



16 March 2021

Otago Regional Council  
Terrace Junction  
1092 Frankton Road  
QUEENSTOWN 9300

File: *Kingston HIF Wastewater Scheme*  
Your Ref: *RM20.164.01*

Dear Sarah

### **RFI RESPONSE – CONSENT APPLICATION RM20.164.01: DISCHARGE PERMIT - LAND**

Please find our response to the request for further information for Consent Application RM20.164.01. This cover letter summarises Otago Regional Council queries and the applicant's responses with further detail provided in the accompanying memorandum from LEI with attachments.

The following matters have been raised (*italics*) and responded (*non-italics*) to:

#### **Surface Water and Ecological Assessment**

*ORC has requested an ecological assessment. The ecological assessment must include the following, but not limited to:*

- *The wetland area adjacent to LTA 2;*
- *The unnamed tributary and any flow path from the wetland identified;*
- *The lake margins at Kingston Township (including Kingston Creek and the unnamed tributary confluences);*
- *The pond within LTA 1 and any flow path with Kingston Creek identified; and*
- *Methods to avoid, remedy or mitigate any adverse effects on the aquatic values identified in the assessment, including any updated water quality monitoring requirements.*

An ecological assessment of the areas listed above has been undertaken by Ruth Goldsmith at Ryder Environmental. Ryder's assessment concluded that the surrounding ecological environment was not sensitive to the applicant's proposal therefore they considered that **effects of the proposed activity on surrounding ecology will be less than minor.**

#### **Groundwater Assessment**

*A hydrogeological assessment of the groundwater system beneath the LTA and Kingston is required to understand the sensitivity of the environment (as required by Schedule 4, Part 6(1)(d) of the Resource Management Act 1991). The assessment must at least include the following (but not limited to):*

##### *Groundwater levels and an assessment of flow direction*

Seven piezometers have been installed within Kingston Station to understand groundwater depth and flow beneath the proposed Land Treatment areas. Bores in the Kingston area and bores south on Trotters Plain near the Mataura River have also been considered for

the flow direction assessment. Groundwater has been measured to be approximately 40 m bgl beneath the land treatment areas and 6 to 16 m bgl at the toe of the terminal moraine at the land treatment areas downgradient boundary. Groundwater flow analysis has confirmed the flow direction is to the north of the land treatment area location toward Lake Wakatipu as presented in the AEE.

Groundwater quality, including the groundwater quality at the LTAs and within Kingston

Five of the seven bores have been sampled for groundwater determinands. Groundwater quality within the Kingston Township has also been reviewed for determinand levels. The sampling results are attached in Appendix of the LEI memo.

Effects of the discharge on the groundwater environment and receiving water bodies, including effects of pathogens and nitrogen; and

The proposed activity has been assessed against the existing (baseline) groundwater environment and it has been determined that there are no additional nutrient effects over and above the baseline and therefore **the effects of the proposed activity on the groundwater environment are considered less than minor.**

Methods to avoid, remedy or mitigate any adverse effects on the groundwater quality identified in the assessment, including any updated monitoring requirements.

The results of the groundwater study confirm the AEE analysis that no adverse effects on the groundwater environment are likely due to the proposed activity, therefore no mitigation is required.

## **System Design, Nitrogen Loading and Plant Uptake**

**1) An assessment on nitrogen application, uptake and leaching values on a monthly basis is required to address the effects of nitrogen applied to the LTAs during periods where there is low or no crop growth. The assessment must include (but not limited to):**

- *Potential dry matter production in each month;*
- *Potential nitrogen uptake in each month;*
- *Nitrogen applied in each month, including seasonal variations in effluent quality;*
- *Nitrogen surplus or deficit relative to potential plant uptake;*
- *Nitrogen uptake based on available nitrogen and potential plant uptake;*
- *Nitrogen leaching based on available nitrogen and potential plant uptake; and,*
- *Methods to manage nitrogen leaching during low growth periods or wet periods.*

The parameters used to assess the nitrogen leaching are a combination of direct inputs to the OVERSEER modelling and inherent in the modelling code. Figures 1 and 2 below present typical plant growth rates and the OVERSEER model summaries of the parameters used, respectively.

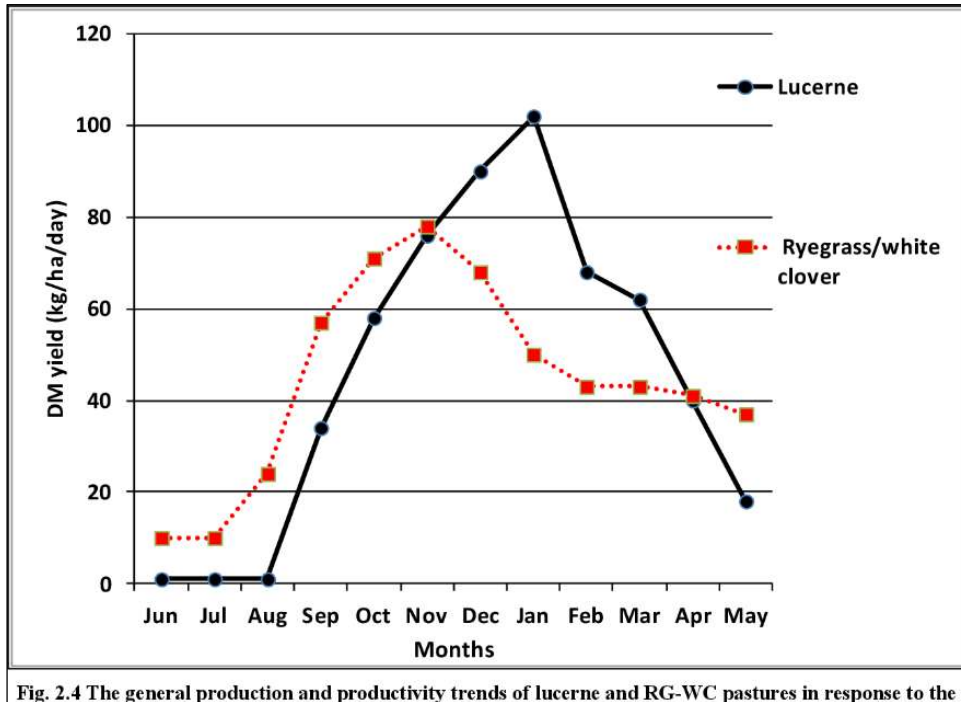


Fig. 2.4 The general production and productivity trends of lucerne and RG-WC pastures in response to the

Figure 1. Typical Lucerne Growth Pattern

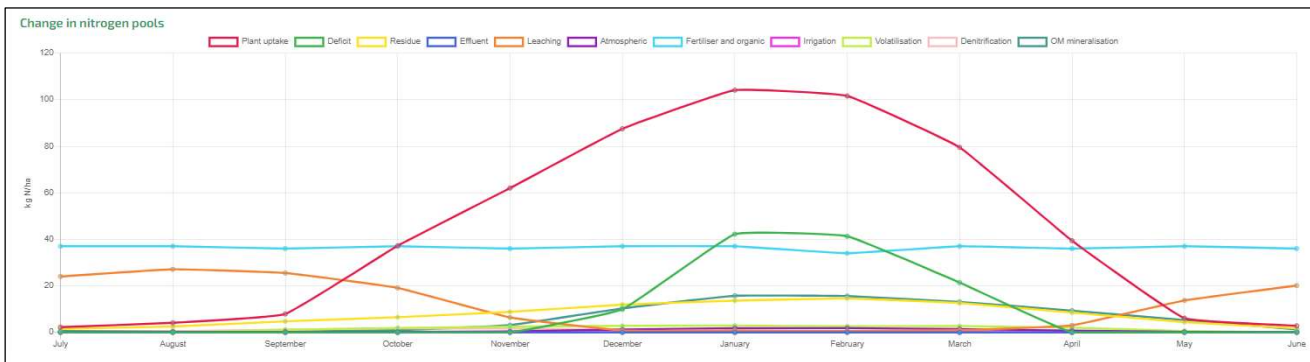


Figure 2. Full Capacity 900 cubic metres over 365 days

LEI does not use a separate spreadsheet model to predict monthly nutrient leaching as it has confidence that OVERSEER can be accurately used for this. LEI's experience is supported by the Environment Court accepting the use of OVERSEER for predicted nutrient leaching rates for land application of wastewater.

Within the consent conditions and LTA design are conditions and requirements to limit leaching. These include:

- limiting maximum daily applications to less than 30% of the unsaturated hydraulic conductivity;
- weekly irrigation depth to less than half the soil WHC;
- limiting annual nitrogen loads;
- maximum dripper spacings;
- maximum drip line width; and,
- depth of drip lines.

The nitrogen leaching when considered with the regional nitrogen balance means that further mitigation measures are not required.

*2) A leaching rate of 140 kg N/ha/year is proposed. This rate is high when compared to the 15 kg N/ha/year limit under Rule 12.C.1.3. Please provide further information to support the high leaching rate and any methods or alternatives to avoid, mitigate or minimise the high leaching rate.*

It is inappropriate to compare the LTA leaching rate to the average property limit of 15 kg N/ha/yr under the ORC rule on a single Ha by Ha basis. The leaching is increasing under the LTA from a baseline of 16 kg to 142 kg N/ha/yr, while the regional nitrogen mass is decreased with the implementation of the community scale WWTP and LTA. The full mass balance for various development scenario's is presented in the AEE and expanded in the S92 response memo.

*3) Please confirm that 200mm depth of dripper lines is suitable when considering plant uptake of nutrients and freezing levels.*

A dripper line depth of 200 mm is within the lucerne root zone that can be well over one metre and the plants will be able to access the nitrogen that is applied to the LTA as it moves through the soil profile. In addition, capillary rise will take nutrients up to any shallow roots.

Temperatures at the 10cm depth are not expected to be below 0, when compared to the nearest soil monitoring site at Cromwell. A dripper depth of 20cm is sufficient to prevent the lines from freezing in winter at this location.

*4) Please provide information on how the flow rates have been determined and information on local conditions that may affect flow rates, such as seasonal changes in occupancy that may affect the treatment ability of the wastewater treatment and disposal system and how the effects of this can be avoided, mitigated or remedied.*

The wastewater flows and influent characteristics from the Kingston community have been based on knowledge and data of similar townships and with direction of QLDC engineering staff. Jacobs have designed and staged the wastewater treatment facilities for the expected influent flows and strength. Flows equal 3 people/dwelling x 250 L/p/d x 1175 = ~900 m<sup>3</sup>/d and x 2 for peak wet weather flow. The village zone map limits the area of the subdivision for non-residential purposes.

*5) Further analysis of wastewater inputs (including industrial/trade premise sources) is required. As such please provide a detailed analysis of this and confirm that the proposed system is designed to treat such inputs.*

The zoning limitations that constrain the subdivision support the assumption that the inflows will be normal domestic strength influent. The more important factor relevant to this application are the wastewater strengths of the applied water to land. Limits for the key parameters are proposed in Conditions' 8, 14 and 14 b of consent. These must be complied with regardless of the influent strength.

## **Water Reticulation**

*The existing water supply for Kingston residences is from bores downgradient of the discharge. The location and timing of this reticulation in relation to the commencement of the discharge is relevant in terms of understanding the existing environment for the assessment of effects. Please confirm the location and timing of the reticulated community supply.*

Only a small number of existing houses rely on bore water supply. The majority of the existing Kingston township collects and stores rain water for potable use (pers comm QLDC). Furthermore, there is small recent development area (Lakefield Estate) that is serviced from a shallow bore adjacent to Kingston Creek. This reticulated supply is only serves as a supplementary supply to onsite rainwater collection and tank storage as every

site is required to have 30m<sup>3</sup> of storage. This bore is detailed in Section 2.8 and the effects assessed in Section 6.3.8 of the AEE.

The bore associated with the new subdivision reticulated community supply was installed in June 2020. The location of the bore is in the same location as was proposed in the AEE (see image below). The bore number is F42/0147 and the location coordinates are NZTM: 1265516E, 4970488N. This bore is not downgradient of the LTA.

The reticulated system is expected to be commissioned in conjunction with the development of the subdivision. The connection of properties other than the new subdivision will be determined between QLDC and each property.

### **Cumulative Effects**

*The definition of effect under Section 3 of the RMA includes any cumulative effect which arises over time or in combination with other effects. Schedule 4 Part 6(1)(b) requires an assessment of the actual or potential effects on the environment of the activity. This includes cumulative effects. Section 6.7 of the application has not specified or assessed any cumulative effects of the proposal. An assessment of cumulative effects is required including identification of any cumulative effects on water quality of surface and groundwater. This must include an assessment on the effects arising over time and the effects arising in combination with other effects.*

The cumulative effects assessment has been based on the nutrient mass balance assessments presented that include the current village remaining or joining the to the reticulated wastewater treatment plant. Overall, there is predicted to be a net reduction in nutrient loss from the discharge of wastewater over what is currently occurring within the catchment.

The addition of a reticulated wastewater network creates the opportunity for newly built houses that are infilling sections at Kingston or building on recently approved subdivisions to avoid installing onsite wastewater discharges, that are permitted by ORC's Water plan.

Based on the reduction in catchment nutrient loading, there is likely to be positive cumulative effects. These effects include a positive impact on Lake Wakatipu's nutrient load, reduced E.Coli risk and an increase in the communities ability to meet its housing needs.

Yours Sincerely

**Queenstown Lakes District Council**

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