



Ref: 21027.10

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By email to: Sarah.davidson@orc.govt.nz

**RE: Kingston Wastewater Discharge Application RM20.164
s92 Response - Aquatic Ecological and Surface Water
Technical Review**

1 Introduction

e3Scientific Limited (e3Scientific) was engaged by Otago Regional Council (ORC) to provide an aquatic ecology and surface water technical review on a consent application by Queenstown Lakes District Council (QLDC) to discharge treated wastewater into land from a proposed community reticulated wastewater scheme for Kingston. e3Scientific provided an initial pre-application review of the information provided in the proposed scheme in 2020 (e3Scientific review dated 21 February 2020) and then completed a review of the full consent application prepared by Lowe Environmental Impact (LEI) in July 2020.

As a result of e3Scientific's review of the consent application dated 24 July 2020 and the Otago Regional Council consenting processes further information (s92) was requested. The response to this s92 is, the memorandum: RFI Queenstown Lakes District Council – Kingston Township Wastewater Discharge Application RM20.164.01, which has been prepared by LEI and is dated 15 March (LEI, 2021).

Otago Regional Council (ORC) have since engaged e3Scientific to provide a technical review of the aquatic ecological and surface water components of the response to the s92 request dated 15 March 2021.

1.1 Information Requested

e3Scientific's request for more information in July 2020 included a detailed ecological and surface water assessment of all surface water bodies which could be affected by the discharge. This ecological assessment was to include, but not be limited to, the following areas:

1. The wetland area adjacent to LTA 2;
2. The unnamed tributary and any flow path from the wetland identified;
3. The lake margins at Kingston Township; and
4. The pond within LTA 1 and any flow path with Kingston Creek identified.

Further to this any methods to avoid, remedy or mitigate any adverse effects on the aquatic values identified within the assessment, including updated water quality monitoring requirements, should be provided.

The assessment was to provide a good understanding of the sensitivity of the freshwater receiving environments and identify any further mitigation that may be required.



1.2 Information Received

Ryder Environmental Limited (REL) completed an ecological assessment titled 'Kingston Township Community Wastewater Aquatic Ecology Assessment November 2020' of the surface water bodies that could be affected by the discharge on behalf of LEI and QLDC. The findings of this review are presented below.

2 Methodology

Eleven locations for surface water samples were identified which include the areas specified within the request for information. However, the pond within land treatment area (LTA) 1 (SW5), had been drained prior to sampling and no habitat was present. No sampling was therefore undertaken, and this water body is not discussed further within the report. Based on this, a total of ten surface water sites were sampled for water quality and nine sites were sampled for macroinvertebrate in October 2020.

The methodology undertaken during the ecological assessment included a variety of methods depending on the type of habitat present. At all sites a general description of available aquatic habitat was provided, and a visual assessment of flow paths were undertaken. Water quality measurements were made at sites on the same day, and collection of benthic macroinvertebrates using a kicknet were collected. Fish were sampled using over-night sets of baited Gee-minnow traps (up to three per site) and fyke nets if suitable habitat was present. e3Scientific finds the range of sampling methodologies used to complete the ecological assessment to be appropriate.

3 Surface Water Connectivity

REL's assessment found that there are no existing surface water connections between the proposed LTA and the identified surface water bodies within the vicinity. Including a potential easterly surface water flow towards Kingston Creek highlighted by e3Scientific in July 2020. REL conclude that the most likely way surface water bodies could be impacted by the effluent is via groundwater connections to the proposed LTA.

4 Water Quality

Water quality results appeared to vary between the LTA pond, unnamed tributary, Kingston Creek and the receiving water body, Lake Wakatipu. Outside of the LTA pond (Pond 2) which unsurprisingly exhibited degraded water quality, Kingston Creek also exhibited degraded water quality, as did Lake Wakatipu with regards to total nitrogen and *Escherichia coli* (*E. coli*) concentrations.

The Regional Plan: Water for Otago (2018) Schedule 15 limits were exceeded for a number of samples and analytes but as REL point out, based on a single round of sampling there is not sufficient data to assess water quality in Lake Wakatipu with regards to water quality limits set out in Schedule 15 of the Regional Plan: Water for Otago (2018).

This data provides a good baseline for water quality in the surrounding surface water sites and the receiving water body, however more sampling would be required to affirm water quality characteristics of these water bodies.

5 Macroinvertebrates

Macroinvertebrate community index scores showed that water quality and/or benthic habitat condition ranged from 'poor' to 'good'. Sites that were found to

be 'good' included the mid-stream sample of the unnamed tributary and the downstream sample of Kingston Creek. Although not collected in the survey REL state that the At Risk – Decliningⁱ freshwater mussels (*Echyridella menziesii*) are known to be present in Lake Wakatipu. It is not stated if they are believed to be within the vicinity surveyed or not.

6 Fish

The At Risk – Decliningⁱⁱ kōaro and longfin eel were found in both downstream samples of the creeks and Lake Wakatipu, respectively. Common bully and brown trout were all caught in the lower reaches of the two creeks sampled and one of the lake sites. A small brown trout was also caught at the upstream Kingston Creek site. The habitat within the lower reaches of the creeks are likely more suitable for fish breeding and feeding as the higher reaches of these creeks appear to be degraded via domination of soft fine sediments and invasive aquatic plants.

7 Proposed Mitigation and Monitoring

REL conclude that the only pathway for contaminants from the LTA to surface water bodies is via groundwater. Also, based on macroinvertebrate sampling the existing aquatic communities in the vicinity of the LTA are expected to be tolerant of any potential contaminant input should leaching occur. Therefore, any adverse effects on aquatic communities are believed to be less than minor. No further mitigation, monitoring nor management was recommended in REL's report based on their assessment and they refer to monitoring recommended by e3Scientific in the pre-application review (dated 21 February 2020).

e3Scientific accepts that no surface contaminant pathways from the LTA to receiving water bodies exist and the macroinvertebrate communities are generalists with relative tolerances to degraded habitats. However, based on statements in the application (LEI, 2020) that the proposed wastewater treatment plant (WWTP) will not increase adverse effects on the surrounding ecology and water quality, and will look to improve water quality and by association ecology, e3Scientific believe a greater baseline dataset should be collected to ascertain current state of the environment as well as post-WWTP operational data to validate the applications statements.

ⁱ Invertebrate conservation status from Grainger, *et al.* (2018).

ⁱⁱ Fish conservation status from Dunn, *et al.* (2018).

8 Summary and Conclusions

Overall e3Scientific finds the REL report provides an appropriate characterisation of the existing surface water bodies ecology and a one-off water quality sampling event. This characterisation however does show that currently a number of the sites sampled exhibit degraded water quality parameters and aquatic habitat condition. At least two high value and At Risk species were observed within the lower reaches of the creeks and Lake Wakatipu and it is likely they would utilise a greater section of both creeks if habitat had not been degraded from soft fine sediment input altering benthic composition, invasive aquatic plants, and removal of riparian planting.

Lake Wakatipu at Kingston Beach is the receiving environment for any potential leaching of nutrients from the LTA via surface water or groundwater. The REL single water quality sampling event showed that there appear to be existing adverse effects on the water quality at this site due to nitrogen and *E. coli* concentrations. Given the classification of Lake Wakatipu as an outstanding water body by the National Policy Statement - Freshwater Management (NPS-FM) (MfE, 2020) and the requirement under Policy 5 of the NPS-FM to improve degraded water bodies (as classified under the National Objectives Framework (NOF)), further sampling to ascertain current quality should be undertaken.

Accumulative water quality effects of any groundwater contaminant loading from the LTA in conjunction with the apparent adverse effects of the individual septic tank system currently in operation within Kingston is a further consideration and is discussed further in Pattle Delamore Partners (PDP) technical memorandum. Ongoing monitoring of surface water sites would enable assessment of any accumulative effects occurring from the simultaneous operation of both the proposed wastewater treatment plant and the individual septic tank system.

9 Proposed Conditions of Consent

In order to establish that the proposed wastewater treatment system is not further exacerbating the currently degraded water quality and habitat condition in the vicinity it is recommended that the following conditions are included if consent is granted. These conditions are specific to surface water and ecology; however, the proposed surface water monitoring should be carried out in conjunction with the groundwater monitoring proposed in PDP's technical memorandum.

1. Surface water monitoring should be undertaken, in conjunction with groundwater monitoring, monthly for at least 12 months to provide a baseline of existing effects. This should be undertaken at the following sites from REL's baseline assessment:
 - SW1, SW2, SW3, SW6, SW7, SW8 (Creek Control Site), SW9, SW10 and SW11 (Lake Control Site).
 - Water quality analytes should be the same as those completed in the baseline assessment completed by REL in October 2020.
 - This data should be compiled into a report and provided to the ORC's Science team prior to the wastewater treatment plant becoming operational.

2. Ongoing surface water quality monitoring at the sites listed in Condition 1 (above) should occur quarterly, or more frequently if required by the baseline sampling results, once the proposed wastewater treatment plant is operational. This data should be provided to ORC within 1 month of collection and be uploaded to the QLDC website.

3. A 10 m buffer of native riparian vegetation between the LTA and the wetland and pond (Pond 2 in the REL report) should be planted to reduce the contaminant pathway to this waterbody.
 - Riparian planting should occur immediately following agreement from the leaseholder and should be maintained with any plant die-off being replaced.

4. A follow up ecological assessment of the sites completed by REL in October 2020 assessment should be completed in October following the wastewater treatment plants' first operational year. The reporting of this assessment should be provided to council within three months of completion.

If you have any questions regarding the information provided in this letter, please contact Bryony Miller on 021 883 381 or via email at bryony.miller@e3scientific.co.nz

Yours sincerely,



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References

- Dunn, N., Allibone, R., Closs, G., Crow, S., David, B., Goodman, J., . . . Rolfe, J. (2018). *Conservation Status of New Zealand freshwater fishes, 2017*. Wellington: Department of Conservation NZ Threat Classification Series 24.
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