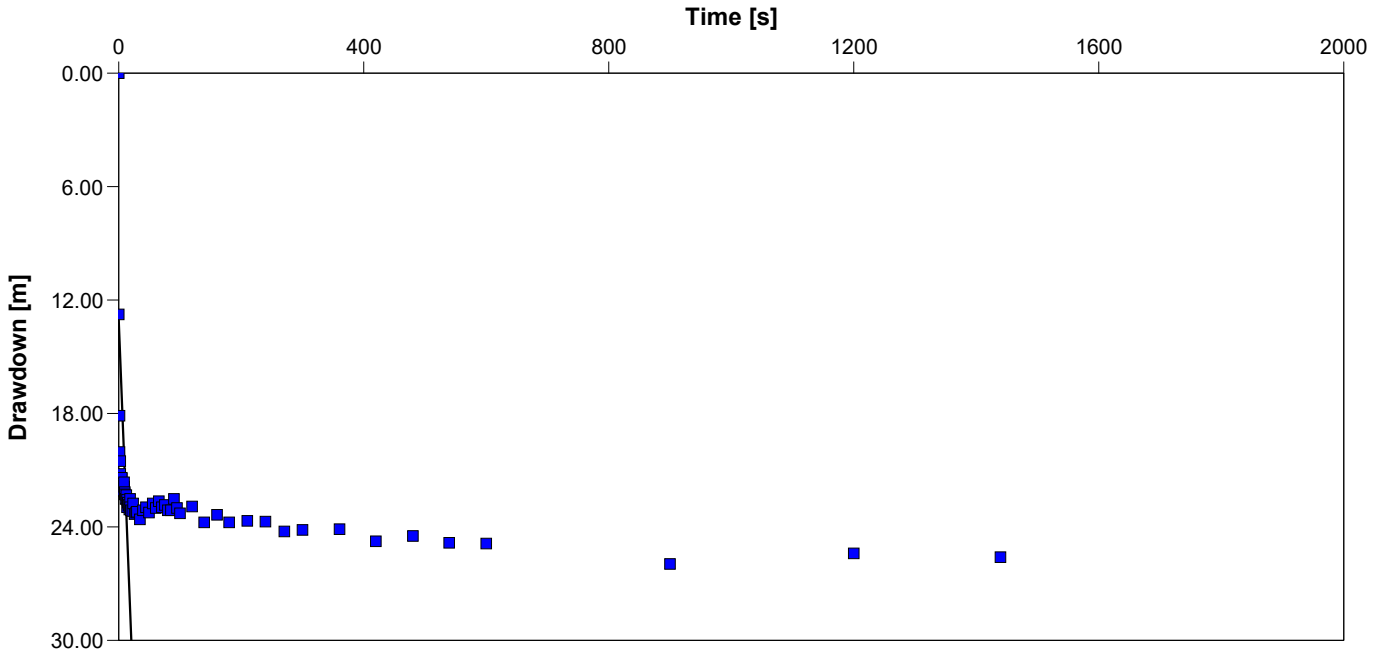


Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Storage coefficient	Radial Distance to PW [m]	
[redacted]	1.22×10^2		0.05	

Tonkin & Taylor Ltd 105 Carlton Gore Road Newmarket Auckland 1033	**Pumping Test Analysis Report** Project: [redacted] Number: 1006981 Client: SMRS Ltd

Location: [redacted]	Pumping Test: Pumping Test 1	Pumping Well: [redacted]
Test Conducted by: SMRS Ltd		Test Date: 21/05/2018
Analysis Performed by:	All data	Analysis Date: 21/05/2018
Aquifer Thickness:	Discharge: variable, average rate 907.2 [m³/d]	



Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Storage coefficient	Radial Distance to PW [m]	
[redacted]	8.85×10^{1}		0.05	

Tonkin & Taylor Ltd **105 Carlton Gore Road** **Newmarket** **Auckland 1033**	**Pumping Test Analysis Report**
	Project: [redacted]
	Number: 1006981
	Client: SMRS Ltd

Location: [redacted]	Pumping Test: Pumping Test 1	Pumping Well: [redacted]
Test Conducted by: SMRS Ltd		Test Date: 21/05/2018
Aquifer Thickness: NAN m	Discharge: variable, average rate 907.2 [m³/d]	

	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [m²/d]	S
1	Excludes first 5 mins		21/05/2018	Cooper & Jacob I	[redacted]	1.22×10^{2}	
2	All data		21/05/2018	Cooper & Jacob I	[redacted]	8.85×10^{1}	
					Average	1.05×10^{2}	

Appendix F: Effects on Groundwater Users

Drawdown Calculations

Notes

1. This workbook calculates drawdown vs time and drawdown vs distance for radial flow to a well under confined or leaky conditions. If the Leakage coefficient (B) is defined the Hantush-Jacob function is used; otherwise calculations are done using the Theis function.

2. Values in the colour shaded cells can be updated by the user; all other cells are protected. Data entry cells are validated e.g. Storativity (S) must be between 0 and 1.0

3. Units of transmissivity (T) and pumping rate (Q) can be selected.

4. The plotted curves are colour coded to indicate the time (or drawdown) option

Disclaimer

Acknowledgement

This workbook uses Visual Basic functions supplied by Dr Bruce Hunt (University of Canterbury, Christchurch, New Zealand).

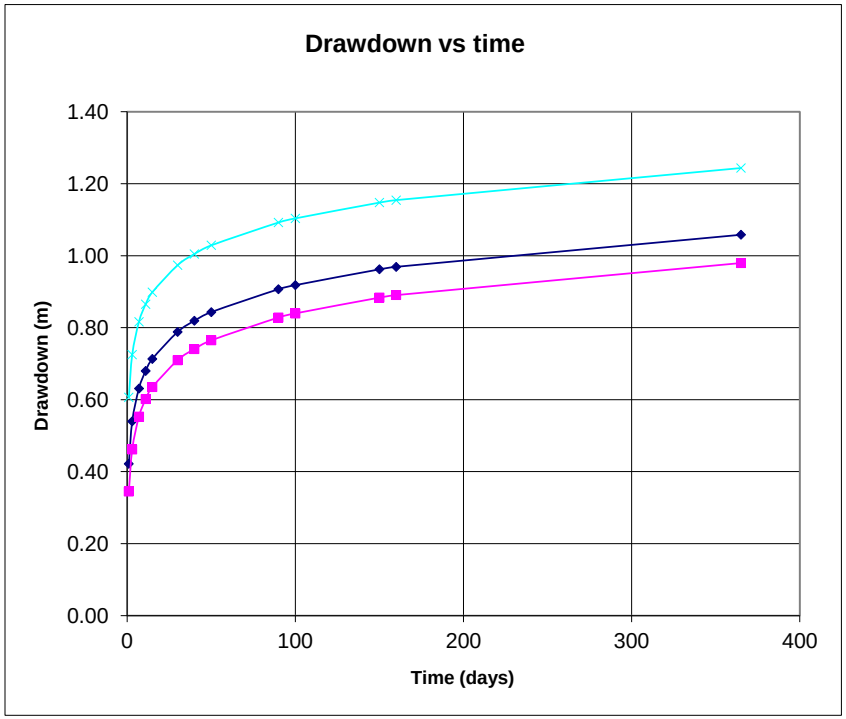
David Scott
Environment Canterbury
February 14, 2001
Ph: +64 3 365 3828
Email: david.scott@ecan.govt.nz

Drawdown Estimate in the confined Ignimbrite Aquifer at a pumping rate of 1.1 L/s

Time-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	1.00E-05	
B		
Pumping rate		
Q	1.1	l/s

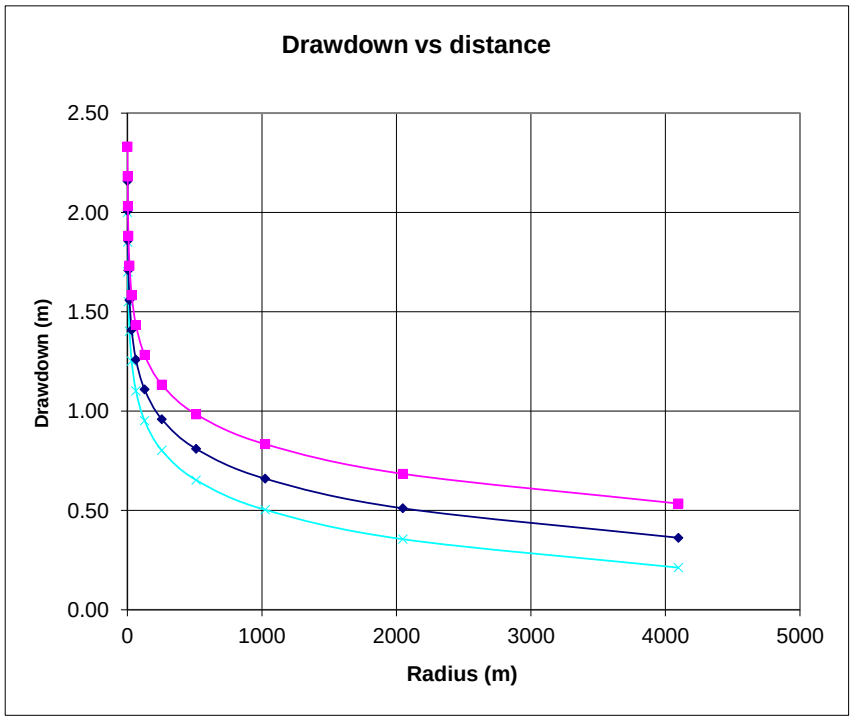
Radius (m)	240	566	814
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	0.606	0.422	0.345
3	0.725	0.540	0.462
7	0.816	0.631	0.553
11	0.865	0.680	0.601
15	0.899	0.713	0.635
30	0.974	0.788	0.710
40	1.005	0.819	0.741
50	1.029	0.843	0.765
90	1.092	0.907	0.828
100	1.104	0.918	0.840
150	1.147	0.962	0.884
160	1.154	0.969	0.890
365	1.243	1.058	0.980



Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	0.00001	
B		
Pumping rate		
Q	1.1	l/s

Time (days)	7	30	150
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	2.001	2.158	2.332
2	1.851	2.008	2.182
4	1.701	1.858	2.032
8	1.551	1.708	1.882
16	1.401	1.559	1.733
32	1.252	1.409	1.583
64	1.102	1.259	1.433
128	0.952	1.109	1.283
256	0.802	0.960	1.133
512	0.653	0.810	0.984
1024	0.503	0.660	0.834
2048	0.355	0.511	0.684
4096	0.212	0.363	0.535

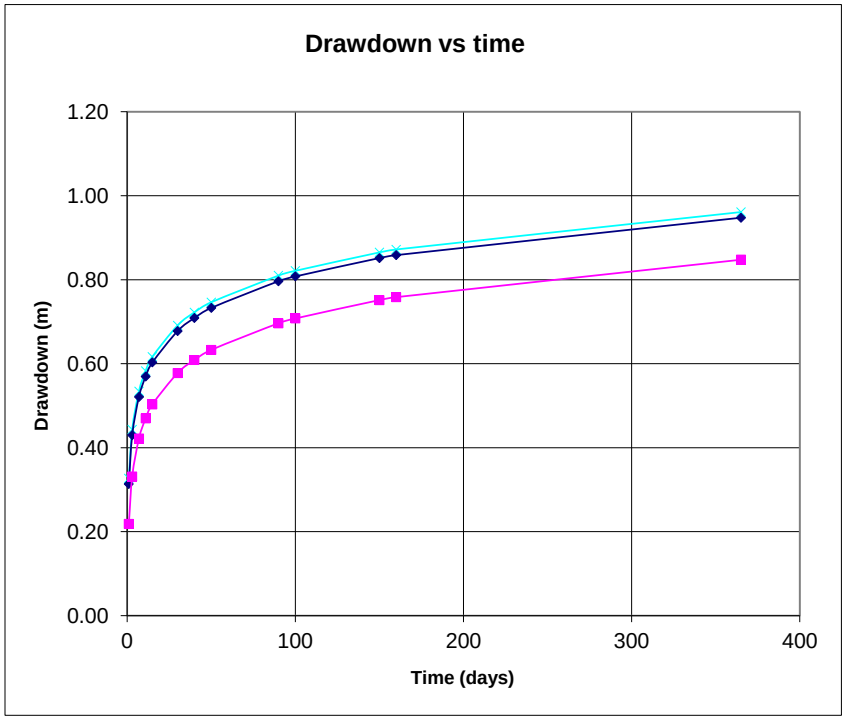


Drawdown Estimate in the confined Ignimbrite Aquifer at a pumping rate of 1.1 L/s

Time-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	1.00E-05	
B		
Pumping rate		
Q	1.1	l/s

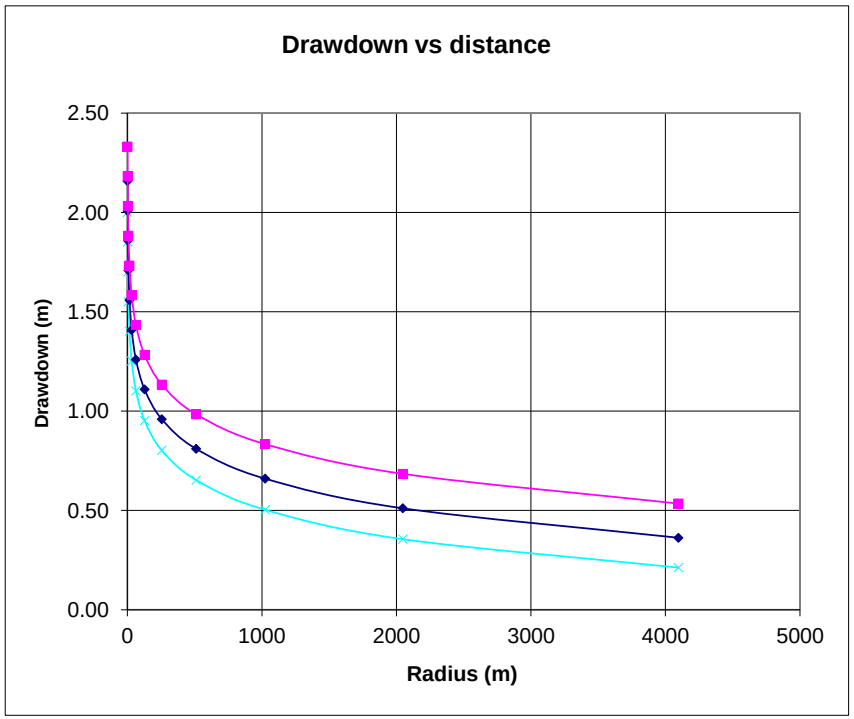
Radius (m)	887	944	1500
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	0.327	0.314	0.219
3	0.443	0.430	0.332
7	0.534	0.521	0.422
11	0.583	0.570	0.470
15	0.616	0.603	0.503
30	0.691	0.678	0.578
40	0.722	0.709	0.609
50	0.746	0.733	0.633
90	0.810	0.796	0.696
100	0.821	0.808	0.708
150	0.865	0.852	0.751
160	0.872	0.858	0.758
365	0.961	0.948	0.848



Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	0.00001	
B		
Pumping rate		
Q	1.1	l/s

Time (days)	7	30	150
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	2.001	2.158	2.332
2	1.851	2.008	2.182
4	1.701	1.858	2.032
8	1.551	1.708	1.882
16	1.401	1.559	1.733
32	1.252	1.409	1.583
64	1.102	1.259	1.433
128	0.952	1.109	1.283
256	0.802	0.960	1.133
512	0.653	0.810	0.984
1024	0.503	0.660	0.834
2048	0.355	0.511	0.684
4096	0.212	0.363	0.535

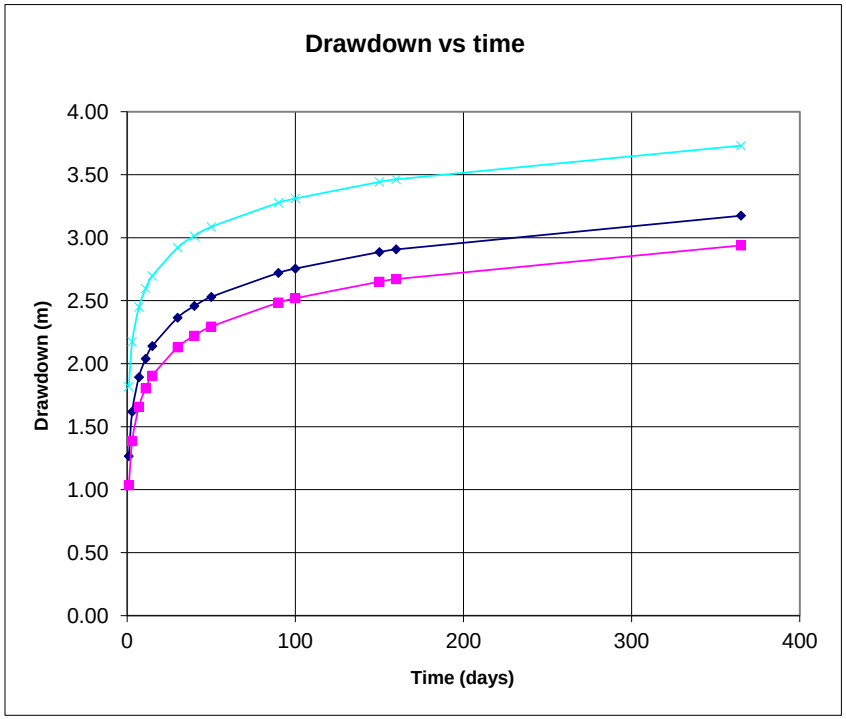


Drawdown Estimate in the confined Ignimbrite Aquifer at a pumping rate of 3.3 L/s

Time-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	1.00E-05	
B		
Pumping rate		
Q	3.3	l/s

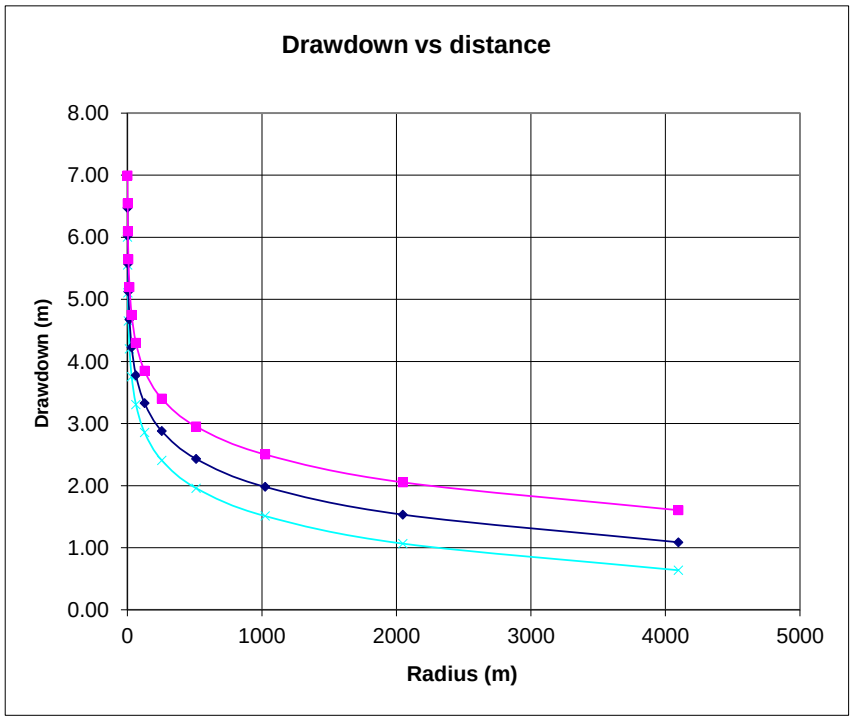
Radius (m)	240	566	814
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	1.819	1.266	1.034
3	2.174	1.619	1.385
7	2.449	1.893	1.658
11	2.595	2.040	1.804
15	2.696	2.140	1.905
30	2.921	2.364	2.129
40	3.014	2.458	2.222
50	3.086	2.530	2.295
90	3.277	2.721	2.485
100	3.311	2.755	2.519
150	3.442	2.886	2.651
160	3.463	2.907	2.671
365	3.730	3.174	2.939



Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	0.00001	
B		
Pumping rate		
Q	3.3	l/s

Time (days)	7	30	150
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	6.002	6.473	6.995
2	5.552	6.024	6.546
4	5.103	5.575	6.096
8	4.654	5.125	5.647
16	4.204	4.676	5.198
32	3.755	4.227	4.748
64	3.306	3.777	4.299
128	2.856	3.328	3.850
256	2.407	2.879	3.400
512	1.958	2.429	2.951
1024	1.510	1.980	2.502
2048	1.066	1.532	2.053
4096	0.637	1.088	1.604

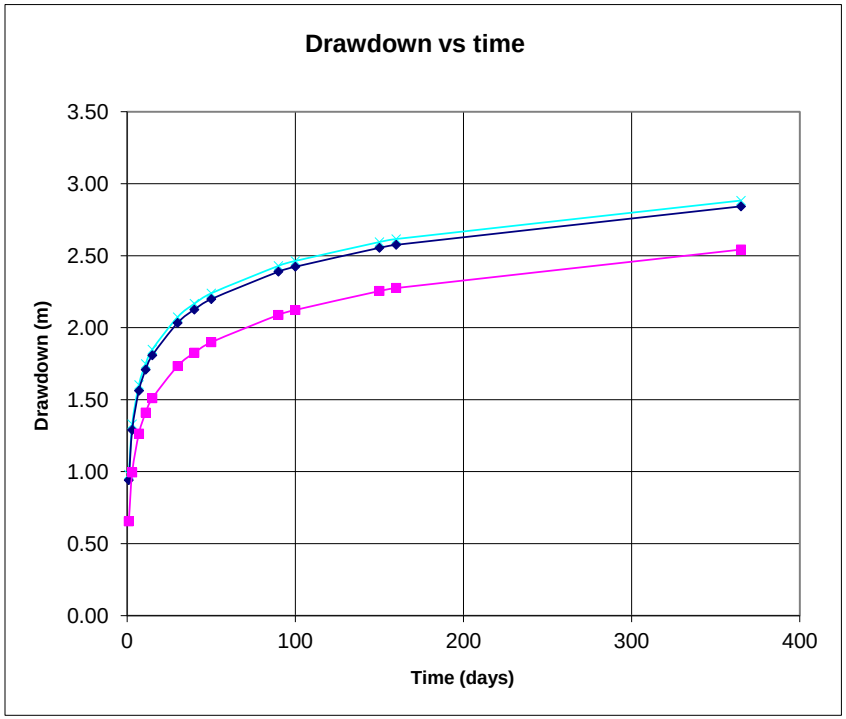


Drawdown Estimate in the confined Ignimbrite Aquifer at a pumping rate of 3.3 L/s

Time-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	1.00E-05	
B		
Pumping rate		
Q	3.3	l/s

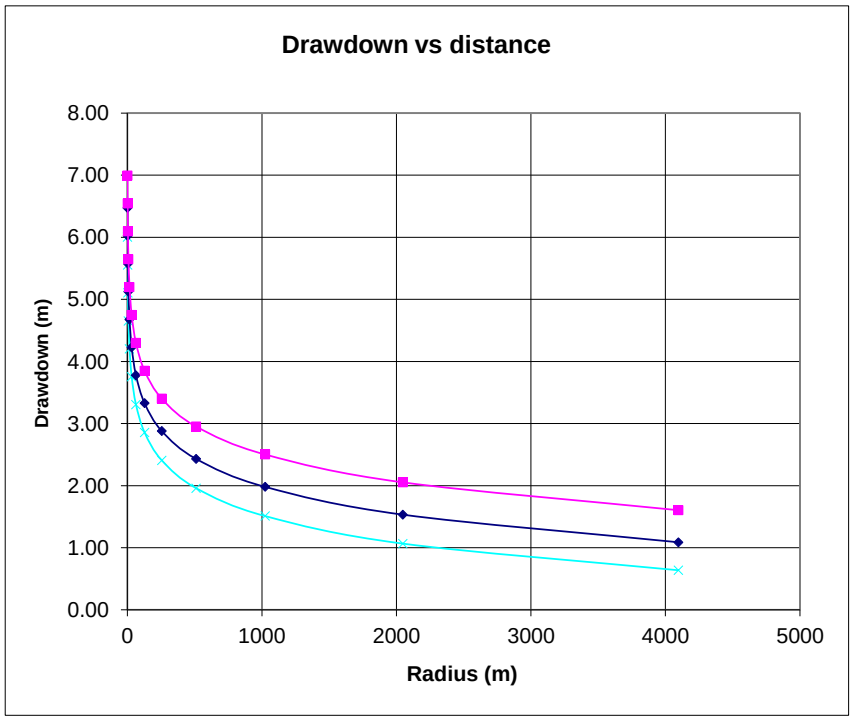
Radius (m)	887	944	1500
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	0.980	0.941	0.656
3	1.330	1.290	0.995
7	1.603	1.563	1.265
11	1.749	1.709	1.410
15	1.849	1.809	1.510
30	2.073	2.033	1.733
40	2.167	2.126	1.826
50	2.239	2.199	1.899
90	2.429	2.389	2.089
100	2.463	2.423	2.123
150	2.595	2.555	2.254
160	2.616	2.575	2.275
365	2.883	2.843	2.543



Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	0.00001	
B		
Pumping rate		
Q	3.3	l/s

Time (days)	7	30	150
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	6.002	6.473	6.995
2	5.552	6.024	6.546
4	5.103	5.575	6.096
8	4.654	5.125	5.647
16	4.204	4.676	5.198
32	3.755	4.227	4.748
64	3.306	3.777	4.299
128	2.856	3.328	3.850
256	2.407	2.879	3.400
512	1.958	2.429	2.951
1024	1.510	1.980	2.502
2048	1.066	1.532	2.053
4096	0.637	1.088	1.604

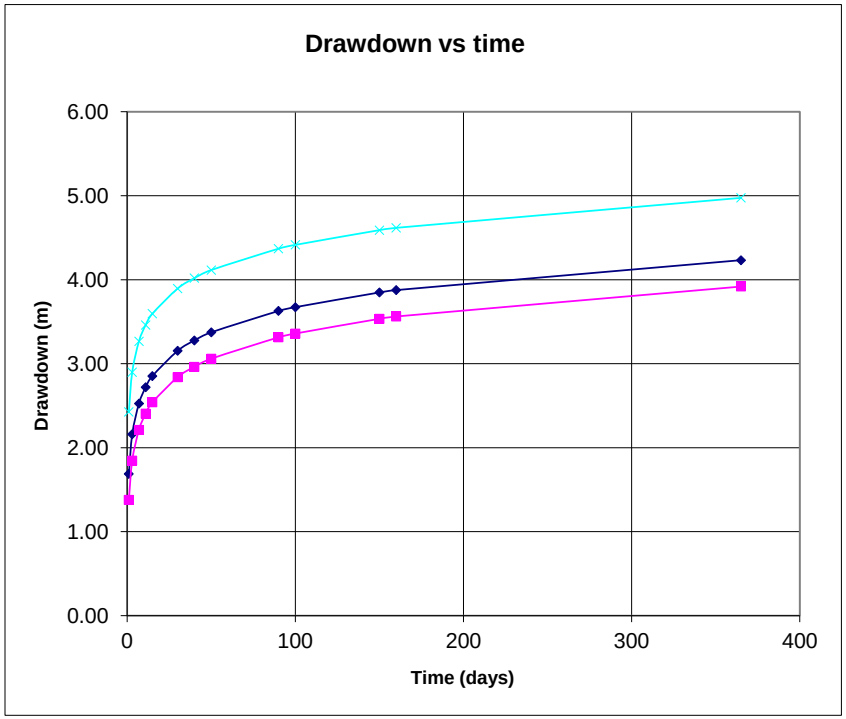


Drawdown Estimate in the confined Ignimbrite Aquifer at a pumping rate of 4.4 L/s

Time-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	1.00E-05	
B		
Pumping rate		
Q	4.4	l/s

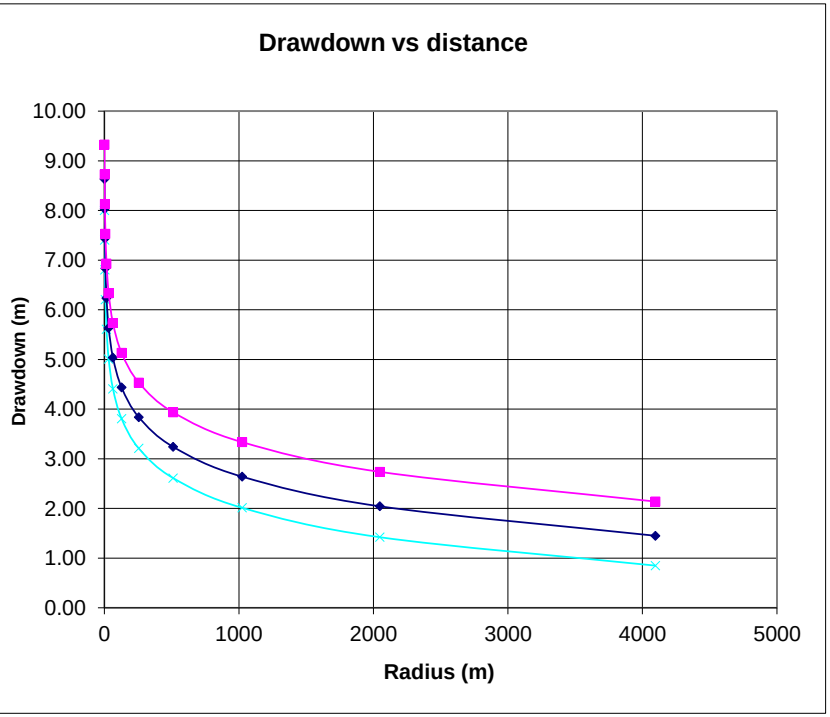
Radius (m)	240	566	814
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	2.425	1.688	1.379
3	2.899	2.159	1.847
7	3.265	2.524	2.211
11	3.461	2.719	2.406
15	3.595	2.853	2.540
30	3.894	3.153	2.839
40	4.018	3.277	2.963
50	4.115	3.373	3.059
90	4.369	3.627	3.313
100	4.414	3.673	3.359
150	4.590	3.848	3.534
160	4.618	3.876	3.562
365	4.974	4.232	3.918



Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	0.00001	
B		
Pumping rate		
Q	4.4	l/s

Time (days)	7	30	150
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	8.002	8.631	9.327
2	7.403	8.032	8.728
4	6.804	7.433	8.129
8	6.205	6.834	7.529
16	5.606	6.235	6.930
32	5.007	5.636	6.331
64	4.408	5.037	5.732
128	3.809	4.437	5.133
256	3.209	3.838	4.534
512	2.611	3.239	3.935
1024	2.013	2.641	3.336
2048	1.421	2.043	2.737
4096	0.849	1.450	2.139

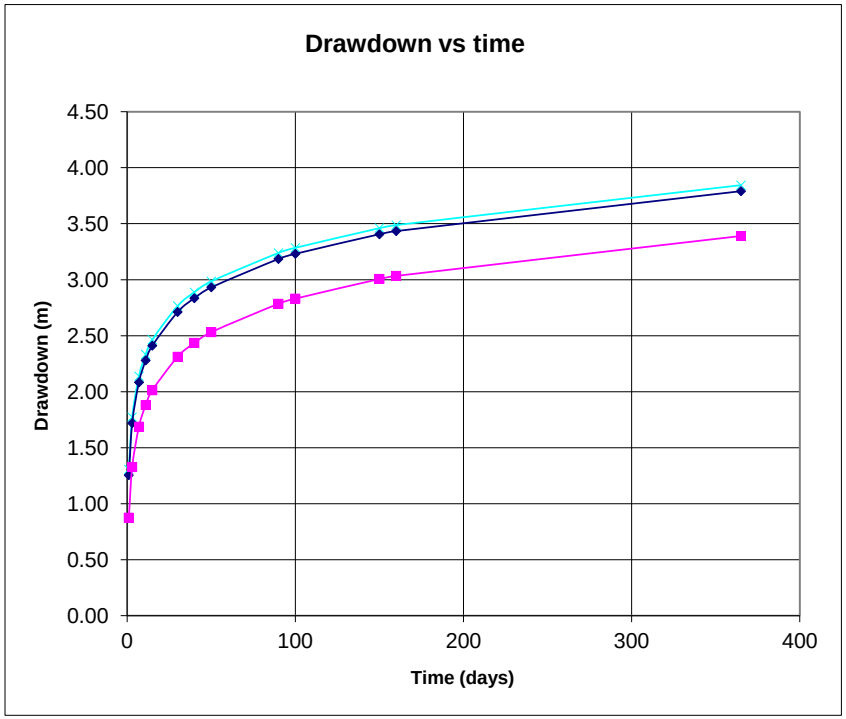


Drawdown Estimate in the confined Ignimbrite Aquifer at a pumping rate of 4.4 L/s

Time-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	1.00E-05	
B		
Pumping rate		
Q	4.4	l/s

Radius (m)	887	944	1500
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	1.306	1.254	0.874
3	1.773	1.720	1.326
7	2.137	2.083	1.686
11	2.332	2.278	1.880
15	2.465	2.412	2.013
30	2.765	2.711	2.311
40	2.889	2.835	2.435
50	2.985	2.931	2.532
90	3.239	3.185	2.785
100	3.285	3.231	2.831
150	3.460	3.406	3.006
160	3.488	3.434	3.034
365	3.844	3.790	3.390



Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	70	m2/d
S	0.00001	
B		
Pumping rate		
Q	4.4	l/s

Time (days)	7	30	150
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
1	8.002	8.631	9.327
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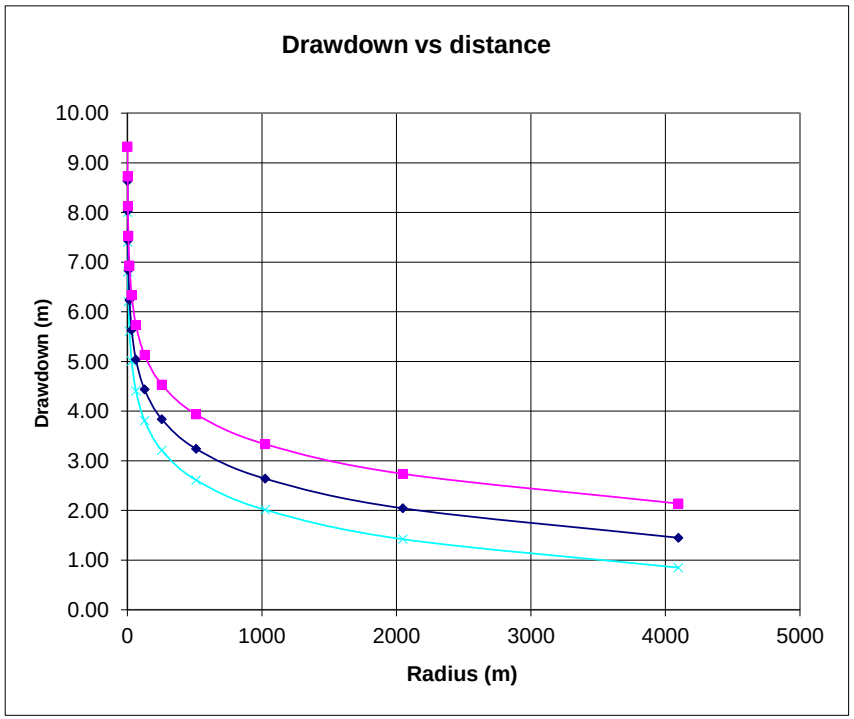
4096	0.849	1.450	2.139



Appendix G: Tangata Whenua Engagement

Megan Taylor

From: Hayley M. Jones
Sent: Thursday, 5 July 2018 10:21 a.m.
To: Carlton Bidois; eu@ngatimaru.iwi.nz; buddymikaere; envirounit@tamatera.org.nz; Reon Tuanau; info.ngatihinerangiiwi@gmail.com
Cc: Jessica Bould
Subject: [redacted]

Kia ora koutou,

Tonkin and Taylor on behalf of [redacted]s currently in the process of preparing a resource consent application to take groundwater from a bore a the property located at [redacted] The purpose of the groundwater take is for frost protection and irrigation of their gold and green kiwifruit orchards on their property, and it is proposed to take up to 380 m^3/d of groundwater at a maximum rate of 10.5 L/s.

Figure 1: Location plan of [redacted] (Source: Google Earth 2018).

We understand that the groundwater take is located within Pirirakau's rohe, and are currently in the process of closing out discussion regarding cultural effects associated with the proposed take and mitigation requirements including;

1. A water measurement device installed to measure the water take for data information gathering;
2. A trigger and response condition for managing potential future instances which may occur where a collection of takes from the aquifer cause issues with water availability.

Bay of Plenty Regional Council (BOPRC) have also advised that the following groups are likely to have an interest in the application;

RecordID	FullName	PostAddress	PhoneNo	Email
C-IWI-00006	Carlton Bidois	Ngati Ranginui Society Inc, PO Box 2526, Tauranga 3140	07 5710934	carltonbidois@
C-HAPU-00031	Julie Shepherd	3 Lochhead Road, RD 6 Te Puna, Tauranga 3176	07 552 4461	julie.shepherd
C-IWI-00003	William Peters	Ngati Maru, C/- Ngati Maru, PO Box 37, Thames 3540	07 8679104	eu@ngatimaru
C-IWI-00005	Buddy Mikaere	Tauranga Maori Business Association, PO Box 13053, Tauranga Central, Tauranga 3141	07 5724140	buddy@manat
C-HAPU-00034	Ngati Kiorekino	612 Welcome Bay Road	C/- 07 544 4413	
C-HAPU-00016	Ngati Kohokino	Tauranga	(07) 544 4413	
C-HAPU-00018	Ngati Te Rakau	612 Welcome Bay Road		
C-HAPU-00019	Ngati Towhare	612 Welcome Bay Road		
C-HAPU-00020	Ngati Whakina	Te Runanga O Ngati Pukenga, 612 Welcome Bay Road, RD 5, Tauranga 3175		
C-MARAE-00029	Aneta Ohia	612 Welcome Bay Road, Papamoa, Tauranga 3118	(07) 542 2276	
C-IWI-00008	Rawinia Brownlee	PO Box 23, Paeroa 3640	(07) 862 6079	environit@ta
C-IWI-00042	Reon Tuanau	C/- PO Box 4369, Mount Maunganui 3149	07 5753765	ReonTuanau@
C-IWI-00041	Ngati Hinerangi (Ngati Hinerangi Trus	PO Box 20, Matamata 3440	211991699	info.ngatihiner

Ngati Te Matau -612 Welcome Bay Road

We will be providing the results of our engagement with Pirirakau to BOPRC with the resource consent application. Please let me know if you have any comments to make on the application.

Many thanks,

Hayley Jones | Resource Management Planner

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Tonkin+Taylor

To send me large files you can use my file drop

Megan Taylor

From: Hayley M. Jones
Sent: Tuesday, 26 June 2018 7:49 a.m.
To: Reuben Hansen; Jessica Bould
Subject: [redacted]

FYI

From: Julie Shepherd [mailto:julie.shepherd@xtra.co.nz]
Sent: Monday, 25 June 2018 9:27 p.m.
To: Hayley M. Jones <HJones@tonkintaylor.co.nz>
Cc: Julie Shepherd <julie.shepherd@xtra.co.nz>; Sally Lochhead <SLochhead@tonkintaylor.co.nz>
Subject: [redacted]

Kia ora Hayley

Thank you for your consideration of how Pirirakau wish to engage with this application.

I understand you have been advised by BOPRC to consult with external interests and I appreciate your recognition of Pirirakau as mana whenua.

We are loathed to respond under the imposition of others being consulted but we accept the application will proceed without feedback notwithstanding judicial reviews if this was to occur.

We are currently engaging with Councils to establish who should be consulted, this is a outstanding matter which we are forced to operate within but we are seeking an end to.

Tangata whenua of Tauranga Moana are also currently initiating a project to develop a cultural effects assessment framework to provide consistency for water take resource consent applications.

For this application the Pirirakau cultural effects seek confirmation that:

1. There will be a water measurement device installed to measure the water take for data information gathering only'
2. A trigger and response condition is applied, this is commonly done where the amount that can be taken has to be reduced when, for example, the flow in a river drops below a specified flow or the groundwater drops below a specified level, notwithstanding a s128 review condition. The cultural effect that is summoned is a kaitiaki baseline concept exercising RMA 1991 provisions and case law of the Augier principle.

On the proviso this condition is accepted by the applicant as a iwi/hapu kaitiaki mechanism we have no further comment. Please respond accordingly with written confirmation.

Sorry my written response has been delayed, with busy work loads and other issues outlined, we in Tauranga Moana are faced with multiple challenges.

Come back to me should you require anything further.

Nga mihi

Julie Shepherd
Pirirakau Incorporated Society
Environment Manager

0272105522

On Wed, Jun 13, 2018 at 3:31 PM, Hayley M. Jones <HJones@tonkintaylor.co.nz> wrote:

Kia ora Julie,

Thank you for your time on the phone,

Tonkin and Taylor on behalf of [redacted] is currently in the process of preparing a resource consent application to take groundwater from a bore [redacted] on [redacted] The purpose of the groundwater take is for frost protection and irrigation of their gold and green kiwifruit orchards on their property, and it is proposed to take up to 380 m^3/d of groundwater at a maximum rate of 10.5 L/s.

Figure 1: Location plan of [redacted] Source: Google Earth 2018).

The frost protection and irrigation activities use water at different times of the year at varying intervals, as shown in the below table;

Table 1: Proposed groundwater take volumes from the applicant's bore.

Groundwater use	Duration of take	Season	Maximum volume of take (per day)	Annual volume
Frost protection of kiwifruit	Up to 10 hours/day	15 days between May - November	380 m^3	5,700 m^3
Horticultural irrigation of gold and green kiwifruit	Up to 7 hours/day	October - April	265 m^3	11,200 m^3

We understand that the groundwater take is located within Pirirakau's rohe, however Bay of Plenty Regional Council (BOPRC) have also advised that the following groups are likely to have an interest in the application;

RecordID	FullName	PostAddress	PhoneNo	Email
C-IWI-00006	Carlton Bidois	Ngati Ranginui Society Inc, PO Box 2526, Tauranga 3140	07 5710934	carltonbidois
C-HAPU-00031	Julie Shepherd	3 Lochhead Road, RD 6 Te Puna, Tauranga 3176	07 552 4461	julie.shephe
C-IWI-00003	William Peters	Ngati Maru, C/- Ngati Maru, PO Box 37, Thames 3540	07 8679104	eu@ngatima
C-IWI-00005	Buddy Mikaere	Tauranga Maori Business Association, PO Box 13053, Tauranga Central, Tauranga 3141	07 5724140	buddy@man
C-HAPU-00034	Ngati Kiorekino	612 Welcome Bay Road	C/- 07 544 4413	
C-HAPU-00016	Ngati Kohokino	Tauranga	(07) 544 4413	
C-HAPU-00018	Ngati Te Rakau	612 Welcome Bay Road		
C-HAPU-00019	Ngati Towhare	612 Welcome Bay Road		
C-HAPU-00020	Ngati Whakina	Te Runanga O Ngati Pukenga, 612 Welcome Bay Road, RD 5, Tauranga 3175		
C-MARAE-00029	Aneta Ohia	612 Welcome Bay Road, Papamoa, Tauranga 3118	(07) 542 2276	
C-IWI-00008	Rawinia Brownlee	PO Box 23, Paeroa 3640	(07) 862 6079	environit@t
C-IWI-00042	Reon Tuanau	C/- PO Box 4369, Mount Maunganui 3149	07 5753765	ReonTuanau(
C-IWI-00041	Ngati Hinerangi (Ngati Hinerangi Trus	PO Box 20, Matamata 3440	211991699	info.ngatihin

Ngati Te Matau -612 Welcome Bay Road

Could you please confirm how you would like us to run this engagement process in the most efficient way which is acceptable to Pirirakau in terms of recognising the hapu's special status over and above these "other groups"? From discussions on the phone with you I understand that this may be by sending an email/letter informing the other groups of the application rather than directly seeking feedback. I assume that in terms of Ngati Ranginui they will defer to Pirirakau anyway?

As outlined above, we are currently in the process of preparing the resource consent application and can provide this to you once the draft is complete (likely to be a couple of weeks away).

Many thanks,

Hayley Jones | Resource Management Planner

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Megan Taylor

From: Hayley M. Jones
Sent: Monday, 9 July 2018 7:36 a.m.
To: Jessica Bould
Subject: [redacted]

FYI

From: buddymikaere [mailto:buddymikaere@gmail.com]
Sent: Friday, 6 July 2018 10:28 p.m.
To: Hayley M. Jones <HJones@tonkintaylor.co.nz>
Subject: Re:[redacted]

Kia ora the application is outside our rohe

Nga mihi

Sent from my Samsung Galaxy smartphone.

-------- Original message --------
From: "Hayley M. Jones" <HJones@tonkintaylor.co.nz>
Date: 5/07/18 10:20 AM (GMT+12:00)
To: Carlton Bidois <carltonbidois@xtra.co.nz>, eu@ngatimaru.iwi.nz, buddymikaere <buddymikaere@gmail.com>, environit@tamatera.org.nz, Reon Tuanau <ReonTuanau@ngaiterangi.org.nz>, info.ngatihinerangiiwi@gmail.com
Cc: Jessica Bould <JBould@tonkintaylor.co.nz>
Subject:[redacted]

Kia ora koutou,

Tonkin and Taylor on behalf of[redacted]is currently in the process of preparing a resource consent application to take groundwater from a bore a the property located at[redacted] The purpose of the groundwater take is for frost protection and irrigation of their gold and green kiwifruit orchards on their property, and it is proposed to take up to 380 m^3/d of groundwater at a maximum rate of 10.5 L/s.

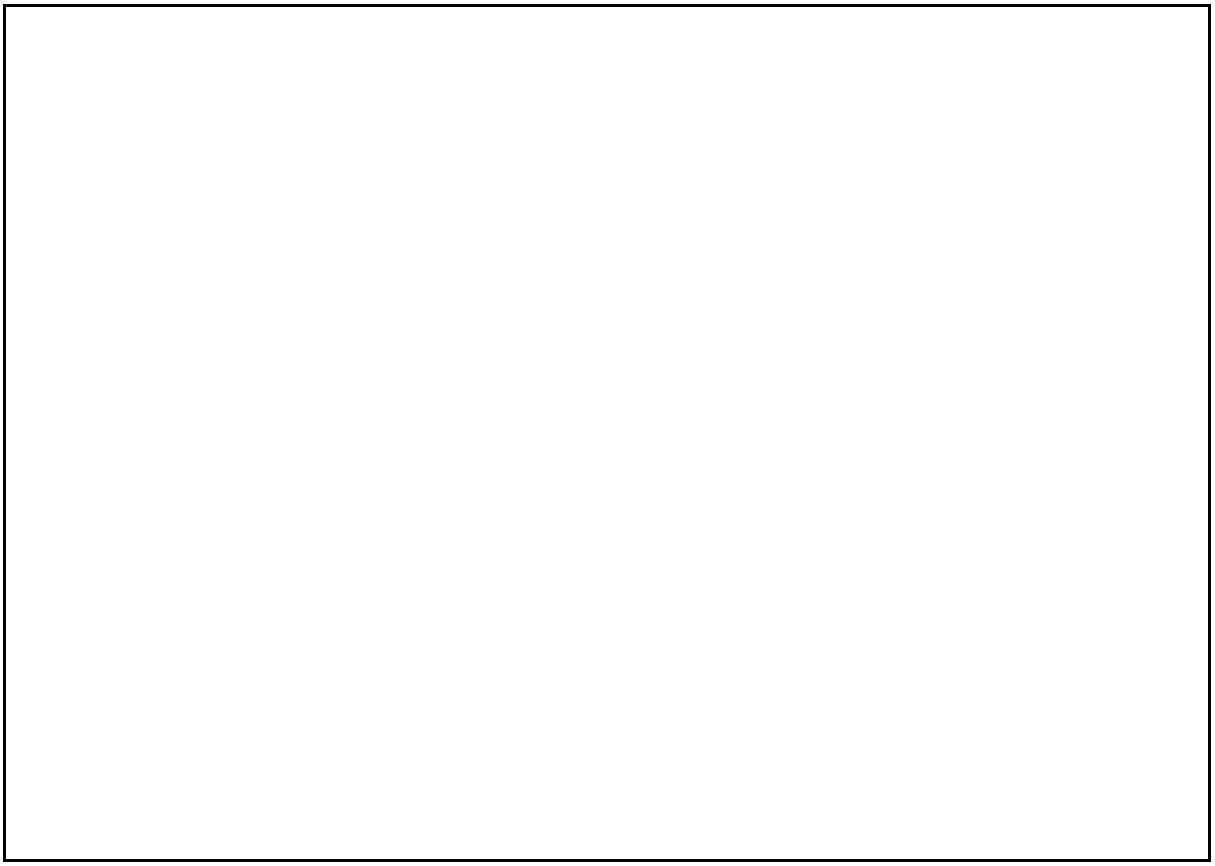

Figure 1: Location plan of bore at [redacted] (Source: Google Earth 2018).

We understand that the groundwater take is located within Pirirakau's rohe, and are currently in the process of closing out discussion regarding cultural effects associated with the proposed take and mitigation requirements including;

1. A water measurement device installed to measure the water take for data information gathering;

2. A trigger and response condition for managing potential future instances which may occur where a collection of takes from the aquifer cause issues with water availability.

Bay of Plenty Regional Council (BOPRC) have also advised that the following groups are likely to have an interest in the application;

We will be providing the results of our engagement with Pirirakau to BOPRC with the resource consent application. Please let me know if you have any comments to make on the application.

Many thanks,

Hayley Jones | Resource Management Planner

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Megan Taylor

From: Hayley M. Jones
Sent: Friday, 6 July 2018 11:29 a.m.
To: Jessica Bould
Subject: [redacted]

FYI

From: eu@ngatimaru.iwi.nz [mailto:eu@ngatimaru.iwi.nz]
Sent: Friday, 6 July 2018 11:03 a.m.
To: Hayley M. Jones <HJones@tonkintaylor.co.nz>
Subject: RE:[redacted]

Tena koe Hayley,

Ngāti Maru is not opposed to this application.

William Peters
Ngāti Maru Runanga

From: Hayley M. Jones <HJones@tonkintaylor.co.nz>
Sent: Thursday, 5 July 2018 10:21 AM
To: Carlton Bidois <carltonbidois@xtra.co.nz>; eu@ngatimaru.iwi.nz; buddymikaere <buddymikaere@gmail.com>; environit@tamatera.org.nz; Reon Tuanau <ReonTuanau@ngaiterangi.org.nz>; info.ngatihinerangiiwi@gmail.com
Cc: Jessica Bould <JBould@tonkintaylor.co.nz>
Subject:[redacted]

Kia ora koutou,

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C-IWI-00005	Buddy Mikaere	Tauranga Maori Business Association, PO Box 13053, Tauranga Central, Tauranga 3141	07 5724140	buddy@manat
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C-MARAE-00029	Aneta Ohia	612 Welcome Bay Road, Papamoa, Tauranga 3118	(07) 542 2276	
C-IWI-00008	Rawinia Brownlee	PO Box 23, Paeroa 3640	(07) 862 6079	environit@ta
C-IWI-00042	Reon Tuanau	C/- PO Box 4369, Mount Maunganui 3149	07 5753765	ReonTuanau@
C-IWI-00041	Ngati Hinerangi (Ngati Hinerangi Trus	PO Box 20, Matamata 3440	211991699	info.ngatihiner

Ngati Te Matau -612 Welcome Bay Road

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Many thanks,

Hayley Jones | Resource Management Planner

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