

**MEMORANDUM**

**Job 10639**

**To:** Sarah Davidson - ORC

**From:** Hayley Mahon (JRA) and Brian Ellwood (LEI)

**Date:** 11<sup>th</sup> June 2021

**Subject:** **Memo in response to Request for Information from ORC dated 15 April 2021 (RM20.164 – Kingston WWTP Discharge Consent)**

**PURPOSE**

This memo has been prepared in response to a request for further information from Sarah Davidson at ORC on 15 April 2021. The request for further information relates to showing how the application for the discharge consent for the Kingston Wastewater Treatment Plan is consistent with the National Policy Statement for Freshwater Management 2020 (NPS-FM).

**BACKGROUND**

An application for discharge of treated domestic effluent into land at Kingston prepared on behalf of Queenstown Lakes District Council by Lowe Environmental Impact was lodged in May 2020. Since the application was lodged, the NPS-FM 2020 has come into force.

Under the NPS-FM 2020, freshwater is required to be managed in a way that 'gives effect' to Te Mana o te Wai, degraded water bodies are to be improved and where water bodies are not degraded, they are required to be maintained or improved using bottom lines defined in the NPS FM.

The following modelling and description show that the development of the proposed Kingston WWTP will be consistent with the NPS-FW, and in particular Policy 5 being to improve the well-being of water bodies (in this case Lake Wakatipu).

**HOW THE PROPOSED DISCHARGE GIVES EFFECT TO THE NPS-FM 2020**

Additional modelling as requested by ORC on 15 April 2021 has been completed. See below Table 1.



**Table 1: Additional Modelling Scenarios**

	<b>A.1 1.5 person per lot</b>	<b>A.2 3 person per lot</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F (ORC water plan permitted baseline)</b>
Township septic tanks no	225	225	0	0	225	425	425
Township leaching at 5.2 kg N/tank/yr per 1.5 people	1170	2340	0	0	2340	4420	4420
Total Nitrogen applied to LTA (kg N/y)	0	0	6570	6570	4337	6570	0
Areal loading rate N to LTA (kg N/ha/y)			438	438	356	438	
Total LTA N Leached (kg N/yr)	225	225	2130	2628	1731	2130	225
Areal Nitrogen leaching rate LTA (kg N/ha/yr)	15	15	142	175	115	142	15
LTA area (ha)	15	15	15	15	15	15	15
Subdivision area (ha)	55	55	55	55	55	55	55
N leached from Subdivision land (kg N/ha/yr)	15	15	2	2	2	2	15
N leached from Subdivision (kg N/yr)	825	825	110	110	110	110	825
Total N Leached (LTA, Village and Subdivision) (kg N/yr)	2220	3390	2240	2738	4181	6660	5470
Change from Baseline (Scenario A.1)	0	1170	20	518	1961	4440	3250
Change from Permitted Baseline (Scenario F)	-3250	-2080	-3230	-2732	-1289	1190	0

**Notes**

<sup>1</sup> Scenario A.2, D, E and F assume 3 people per septic tank leaching 10.4 kg N/y

<sup>2</sup> Scenario E is not valid as the subdivision Plan Change was for up to 744 residential lots only, all other scenarios have been rounded to 1,200 lots (744 new plus 225 existing plus 200 Kingston infill)

<sup>3</sup> Scenario F, ORC permitted is added to show the nitrogen losses currently permitted under ORC water Plan rules with no subdivision and an increased occupancy for 3 person per lot



As shown, the baseline for the total nitrogen leached (kg N/yr) over the whole Kingston village, proposed subdivision area (undeveloped) and 15 ha Land treatment area (LTA) is 2220kg N/yr. The worst-case Scenario D (where 225 existing septic tanks in Kingston village remain but with an increased resident population of 3 person per lot and the new subdivision area along with village infill is developed) will leach a total of 4181 kg N/yr. Scenarios B & C also will leach nitrogen at a volume over 2220kg N/yr.

Through the volunteering of conditions, the applicant can show that the baseline for total nitrogen leached can be maintained. The applicant volunteers conditions where the total mass of nitrogen leached to groundwater calculated using the nitrogen mass balance shall not exceed 1,050 kg N/yr while the existing 225 septic tanks within the Kingston Village are not reticulated to the WWTP. For every property within Kingston Village with a septic tank that is reticulated to the WWTP, the total mass of nitrogen allowed to be leached beneath the LTA shall increase by 5.2 kg N/yr.

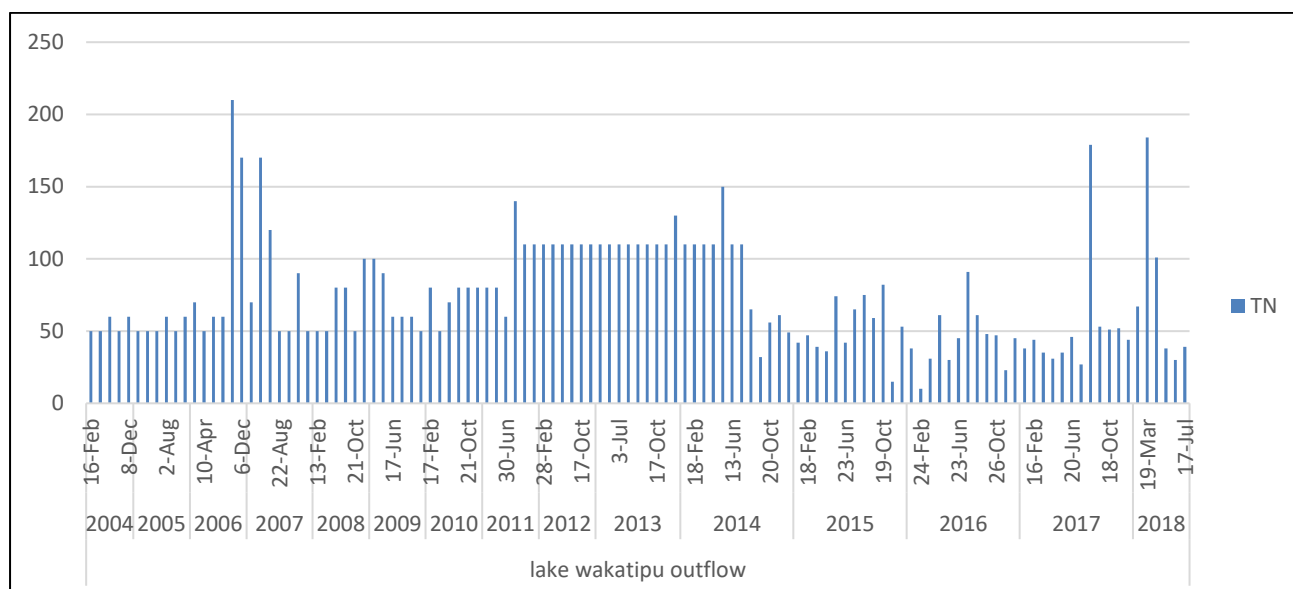
Eventually, if all 225 properties with septic tanks within Kingston Village became reticulated to the WWTP, the additional nitrogen that would be allowed to be leached by the LTA would be 1,170 kg N/yr (225 septic tanks x 5.2 kg N/yr). If you add that additional volume allowed to be leached in exchange for the septic tanks being reticulated (1,170 kg N/yr) to the volunteered amount by the applicant in Condition 11 (1,050kg N/yr) then this total that would be allowed to be leached would add to 2,220 kg N/yr which is the same as the baseline amount which is currently leached by the 225 septic tanks in Kingston Village.

By implementing these volunteered conditions, the applicant can maintain the current baseline amount of nitrogen being leached into Lake Wakatipu at Kingston while also accommodating an increase in the population density of the existing village residences. Under the NPS-FW, Otago Regional Council will be required to set Water Quality standard states for attributes such as nitrogen in water bodies. As this process has not taken place as of yet, an indicative Standard can be found within Schedule 15 of the Regional Plan Water and shown in Table 2.

**Table 2: Schedule 15 Numerical Limits and Target for Lake Wakatipu**

<b>Total Nitrogen</b>	<b>Total Phosphorous</b>	<b>Ammoniacal Nitrogen</b>	<b>E.Coli</b>	<b>Turbidity</b>
0.1 mg/L	0.005 mg/L	0.01 mg/L	10 cfu/100 ml	3 NTU

According to baseline data, the value of Total Nitrogen should be lower than 0.1 mg/l or 100 mg/m<sup>3</sup>. The total Lake Nitrogen concentration is measured in the Wakatipu Outflow by ORC. The results between 2004 and 2018 are presented in Figure 1.



**Figure 1: Total Nitrogen (mg/m<sup>3</sup>) in Lake Wakatipu Outflow from 2004-2018**

In reviewing the data record, the Total Nitrogen concentrations at the Lake Wakatipu outflow site representing the cumulative concentration of nitrogen in the lake are generally below the Schedule 15 limit and only occasionally exceed the limits. Since 2014, the nitrogen concentration has twice exceeded the limit. The nitrogen value at Lake Outlet is likely given the natural variability to be comparable with the monitoring sites of Lake Wakatipu sampled by Ryders i.e. East: where nitrogen is below the limit, west: where nitrogen is just above the limit and mid: where the value is twice for the year 2020. Therefore, it can be expected that if Kingston Bay was an FMU sampling site, overall water quality regarding nitrogen would be achieved in Lake Wakatipu at Kingston.

Given the occasionally high samples recorded, in the future Lake Wakatipu may be considered to be a degraded water body and therefore under Policy 5 of the NPS-FW, the health of the freshwater ecosystems is to be improved. In this case, we read this as the nitrogen baseline levels of Lake Wakatipu at Kingston are to be improved.

As mentioned above, it has been demonstrated that the nitrogen leaching from Kingston can be maintained at the current baseline level of 2,220kg N/yr with the 225 existing septic tanks remaining not reticulated to the WWTP plus the staged development of 744 additional lots under the QLDC ODP Plan Change 25.

In order to improve the nitrogen leaching levels further, the applicant can pull a number of levers, these are to increase the LTA size and improve the WWTP effluent quality:

- **Increase LTA Size:** The application and assessment of effects have been based on the conservative use of 15 ha of the land treatment area out of 25 ha to receive the full future wastewater flow. Prior to the development of the full wastewater flow, it is proposed that QLDC would have the flexibility to manage the total nitrogen loading rate by changing the irrigation area or the amount of treatment at the WWTP. Table 3 reproduced from the AEE presents several development scenarios demonstrating the flexibility. The final scenario in Table 2 presents the full development scenario with 21 ha. The additional area 21 to 25 ha provides space for operational headlands around the LTA, for managing the loading rate and



for blocks to be rotated with the Kingston Station's other land uses like grazed pasture or crop, allowing for Lucerne renewal over an extended period. With either 15 or 21 ha of possible LTA area, the estimated LTA leaching mass (kg N/yr) is less than the baseline of 2,220kg N/yr and therefore it can be shown that the WWTP can improve the quality of Lake Wakatipu; and

- **Increase level of treatment in WWTP:** It is possible as the development stages occur for future stages to achieve a higher level of treatment for a given volume of wastewater. The treatment standards that the AEE is based on are conservative and readily achievable for an activated sludge type treatment system representing a balance of inputs. A higher quality effluent prior to land application from the WWTP would present more significant operating costs for heating, aeration, and potential carbon dosing during the denitrification phase of the treatment cycle. LEI acknowledges PDP's review comment that an effluent quality of less than 10 mg/L nitrogen is achievable. Basing the assessment on a high Total Nitrogen concentration provides headroom for QLDC to invest in improved treatment quality in the future should unanticipated effects develop or future treatment standards from the Three water review or future National level water quality limits require the community WWTP operation to achieve a better water quality prior to land application. Improved environmental outcomes would be achieved if lower a Nitrogen concentration wastewater was applied at the same hydraulic loading rate as currently modelled.

The improvement in WWTP quality would be more beneficial with reducing winter leaching losses from the LTA than increasing the LTA area.



**Table 3: Stage 1 and Stage 2 Example Scenarios**

Consent stage	Stage One:				Stage Two:			
	Higher BOD, and N up to 450 Lots				Lower BOD and N			
Treatment system	Pond	SBR	Pond	SBR	SBR	SBR	SBR	SBR
Treatment intensity	Low	Low	Low	High	Low	High	High	High
Lots	200	400	400	400	600	900	<b>1200</b>	1200
Design Flow Rate (ADWF) (m3/day)	150	300	300	300	450	675	<b>900</b>	900
Nitrogen concentration at WWTP (mg/L)	50	<b>30</b>	<b>50</b>	<b>20</b>	30	20	<b>20</b>	20
Nitrogen mass (kg/yr)	2,738	3,285	5,475	2,190	4,928	4,928	<b>6,570</b>	6,570
LTA area required to meet 450 kg N/ha (ha)	6.1	7.3	12.2	4.9	11	11	<b>14.6</b>	14.6
Hydraulic loading at minimum LTA area (ADWF) (mm/day)	2.47	4.11	2.47	6.16	4.11	6.16	<b>6.16</b>	6.16
Possible LTA area development scenario (ha)	7	<b>7</b>	<b>15</b>	<b>7</b>	12	15	<b>15</b>	21
Possible scenario hydraulic loading (mm/d)	2.14	4.29	2	4.29	3.75	4.5	<b>6</b>	4.29
Possible scenario nitrogen loading rate (kg/ha/yr)	391	<b>469</b>	365	313	411	329	<b>438</b>	313
Proposed Consent N loading limit (kg/ha/yr)	450	<b>450</b>	450	450	450	450	<b>450</b>	450
Estimated leaching (32% if applied N) (kg N/ha/yr)	125	150	117	100	132	105	140	100
<b>Estimated LTA Leaching Mass (kg N/yr)</b>	<b>876</b>	<b>1,051</b>	<b>1,752</b>	<b>701</b>	<b>1,578</b>	<b>1,579</b>	<b>2,102</b>	<b>2,103</b>

For completeness, a full policy assessment under the relevant policies of the NPS-FW is included below:



Policy (NPS-FW 2020)	Assessment
<p><b>Policy 1:</b> Freshwater is managed in a way that gives effect to Te Mana o te Wai.</p>	<p>Te Mana o te Wai is the concept that recognises that protecting the health of freshwater protects the health and well-being of the wider environment. As demonstrated in this RFI, the health of freshwater is being improved by the implementation of the WWTP. This contributes to Te Mana o te Wai by improving the well-being of the freshwater.</p>
<p><b>Policy 2:</b> Tangata whenua are actively involved in freshwater management (including decision making processes), and Māori freshwater values are identified and provided for.</p>	<p>Aukaha and Te Ao Marama have been consulted on this project since the outset.</p>
<p><b>Policy 3:</b> Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments.</p>	<p>The effects of this discharge consent have assessed the effects on all of the downstream tributaries and waterbodies including Lake Wakatipu.</p>
<p><b>Policy 4:</b> Freshwater is managed as part of New Zealand's integrated response to climate change.</p>	<p>N/A – Higher national level policy.</p>
<p><b>Policy 5:</b> Freshwater is managed through a National Objectives Framework to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.</p>	<p>National Objectives Framework is yet to be developed by ORC – Council level policy.</p>
<p><b>Policy 6:</b> There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.</p>	<p>There is to be no further loss of extent of natural inland wetlands or value loss to occur as part of this proposal.</p>



**Policy 7:** The loss of river extent and values is avoided to the extent practicable.

The compulsory values that must be assessed as part of this application (Appendices 1A and 1B) include:

**1. Ecosystem Health** - As covered by Ryder Consulting, adverse effects on aquatic communities within surface water bodies will be less than minor. As covered by LEI, the water quality can be improved by the implementation of the WWTP.

**2. Human contact** – As covered in the AEE section 6.3.2 and S92 response, the discharge via groundwater connections to surface water bodies is going to have a less than minor effect on the human contact with the water body. The potential to remove uncontrolled septic tank discharges into the groundwater near Lake Wakatipu will enhance the communities ability to use Lake Wakatipu.

**3. Threatened species** - As covered by Ryder Consulting, adverse effects on aquatic communities within surface water bodies will be less than minor.

**4. Mahinga kai** – As covered by Ryder Consulting, adverse effects on aquatic communities within surface water bodies will be less than minor and therefore the kai would be safe to harvest and eat.

**5. Natural form and character** – The physical and natural movement and location characteristics of waterbodies will not change as part of this proposal due to the combination of a proposed secondary treatment plant, the low hydraulic application rate, and the large depth of unsaturated soil and subsoil that will reduce the potential for nutrient and faecal bacteria contaminants leaching to groundwater from the effluent application.

**6. Drinking water supply** – The drinking water supply for Kingston is uphill and from a groundwater supply not connected to the LTA.





The discharge from the WWTP is not going to have an effect on the drinking water supply.

**7. Wai tapu** – Aukaha and Te Ao Marama have been consulted on this project.

**8. Transport and tauranga waka** – The proposed WWTP is not going to have an impact on transport or tauranga waka.

**9. Fishing** - As covered by Ryder Consulting, adverse effects on aquatic communities within surface water bodies will be less than minor.

**10. Hydro-electric power generation** – The proposed WWTP is not going to have an impact on transport or tauranga waka.

**11. Animal drinking water** – The discharge via groundwater connections to surface water bodies has been assessed to have a less than minor effect due to the maintenance of the baseline nutrient loss in the catchment and low or nil discharge of faecal bacterial due to the large depth of unsaturated soils and long travel times between the point of discharge and the potential surface water receiving body. The water will be suitable for drinking by all animals.

**12. Irrigation, cultivation, and production of food and beverages** – The beneficial reuse of wastewater and nutrients for lucerne or pasture irrigation will enhance the production of agriculture products and offset the need for winter forage crops on Kingston Station

**13. Commercial and industrial use** – The proposed discharge associated with the development of a community WWTP enables commercial development to occur at a scale approved in the Plan Change 25, this includes the development of cafes and visitor accommodation in Kingston area.



<p><b>Policy 8:</b> The significant values of outstanding water bodies are protected.</p>	<p>Lake Wakatipu is recognised as having outstanding characteristics under the Water Conservation (Kawarau) Order 1997. These characteristics include:</p> <ul style="list-style-type: none"> <li>- As a habitat for terrestrial and aquatic organisms</li> <li>- As a fishery</li> <li>- For its wild, scenic, and other natural characteristics</li> <li>- For scientific values</li> <li>- For recreational, or historical purposes</li> <li>- For significance in accordance with tikanga Maori</li> </ul> <p>These values have been covered in the assessment of other policies in this table.</p>
<p><b>Policy 9:</b> The habitats of indigenous freshwater species are protected.</p>	<p>As covered by Ryder Consulting, adverse effects on aquatic communities within surface water bodies will be less than minor.</p>
<p><b>Policy 10:</b> The habitat of trout and salmon is protected, insofar as this is consistent with Policy 9.</p>	<p>As covered by Ryder Consulting, adverse effects on aquatic communities within surface water bodies will be less than minor.</p>
<p><b>Policy 11:</b> Freshwater is allocated and used efficiently, all existing over-allocation is phased out, and future over-allocation is avoided.</p>	<p>N/A – this is not a water take application.</p>
<p><b>Policy 12:</b> The national target (as set out in Appendix 3) for water quality improvement is achieved.</p>	<p>N/A – Higher national level policy.</p>
<p><b>Policy 13:</b> The condition of water bodies and freshwater ecosystems is systematically monitored over time, and action is taken where freshwater is degraded, and to reverse deteriorating trends</p>	<p>Monitoring conditions will be imposed as part of this consent.</p>



<p><b>Policy 14:</b> Information (including monitoring data) about the state of water bodies and freshwater ecosystems, and the challenges to their health and well-being, is regularly reported on and published.</p>	<p>Monitoring conditions will be imposed as part of this consent.</p>
<p><b>Policy 15:</b> Communities are enabled to provide for their social, economic, and cultural wellbeing in a way that is consistent with this National Policy Statement.</p>	<p>The Kingston WWTP will enable residents of Kingston to connect to a reticulated wastewater treatment system enabling QLDC and ORC to have more control over discharge through monitoring and improvement to the system. The modelling above shows that the implementation of the WWTP can improve the levels of total nitrogen and improve the health of Lake Wakatipu.</p>

## CONCLUSION

As shown in the modelling above, the Applicant can maintain the current baseline amount of nitrogen being leached into Lake Wakatipu at Kingston whilst accommodating an increase in the population density of the existing village residences. Furthermore, the Applicant can reduce the amount of nitrogen being leached through increasing the Land Treatment Area and/or through increasing the level of treatment in the WWTP.

Through the policy assessment above, the proposed Kingston WWTP is shown to be consistent with the NPS-FW as its implementation will improve the water quality of Lake Wakatipu whilst having a less than minor effect on Maori freshwater values, ecological values, natural characteristics, recreation values and commercial use of Lake Wakatipu and its associated tributaries.

## **PROPOSED CONSENT CONDITIONS**

The applicant proposes the following consent conditions and seeks consent term of 35 years.

<b>Specific</b>	
1.	If this consent is not given effect to within a period of 10 years from the date of commencement of this consent, this consent shall lapse under Section 125 of the Resource Management Act 1991.
2.	<p>a) The Total Volume of wastewater discharged shall not exceed 1,800 cubic metres per day.</p> <p>b) The average daily Total Volume over a rolling 30 day period shall not exceed 900 cubic metres per day.</p>
3.	The rate of application shall not exceed a 7-day average of 12 millimetres per day in any part of the Land Treatment Area.
4.	<p>Prior to receiving any wastewater, the treatment and land application system shall comprise as a minimum:</p> <ul style="list-style-type: none"> <li>i. Wastewater treatment plant (<b>WWTP</b>) providing primary and secondary treatment;</li> <li>ii. Land Treatment Area with an initial minimum area of 5 ha available, with a minimum of 15 ha at full development area within a total area of up to 25 ha;</li> <li>iii. Subsurface pressure compensating drip irrigation buried to a depth greater than 150 millimetres below the ground surface; and</li> <li>iv. Dripper lines at a maximum of 1 m spacing and emitters spaced at a maximum of 0.6 m centres.</li> </ul>
5.	<p>The Land Treatment Area shall not be used:</p> <ul style="list-style-type: none"> <li>a) For roading whether sealed or unsealed;</li> <li>b) As a hardstanding area;</li> <li>c) For erecting buildings or any non-effluent systems structures;</li> <li>d) For activities that require intensively managed grass surfaces (e.g. grass tennis courts or bowling greens or golf tees and greens); and</li> <li>e) For grazing stock.</li> </ul>
6.	The Land Treatment Area shall be located within the marked area outlined in Plan ORCXXXXX and managed via a cut and carry management regime.

7.	<p>Waterbody buffer zones shall be established and maintained as follows:</p> <ul style="list-style-type: none"> <li>v. If Land Treatment Area dripper lines are located closer within 15 m from any permanent wetland or pond, the consent holder shall, prior to the application of wastewater to that the Land Treatment Area, establish and maintain a native riparian vegetation buffer of a width of 10m between any the permanent wetland or pond and the nearest Land Treatment Area dripper line; and</li> <li>vi. Prior to application of wastewater to the Land Treatment Area, ephemeral ponding areas shall be identified and the consent holder shall establish a 5 m non irrigated buffer around any ephemeral pond.</li> </ul>
8.	<p>The Total Nitrogen loading of the Land Treatment Area shall not exceed 450 kg N/ha/yr.</p> <p><b><i>Advice note:</i></b> <i>The Land Treatment Area loading rate of 450 kg N/ha/yr is calculated based on the daily flow data collected under Condition 13 multiplied by the Total Nitrogen concentration sampling collected under Condition 19 of this consent and divided by the Land Treatment Area. At a design flow of 900 m<sup>3</sup>/day average dry weather flow, to achieve Total Nitrogen load of 450 kg N/ha/yr or less, the average Total Nitrogen equals 20 milligrams per litre.</i></p>
9	<p>Harvest monitoring;</p> <p>(a) During every grass/lucerne harvest event from the Land Treatment Area, the consent holder shall:</p> <ul style="list-style-type: none"> <li>vii. obtain one composite sample for every five hectares of the land application area harvested. A composite sample shall consist of ten samples of cut grass</li> <li>viii. analyse the composite samples for Total Nitrogen content.</li> <li>ix. record the weight of grass harvested in kilograms of dry matter.</li> <li>x. use the data obtained under Conditions 9(a)(ii) and 9(a)(iii) to determine the kilograms of Nitrogen per hectare exported from the land application area via the cut and carry system.</li> </ul> <p>(b) The results of this analysis shall be presented in the Annual Report, required under Condition 22 of this consent.</p>

10	<p><b>Nitrogen Mass Balance Calculation</b>  The consent holder shall annually calculate the Nitrogen Mass Balance (i.e. an estimate of the mass of Nitrogen lost to groundwater from the Land Treatment Area) as follows:</p> <ul style="list-style-type: none"> <li>a) Calculate the Total Nitrogen applied to land each year less the Total Nitrogen removed by harvesting each year. <ul style="list-style-type: none"> <li>i. The Total Nitrogen applied to the Land Treatment Area shall be calculated on a monthly basis using the Total Volume of wastewater applied that month multiplied by the concentration of Total Nitrogen sampled from the WWTP discharge in the same period less ammonia volatilisation (5% of the applied Nitrogen) and less denitrification (10% of applied Nitrogen).</li> <li>ii. The Total Nitrogen applied to the Land Treatment Area for the yearly reporting period is the sum of Total Nitrogen in Condition 10(a)(i)</li> <li>iii. The Total Nitrogen removal by harvesting grass or lucerne from the Land Treatment Area each year shall be estimated by obtaining dry matter content and Total Nitrogen content after each crop/plant harvest in accordance with Condition 9(a).</li> </ul> </li> </ul>
11	<p>The Nitrogen Mass Balance (Total Nitrogen applied less Total Nitrogen removed) calculated in accordance with Condition 10 shall not exceed:</p> <ul style="list-style-type: none"> <li>a) 1,050 kg N/yr while existing properties (as at the date of the consent) within Kingston with septic tanks discharging to the ground (<b>Existing Property</b>)..</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>b) 1,050 kg N/yr plus 5.2 kg N/yr for every Existing Property that has been connected to a communal collection system and conveyed the WWTP.</li> </ul> <p>The results of this Nitrogen Mass Balance calculation shall be presented in the Annual Report, required under Condition 22 of this consent</p> <p><b>Advice note:</b> <i>The Total Nitrogen leaching mass when 225 properties are reticulated to the WWTP shall be 1,050 plus 225*5.2 = 2220 kg N/yr.</i></p>
<b>Performance Monitoring</b>	
12.	<p>Prior to commissioning the land treatment system, the Land Treatment Area shall be marked out by any means that ensure the extent of the areas are identifiable on the ground surface and shall remain marked out for the term of the consent.</p>
13.	<ul style="list-style-type: none"> <li>a) Prior to commissioning the Land Treatment Area, the consent holder shall install a flow meter and data logger on the outlet pipe from the treatment system to record the volume of effluent discharged to the Land Treatment Area. The flow meter shall have an accuracy range of +/- 5%.</li> <li>b) Once the flow meter and data logger are installed, the consent holder shall measure and record the daily volume of effluent discharged to the Land Treatment Area.</li> <li>c) The flow records shall be forwarded to the Consent Authority with the annual report required under Condition 22 of this consent and upon request.</li> </ul>

14.	Prior to commissioning the treatment and land treatment system, the consent holder shall establish adequate facilities and access for wastewater quality sampling, such as a hand operated tap/valve that is on the outlet pipe from the treatment system before the wastewater discharges to the Land Treatment Area.
15.	<p>Prior to commissioning the treatment and land treatment system, the consent holder shall provide as-built construction plans and a Producer Statement or Certificate of Compliance and photographs of the treatment and land treatment system. These shall include, but are not limited to, the following:</p> <ul style="list-style-type: none"> <li>a) Plans of the treatment system described in Condition 4 of this consent;</li> <li>b) Plans of the Land Treatment Area clearly showing all the irrigation zones;</li> <li>c) Details of the area of each zone, the maximum volumes of wastewater discharged to each zone (litres per second), and the duration (hours) and daily frequency of each application to the zones; and</li> <li>d) Photographs of each of the irrigation zones.</li> </ul>
16	<p>Prior to application of wastewater to Land Treatment Area One (LTA 1 as shown on plan ORCxxxx, Appendix C), the consent holder shall install groundwater monitoring bores GW2, GW3A, and GW3B and GW4 in the locations presented in the attached monitoring bore location plan ORCXXXX.</p> <p>and</p> <p>Prior to the application of wastewater to Land Treatment Area Two (LTA 2 as shown on plan ORCxxxx, the consent holder shall install groundwater monitoring bores GW1, GW5 and GW6 in the locations presented in the attached monitoring bore location plan ORCXXXX.</p> <p>Once installed, borelogs and bore construction details shall be submitted to the consent authority confirming location, depth, groundwater levels and geology.</p>
17.	<p>Following the commissioning of the treatment and land treatment system, the consent holder shall in any one day of January, March, May, July, September and November each year, obtain representative samples of the treated wastewater from the tap/valve installed under Condition 14 of this consent. The samples shall be analysed for the following parameters and results submitted with the annual report required by Condition 22:</p> <ul style="list-style-type: none"> <li>a) Biochemical oxygen demand (5 day);</li> <li>b) Total suspended solids;</li> <li>c) Total Nitrogen;</li> <li>d) Total Phosphorus;</li> <li>e) Escherichia coli; and</li> <li>f) pH.</li> </ul>

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| 18. | <p>a) If the number of connections to the WWTP is less than 450, the results collected under Condition 19 of this consent shall not exceed the following 12 month rolling mean limits:</p> <ul style="list-style-type: none"><li>i. 50 milligrams per litre of biochemical oxygen demand (5 day);</li><li>ii. 30 milligrams per litre of total suspended solids;</li><li>iii. 10 milligrams per litre of total phosphorus;</li><li>iv. 10,000 colony forming units per 100 millilitres of Escherichia coli (rolling 12-month geometric mean).</li></ul> <p>b) If the number of property connections to the WWTP is greater than 450 the results collected under Condition 19 of this consent shall not exceed the following 12 month rolling mean limits::</p> <ul style="list-style-type: none"><li>xi. 20 milligrams per litre of biochemical oxygen demand (5 day);</li><li>xii. 30 milligrams per litre of total suspended solids;</li><li>xiii. 10 milligrams per litre of total phosphorus;</li><li>xiv. 10,000 colony forming units per 100 millilitres of Escherichia coli (rolling 12-month geometric mean).</li></ul> |
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19	<p>a) The consent holder shall as part of the Operations and Maintenance Manual required under Condition 23, establish a water quality monitoring program within the unnamed tributaries at upstream and downstream at or about locations marked SW3, SW4, SW6, SW7, SW8, and Lake shore locations at or about SW9, SW10, SW11 and applicable groundwater monitoring wells required as part of Condition 16 shown on plan ORCxxxx.</p> <p>b) The water quality monitoring program shall collect samples on a quarterly basis and analyse water samples for:</p> <p>c) BOD5;</p> <ul style="list-style-type: none"><li>i. Total Phosphorous;</li><li>ii. Total Nitrogen;</li><li>iii. Nitrate-N;</li><li>iv. NH<sub>4</sub>-N; and</li><li>v. Field measurements of pH, EC and dissolved oxygen.</li></ul> <p>d) Seasonal sampling for the duration of the consent, that is, spring, summer, autumn and winter (total of four samples per year) prior to the commissioning of the WWTP and ongoing after operation commences. The sampling during the year shall include at least one sampling event that is taken on the day of or the day following when rainfall in the preceding 24 hr period has exceeded 10 mm (wet weather event).</p> <p>e) An estimate of flow from the tributary at the time of sampling as set out in the Operations and Maintenance Manual required as part of Condition 23.</p> <p>f) The monitoring bores headworks are to be surveyed for contaminant protection integrity and water level measurements taken at the time of water quality parameter sampling.</p> <p>g) Prepare and provide to ORC a baseline report of the results and interpretation of the first seasonal monitoring compared with the pre-commissioned monitoring. The baseline report shall be submitted as part of the second years annual reporting in accordance with condition 22.</p> <p>h)The consent holder shall review the water quality monitoring program five years after the WWTP is operational (and every five years after that) and confirm the program's continued suitability for identifying effects and if the frequency of sampling at some or all sites can be reduced. Program changes shall submitted as part of an update to the Operations and Maintenance Manual.</p>
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20	<p>An assessment of the soil conditions shall be undertaken by a suitably qualified and experienced practitioner on a two-yearly basis until such time as the consent authority determines the effects of the disposal to land are acceptable. The assessment shall include:</p> <ul style="list-style-type: none"> <li>a) Four soil samples shall be collected at random from within the Land Treatment Area, at the following depths <ul style="list-style-type: none"> <li>i. 0 -20 cm</li> <li>ii. 30 – 50 or at the application depth</li> <li>iii. 80 – 100 cm</li> </ul> </li> <li>b) The four soil samples from each depth shall then be composited and analysed for the following: <ul style="list-style-type: none"> <li>i. Exchangeable Cations (Sodium, Potassium, Magnesium, Calcium);</li> <li>ii. Olsen P;</li> <li>iii. Total Phosphorus</li> <li>iv. Cation exchange capacity;</li> <li>v. Base saturation;</li> <li>vi. Total carbon;</li> <li>vii. Total Nitrogen;</li> <li>viii. pH; and</li> <li>ix. Suite of seven heavy metals (Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Zinc)</li> </ul> </li> <li>c) At the application depth, soil shall also be tested for: <ul style="list-style-type: none"> <li>i. in situ infiltration capacity (Ksat) at the application depth;</li> <li>ii. indications of oxidation reduction potential (gleying) of the soil;</li> <li>iii. an infield assessment of soil structure</li> </ul> </li> <li>d) A control site shall be chosen outside of the Land Treatment Area, and samples collected and tested in accordance with condition's 20.A, 20.B, and 20.C. The control samples shall not be composited with the Land Treatment Area samples.</li> <li>e) The results of the soil assessment shall be submitted to the consent authority within following years annual report of undertaking the field work.</li> </ul>
21.	<p>All sampling techniques employed in respect of the conditions of this consent shall be acceptable to the Consent Authority. All analyses undertaken in connection with this consent shall be performed by an IANZ registered laboratory or otherwise as specifically approved by the Consent Authority.</p>

22.	<p>The consent holder shall, following the commissioning of the WWTP, forward an annual report in writing to the Consent Authority by 1 September each year. The annual report shall cover the preceding calendar year 1 July to 30 June and shall report on compliance with the consent. The report shall include:</p> <ul style="list-style-type: none"> <li>a) A copy of all analytical results for the year;</li> <li>b) A summary of the year's monitoring results, in context of the previous years' results and baseline report;</li> <li>c) Comments on compliance with the conditions of this discharge permit;</li> <li>d) Details of the cut and carry operation including the number of harvests, mass harvested, dry matter Nitrogen concentration;</li> <li>e) Details of the Nitrogen balance including the number of existing (as at the date of consent) septic tanks in Kingston that are connected to the communal scheme and the Total Mass of Nitrogen allowed to be lost under condition 11.</li> <li>f) A summary of complaints received, the validity of each complaint and any corrective action taken;</li> <li>xv. A summary of any malfunctions or breakdowns and the corrective action taken.</li> </ul>
23	<p>Prior to commissioning the wastewater treatment plant and land treatment system, the consent holder shall prepare and forward an Operations and Management Manual to the Consent Authority for the treatment and land treatment system to ensure its effective and efficient operation at all times.</p> <p>The system shall operate in accordance with this manual at all times, which shall be updated as appropriate. The manual shall be to the satisfaction of the Consent Authority and include, as a minimum:</p> <ul style="list-style-type: none"> <li>a) A brief description of the treatment and land treatment system, including a site map that shows the location of the treatment system, discharge location, sampling sites and the drainage network;</li> <li>b) Key operational matters including weekly, monthly and annual maintenance checks;</li> <li>c) Monitoring requirements and procedures;</li> <li>d) A management plan for the cut and carry operation including procedures for harvesting grass/lucerne from the site and for maximising grass/lucerne growth and Nitrogen uptake by grass/lucerne such as soil tests, supplementary nutrient additions and pest and weed control;</li> <li>e) Contingency plans in the event of system malfunctions (including provision for the removal and disposal of effluent by tanker truck should there be prolonged system failure);</li> <li>f) The means of receiving and dealing with any complaints;</li> <li>g) Key personnel and contact details; and</li> <li>h) Emergency contact phone numbers.</li> </ul>
24.	<p>At all times, the consent holder shall ensure that the Consent Authority has a copy of the most recent version of the Operations and Management Manual.</p>
25.	<p>Records of maintenance, complaints, malfunctions and breakdowns shall be kept in a log and be made available on request.</p>

26.	The wastewater treatment plant and land treatment system shall be serviced at least once every 12 months by a qualified person with at least two years' experience in the maintenance of such systems. The servicing shall be in accordance with the Operations and Management Manual.
<b>General</b>	
27.	No ponding or surface run-off of effluent shall occur as a result of the exercise of this consent.
28.	This permit does not authorise the discharge of sludge to land or water.
29.	<p>If the consent holder:</p> <p>a) Discovers koiwi tangata (human skeletal remains), waahi taoka (resources of importance including Pounamu/greenstone), waahi tapu (places or features of special significance) or other Maori artefact material, the consent holder shall without delay:</p> <ul style="list-style-type: none"> <li>(i) Notify the Consent Authority, Ngai Tahu and New Zealand Historic Places Trust and in the case of skeletal remains, the New Zealand Police; and</li> <li>(ii) Stop work within the immediate vicinity of the discovery to allow a site inspection by the New Zealand Historic Places Trust and the appropriate Runanga and their advisors, who shall determine whether the discovery is likely to be extensive, if a thorough site investigation is required, and whether an Archaeological Authority is required.</li> </ul> <p>Site work shall recommence following consultation with the Consent Authority, the New Zealand Historic Places Trust, Ngai Tahu, and in the case of skeletal remains, the New Zealand Police, provided that any relevant statutory permissions have been obtained</p> <p>b) Discovers any feature or archaeological material that predates 1900, or heritage material, or disturbs a previously unidentified archaeological or heritage site, the consent holder shall without delay:</p> <ul style="list-style-type: none"> <li>(i) Stop work within the immediate vicinity of the discovery or disturbance;</li> <li>(ii) Advise the Consent Authority, the New Zealand Historic Places Trust, and in the case of Maori features or materials, Ngai Tahu, and if required, shall make an application for an Archaeological Authority pursuant to the Historic Places Act 1993; and</li> <li>(iii) Arrange for a suitably qualified archaeologist to undertake a survey of the site.</li> </ul> <p>Site work shall recommence following consultation with the Consent Authority.</p>

**Review**

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| 30. | <p>The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months of each anniversary of the commencement of this consent, for the purpose of:</p> <ul style="list-style-type: none"><li>a) Determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which becomes evident after the date of commencement of the consent; or</li><li>b) Ensuring the conditions of this consent are consistent with any National Environmental Standards, Regulations, relevant plans and/or the Otago Regional Policy Statement; or</li><li>c) Requiring the consent holder to adopt the best practicable option, in order to remove or reduce any adverse effect on the environment arising as a result of the exercise of this consent.</li></ul> |
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Appendix 1: Manawhenua values discussed with Aukaha

Mana Whenua - values to consider	QLDC - Preliminary assessment of effect on Mana Whenua value	QLDC - Proposed mitigation (design response etc)	Mana whenua review of QLDC assessment	Mana whenua consideration of potential impact/opportunity	Mana whenua feedback/requested response from QLDC	QLDC Response to Mana whenua request
<b>Nohoaka</b>	No operative or non-operative nohoaka within or adjacent to the proposed development site.	n/a	Agreed	No impact identified	n/a	n/a
<b>Statutory acknowledgment areas</b>	The assessment of environment effects concludes there will be no adverse effects on surface water and less than minor effects on the receiving environment. The latter is largely a result of ridding the township of individual septic tanks and introducing improved wastewater treatment (community collection).	The overall wastewater scheme is the response to reducing adverse effects on the environment due to wastewater. Allowance of overflows are also being designed into the Project; however, this is subject to a separate assessment for the wastewater treatment plant.	Agreed – Implementation of a WWTP should reduce adverse effects to the receiving cultural landscape (Whakatipu-wai-Māori Statutory Acknowledgement Area), when compared to many individual, domestic on-site treatment plants. Application pertains to a Notice of Requirement for areas where a sub-surface drip is to be installed (through consultation of a discharge to land resource consent application). This area is to be fenced off and used for growing produce by the farmer who farms this land. The use of crops to help increase nutrient/contaminant absorption would, further, reduce adverse effects on the receiving cultural landscape.	No impact identified	N/A	n/a
<b>Wāhi tūpuna (ancestral landscapes)</b>	Land treatment area is outside identified wāhi tūpuna.	n/a	Agreed- manawhenua have a large degree of association to the area, as is evident through Takerehaka, ara tawhito and documented accounts of mahika kai. However, the wāhi tūpuna that encompass these values have been altered through consultation of the QLDC PDP to allow for development in this area. For this reason, the Notice of Requirement to change these land parcels to discharge areas for wastewater treatment, all of which is outside the Wāhi Tūpuna, do not need mitigation measures – to come in further applications for a discharge of contaminants to land	No impact Identified	N/A	n/a
<b>Wai (water quality)</b>	Introducing a community collection network, improving wastewater treatment and having a land treatment area managed via a cut & carry regime, is actually deemed to reduce the current environment effects i.e. the project actually reduces the total nitrogen leaching into the environment.	n/a	Agreed – With the proposed development in the area adding up to a further 700 individual domestic wastewater treatment systems, it would be far more difficult to monitor and find the source of adverse effects to the receiving cultural landscape, when compared to one community WWTP. This is largely a result of individual maintenance capacity and efforts varying from household to household. Notice of Requirement should not require too many mitigation measures	Monitoring bores to monitor nutrients leaching to the environment is a concern. However, this is to be dealt with under an application for discharge to land. Ultra vires for a Notice of Requirement	N/A	n/a

Appendix 1: Manawhenua values discussed with Aukaha

<p><b>Wetlands</b></p>	<p>QLDC has identified three wetland areas within or adjacent to the proposed land treatment area. It is unclear whether these are manmade or modified natural wetlands (for duck hunting and/or farm animal water source) and how these might connect to surrounding water courses. There is also an ephemeral pond located within the proposed land treatment area.</p>	<p>The land treatment area proposes to use subsurface drip irrigation. This means chances for surface water contamination is low. However, a condition is proposed for all wetland areas (natural or manmade) to have a 10 metre non-irrigated planted riparian buffer zone. Proposed planting includes flax, kowhai, toetoe, pohuehue and other native species. It is also proposed that any ephemeral ponds have a 5 metre non-irrigated buffer zone.</p>	<p>It would be good to know what ecological services (fisheries values, are there any significant or rare fauna or flora populations supported by these waters) these wetlands do provide and how they connect to the surrounding water tables so as to assess better how such a discharge would effect the water quality of these wetlands. This knowledge is more important to assess the effects of a discharge than a Notice of Requirement. However, as the intention of this NOR is to, ultimately, allow for discharge, it would be good to know</p>	<p>Discharges of contaminants to land, especially subsurface, have the potential to contaminate the surrounding water tables, resulting in contaminants entering unique systems such as wetlands. As this application relates to the rezoning of land adjacent to wetlands for discharge of wastewater to land, consideration of the effects of this discharge to the neighbouring wetlands is important for the preservation of mauri of these taoka, and the wider receiving cultural landscape. A 10 metre indigenous-planted buffer between these wetlands and the discharge of wastewater would help reduce possible cross-contamination through the plants absorbing discharged nutrients from the soil before it reaches the wetlands</p>	<p>For this mitigation measure to be effective, plants would have to be well established in the area. Change of condition to require this planting to be established for at least a year before discharge occurs.</p> <p>Plants should also be monitored de-weeded and, should one die within five years of being planted, this tree should be replaced with another individual of the same species</p> <p>Plants should be locally-sourced, so as to ensure they are genetically similar to naturally-occurring individuals of the same species</p>	<p>Agreed and conditions resource consent accordingly</p>
<p><b>Margins of water courses</b></p>	<p>There are no discernible water courses located within the proposed land treatment area. However, this is an unnamed tributary located to the northwest of the proposed land treatment area.</p>	<p>Protection measures will be in place during construction to mitigate construction related effects on the environment. These will be described in an environmental management plan; of which, will be a contractual requirements. This may include (but is not limited) silt fencing, bunding &amp; settling tanks.</p>	<p>Agreed – unnamed tributary will need to be properly managed and cared for through the consenting of the subdivision to go in as this trib runs through the land airmarked for subdivision. No concerns relating to a Notice of Requirement</p>	<p>No impact identified</p>	<p>N/A</p>	<p>n/a</p>
<p><b>Maori heritage and archaeological values</b></p>	<p>An archaeological risk investigation has identified historic Maori land use in the area; however, there are no recorded archaeological sites within the proximity of the land treatment. Furthermore, there are no listed heritage features listed on the Heritage New Zealand Pouhere Taonga Rārangi Kōrero/The List. Therefore, it has been noted that higher risk areas for Māori occupation are closer to Lake Wakatipu, Allen Creek and the</p>	<p>It is proposed physical works for the proposed land treatment area can commence with an Accidental Discovery Protocol (ADP) in place. A contractor briefing will be undertaken to ensure that the contractors understand the procedures of an ADP and provide them with information regarding what archaeological material could be uncovered.</p>	<p>Lack of recorded Māori Archaeological findspots does not, under any circumstances, equate to lack of association. Manawhenua have strong association to the landscapes around Takerehaka/Kingston, as is evident with the large array of ikoa tawhito and korero of the area.</p>	<p>Agreed</p>	<p>- If any Māori material is discovered, NZHP will assist the Queenstown Lakes District Council in contacting all relevant parties, including HNZPT and mana whenua. If any Taoka Tūturu are uncovered, they will, prima facie, belong to the Crown. NZHP, in collaboration with mana</p>	<p>Agreed</p>

Appendix 1: Manawhenua values discussed with Aukaha

	Mataura River. This denotes a lower risk for the land treatment area that is located inland ~2km from the lake shore and 8km from the Mataura River.				<p>whenua, shall submit them for custody until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.</p> <p>- A manawhenua representative or archaeologist approved by Te Rūnanga Ōtākou should be contacted and be present should any archaeological finds of Māori origin be uncovered.</p>	
<b>Biodiversity &amp; Mahika kai</b>	Apart from the wetlands and watercourses already described; there are no clear biodiversity areas located within the proposed land treatment area. The existing land use is privately farmed; predominately with pasture and some forage crops. The surrounding area is not generally intensively farmed, only some winter grazing of dried-off dairy cows and grass pasture. The remainder of the large run property is mostly low intensity grazing by sheep and cows.	n/a	Agreed	No Impact identified	N/A	n/a
<b>Air &amp; Atmosphere</b>	It is considered that no objectionable emissions will come from land treatment area itself. However, there is minor risks associated with construction.	Protection measures will be in place during construction to mitigate construction related effects on the environment. These will be described in an environmental management plan; of which, will be a contractual requirements. This may include (but is not limited) silt fencing, bunding & settling tanks.	Agreed	Agreed	N/A	n/a



## Written Approvals of Persons Likely to be Adversely Affected

I /We (Please print full name) Mike Sherman for Land Information NZ  
of (Address) LINZ, 112 Tuam Street, Christchurch, 8023

I /we have read the full application for the proposal by (Applicant)  
LEI on behalf of QLDC

for a Resource Consent (Number) (TBC when lodged) to Create a  
Wastewater Land Transfer Area to Create a Wastewater Land Transfer  
Area

and give my/our written approval to the proposed activity/activities.

In signing this written approval I/we understand that:

- The consent authority must decide that I/we am/are no longer an affected person, and disregard adverse effects on me/us
- That /we I may withdraw my/our written approval in writing before the hearing, or if no hearing before a decision is made on the application.

Signature/s *MA Sherman* Date 25/05/2020

*(or person authorised to sign on behalf of affected party/parties)*

Phone 027 7052211 Fax \_\_\_\_\_ Email msherman@linz.govt.nz

**Please note:** If this application is subsequently notified the above approval does not constitute a submission as required under Section 96 of the Resource Management Act 1991.

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Date: 25/05/2020

This approval is specific to the above application and is for the purposes of s95 of the RMA. It is not indicative of any associated arrangement with the Commissioner of Crown Lands or other statutory approval which may be required from Land Information New Zealand in regards to the proposed activity. You are required to obtain authorisation from the Commissioner of Crown Lands in order to undertake any activities on land owned or administered by Land Information New Zealand. We look forward to receiving that application in the near future.

*Mike Sherman*

Mike Sherman  
Portfolio Manager  
Crown Property



