In the matter of the Resource Management Act 1991

And

In the matter a resource consent application by Queenstown Lakes District Council to discharge treated wastewater to land for the purpose of disposing of wastewater from Kingston Township

Statement of evidence of Ralph Robert Henderson

23 December 2021

MEREDITH CONNELL

Solicitors:
J Beresford
PO Box 90750, Victoria Street West, Auckland 1142
DX CP24063
T: +64 9 336 7500
Joanna.beresford@mc.co.nz

Barrister:
Janette Campbell
PO Box 141, Shortland Street, Auckland 1140
T: +64 9 802 1430
janette@campbell.legal

Statement of evidence of Ralph Robert Henderson

1 Executive summary

1.1 Queenstown Lakes District Council (QLDC) is seeking consent to discharge treated wastewater to land from a communal wastewater treatment and disposal system servicing the township of Kingston.

1.2 Currently there is no reticulated water or wastewater systems servicing the township of Kingston and the majority of properties discharge wastewater to ground through individual on site schemes. Due to the limited treatment these systems provide and the proximity of domestic discharges to the lake there has long been a concern regarding the effects on water quality at Kingston.

1.3 To create an economy of scale to improve the affordability of a community scheme for the local community QLDC have rezoned an area of land adjacent to Kingston for residential development. In combination it is anticipated that these areas will enable Kingston to grow to approximately 1,200 lots. The proposed community system will provide water and wastewater services to service both the existing township and the more recently zoned area.

1.4 The proposed system will be staged to deliver more intensive treatment of the wastewater as the local community grows and will offer a higher level of treatment than existing onsite wastewater systems. The proposal disposes of the wastewater in a culturally sensitive manner by establishing land treatment areas that will move the location of discharges away from the lake to an area disconnected from any surface water bodies and with a greater separation to groundwater.

1.5 The key element of concern arising from the discharge is the management of the cumulative effects of nitrogen on the receiving environment. The Applicant has modelled the potential cumulative effects of nitrogen using the best available systems and has proposed extensive conditions of consent to monitor and manage the discharge of contaminants.

1.6 It is my overall conclusion that, based on the technical evidence supporting the application, the effects of the proposal will be no more than minor and the application is consistent with the relevant planning documents.

2 Qualifications and experience

2.1 My full name is Ralph Robert Henderson.

2.2 I hold the position of Senior Resource Management Planner / Principal with the with the environmental consultancy firm Boffa Miskell Limited, based in the firm's Queenstown office. I have been employed by Boffa Miskell since 2018.

2.3 I hold a Masters in Regional and Resource Planning from Otago University and am a full member of the New Zealand Planning Institute.

2.4 I have over 20 years' experience in statutory and environmental planning, effects assessment, policy analysis, plan preparation and administration, and public consultation, gained both in New Zealand and in the United Kingdom.

2.5 I have previously been employed by Queenstown Lakes District Council (**QLDC**) as a policy analyst. During this time, I was involved in the development of Plan Change 25 Kingston Village Special Zone for the Queenstown Lakes District Plan. Plan Change 25, which resulted in the rezoning of land adjacent to the existing Kingston township for residential expansion.

2.6 Prior to joining Boffa Miskell I was employed by the Otago Regional Council (**ORC**) as a policy analyst and as a consents planner. Since joining Boffa Miskell I have continued to work for the ORC as a consultant planner on a contractual basis. In this capacity I have processed consents for the renewal of community wastewater treatment plants in Otago and have processed consents for the installation of domestic scale wastewater plants in Kingston township.

2.7 I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Practice Note 2014. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

3 Role in the project and scope of evidence

3.1 I was engaged by Queenstown Lakes District Council in 2021 and my role in the project is to assist in the statutory planning processes.

3.2 I visited the site of the proposed wastewater treatment system and land treatment area on the 24th of November 2021.

3.3 The purpose of my evidence is to summarise the planning issues identified in the assessment of environmental effects and associated technical reports presented with the application and respond to matters raised by the submitters and the Council planner.

3.4 My evidence is set out as follows:

(a) An assessment of the application in terms of Part II of the Resource Management Act (**RMA**), and of Sections s104 , 105 and 107 in particular.

(b) An assessment of the submissions received relevant to my evidence.

(c) An assessment of matters raised in the s 42A report.

3.5 In preparing my evidence, I have reviewed the application documents as set out in Appendix 1 to this report.

3.6 I have read the evidence of Timothy Court-Patience, Dr Goldsmith and Mr Ellwood and rely on their evidence in relation to their areas of expertise.

4 Background

4.1 The evidence of Mr Court-Patience provides a detailed overview of the development of the current proposal and I do not wish to repeat this in detail. However, I do wish to note the process has originated as a community driven response to a local environmental and health issue. The Kingston community plan process identified a 20 year vision for Kingston to address these issues and two of the key community outcomes desired within that timeframe were:

> (e) To protect and enhance the quality of the Lake Wakatipu.
>
> (g) To provide the cost-effective reticulation of sewerage and water for the Township of Kingston.[1]

4.2 QLDC have worked actively to achieve the outcomes of Kingston 2020 and recognised the community outcomes in the 2007 Growth Management Strategy (GMS) [2]. QLDC subsequently worked in a joint venture arrangement with the owner of Glen Nevis Station to rezone land adjacent to Kingston to provide a scale of development that would enable the provision of a reticulated sewage and water system to both the new and existing urban areas (Figure 1)[3].

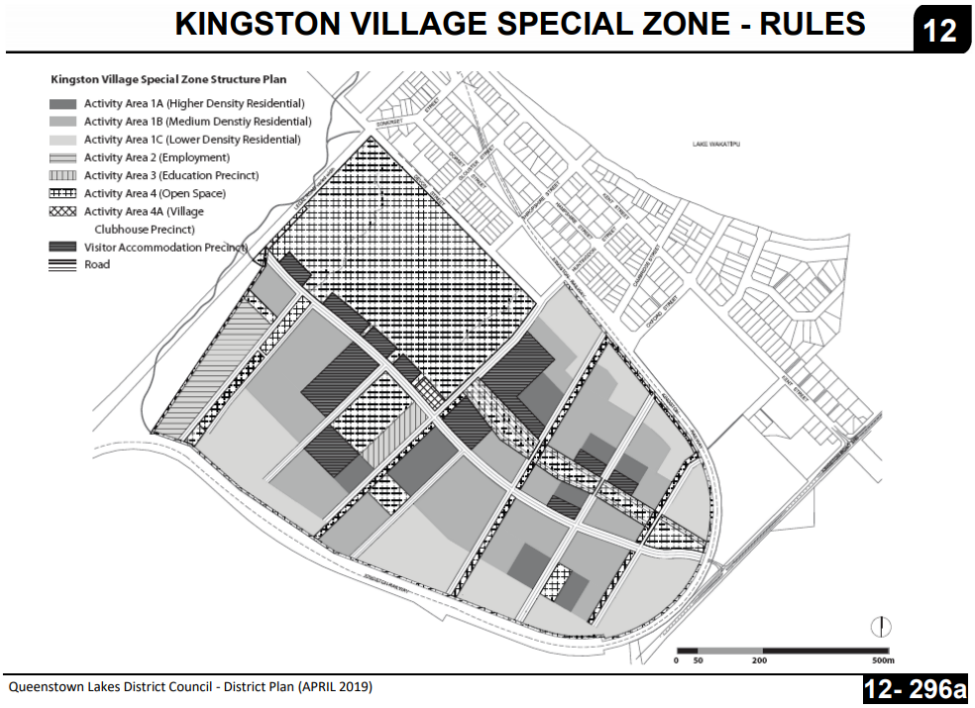

Figure 1: Area rezoned by Plan Change 25: Kingston Village Special Zone

4.3 Planning provisions have informed the design requirements for the proposed infrastructure, including the development capacity of the existing Kingston township and the area rezoned for development. In my evidence I will refer to the existing township as Kingston township and area proposed for additional development as the plan change area.

[1] QLDC Growth Management Strategy – Final, QLDC, April 2007
[2] QLDC Growth Management Strategy – Final, QLDC, April 2007.
[3] The plan change area is now owned by Kingston Village Limited (KVL)

4.4 As noted in the evidence of Mr Court-Patience, QLDC have pursued a separate process for the consenting of a community water supply and water treatment system for the Kingston community.

Proposed Wastewater Treatment Plant

4.5 The identification of an appropriate method of wastewater treatment and disposal requires an understanding of the wastewater characteristics and effluent quality and the characteristics of the area in which the discharge may occur.

4.6 Section 2 of the assessment of environmental effects (AEE) details the site investigation process and the characteristics of the site.[4] Further information on the underlying geology of the area and groundwater and surface flows was provided in response to a request for further information.[5] This is discussed in Section 4 of Mr Ellwood's evidence.

4.7 The assessment of potential wastewater flows in influent characteristics are described in Section 5 of Mr Ellwood's evidence. Growth within Kingston has occurred at a lower rate than other parts of the District and, as explained in Mr Court-Patience's evidence, the lack of reticulated water and wastewater is a factor limiting growth. However, the development of the plan change area and the provision of reticulated services may make Kingston an increasingly attractive and affordable option for residents.

4.8 As noted at paragraph 5.3 of the evidence of Mr Ellwood, it is anticipated that 90% of the wastewater will be domestic and up to 10% of the volume will be discharges from commercial or trade activities such as restaurants, cafes and tourist facilities. No trade waste influent is anticipated at this point and it is noted that activities requiring Offensive Trade Licence under the Health Act 1956 have either non-complying or prohibited activity status under the provisions of the Kingston Village Special zone.[6] However, as noted by Mr Ellwood the Applicant has volunteered conditions of consent 8, 18 (a), and 18 (b) which establish limits on effluent quality that must be achieved, regardless of the influent to the plant.[7]

4.9 Mr Ellwood outlines the nature of the proposed wastewater treatment plant (**WWTP**) in Section 5 of his evidence. I will not repeat this information but note key features of the proposal are the adaptive nature of the system. As the system will be servicing a growing population, stage 1 utilises an oxidation pond as part of a tertiary treatment process. This will occur until influent volumes reach the level this needs to be upgraded.

4.10 The design proposes a sequencing batch reactor (SBR) in Stage 2. A SBR would provide the higher level of treatment needed as the volume of influent to be processed increases. A SBR is modular and can incorporate additional stages of treatment if necessary. This provides the proposal will flexibility to further increase the quality of treatment if necessary.

[4] AEE, Sections 2.1-2.13.
[5] NIWA, 2020, LEI 2021.
[6] Kingston Village Special Zone, Rules 12.28.3.4 and 12.28.3.5
[7] Statement of Evidence of Brian Ellwood, paragraph 7.5(f)

4.11 The quality of treatment achieved by the WWTP Stage 1 will be lower than will be achieved by Stage 2 however this will be managed by discharging at a lower rate over a larger portion of the land treatment area (LTA). Mr Ellwood notes that the LTA are not simply disposal areas as they constitute a further stage of the treatment process.

4.12 Treated wastewater from the WWTP will be discharged to two LTAs via sub-surface drip irrigation. The combined area of the proposed LTA is 25 hectares (ha) however it will be developed in stages to respond to the number of properties being serviced. At full capacity a minimum of 15 ha of the total 25 ha LTA will be required for disposal, with the remaining area providing capacity for replanting and flexibility for manage any variables that may occur by increasing the area to which discharge may occur. The LTA will be managed as a cut and carry system to reduce nutrient loading within the catchment by growing the crops for use elsewhere.

4.13 Key conditions have been volunteered to maintain the effect of nitrogen on the environment to levels that may currently be anticipated. These include:

(a) a limit to the total volume of wastewater discharged from the WWTP (Condition 2);

(b) a limit to the total nitrogen loading of the LTA of 450 kg N/ha/year (Condition 16);

(c) monitoring of the quantity and quality of effluent discharged from the WWTP (Conditions 12 and 16);

(d) monitoring of surface and groundwater sites located as shown on Figure 2 (Condition 7);

(e) monitoring of the LTA harvest to determine the effectiveness of nitrogen removal via the cut and carry system (Condition 21);

(f) annual calculation of nitrogen mass balance (Condition 22); and

(g) an annual nitrogen mass balance limit that links the level of development that can occur in the plan change area to a reduction in the number of on-site wastewater systems in Kingston township (Condition 23).

Figure 2: Location of LTA and surface and groundwater monitoring locations

5 Site Characteristics

5.1 Detailed descriptions of the site, site characteristics and the proposed system have been provided in the application and in the evidence of Mr Court-Patience and Mr Ellwood. I adopt these descriptions for the purposes of my evidence.

6 Reasons for consent

6.1 The application is for a new consent to discharge treated wastewater to land from the Kingston Township. The applicant seeks consent to discharge up to 1,800 cubic metres (m^3) of treated wastewater to land for the disposing of wastewater from the Kingston Township at Kingston.

6.2 Section 12 of the Regional Plan: Water for Otago (RPW) contains the rules relating to discharges to water or to land in a manner that may enter water.

6.3 Section 12.A contains rules relating to the discharge of human sewage.

6.4 Rule 12.A.A.1 states:

> The discharge rules in section 12.A apply where a discharge contains human sewage.

6.5 Rule 12.A.1.3 permits the discharge of human sewage to land from many older on-site wastewater systems in Kingston, providing:

> (a) The discharge was lawfully carried out without resource consent prior to 28 February 1998; and

> (b) There is no direct discharge of human sewage, or effluent derived from it, to water in any water body, drain, water race, or the coastal marine area; and
>
> (c) Effluent from the system does not run off to any other person's property; and
>
> (d) The discharge does not cause flooding of any other person's property, erosion, land instability, sedimentation or property damage.

6.6 The permitted activity standards of Rule 12.A.1.3 are more permissive than for systems installed after February 1998 as they do not place a daily limit on the discharge, they do not require a disposal field or require a setback from property boundaries, bores or surface water bodies.

6.7 Rule 12.A.1.4 permits the discharge of human sewage to land through on-site wastewater systems installed after 28 February 1998, subject to conditions. These conditions require the disposal field to be sited more than 50 metres from any surface water body or bore and includes a threshold volume of 2,000 litres per day.

6.8 Due to the volume of the proposed discharge the application cannot comply with the permitted activity rules of Section 12.A.1.1 -12.A.1.4 and requires assessment as a discretionary activity under Rule 12.A.2.1 which states:

> Except as provided for by Rules 12.A.1.1 to 12.A.1.4, the discharge of human sewage to water, or onto or into land in circumstances where it may enter water, is a discretionary activity.

6.9 Section 12.B contains rules relating to discharges from industrial or trade premises.

6.10 The proposed system primarily provides for the discharge of domestic wastewater but will also enable the disposal of the limited commercial and trade activity that is located in Kingston or the proposed development area.

6.11 The proposed discharge cannot comply with the permitted activity rules of Section 12.B.1.1 -12.B.1.10, or Rules 12.B.2.1 or 12.B.3.1 and requires assessment as a discretionary activity under Rule 12.B.4.1 which states:

> The discharge of water (excluding stormwater) or any contaminant from an industrial or trade premises or a consented dam to water or to land is a discretionary activity, unless it is permitted by Rule 12.B.1.6, 12.B.1.7, 12.B.1.10 or 12.B.1.11.

6.12 Section 12.C contains rules relating to any discharge not provided for in Sections 12A or 12B.

6.13 I consider the application should be most appropriately assessed under rules Rule 12.A.2.1 and Rule 12.B.4.1 for the reasons identified above. However, through the application and assessment consideration has been given to the balancing of nitrogen currently discharged into the environment or that which could be discharged as a permitted activity against the volumes of nitrogen proposed to be discharged.

6.14 Rule 12.C.1.3 establishes permitted thresholds for the discharge of nitrogen to land areas sensitive to nitrogen. The subject area is zoned a Nitrogen Sensitive

Area in Map H6 of the RPW. The relevant sections of Rule 12.C.2.3 are as follows:

> The discharge of nitrogen onto or into land in circumstances which may result in nitrogen entering groundwater, is a permitted activity, providing:
>
> (a) From 1 April 2026, the nitrogen leaching rate does not exceed:
>
> (i) 15 kgN/ha/year for the total area of land managed by a landholder that is located over the relevant Nitrogen Sensitive Zone identified in Maps H5 and H6; and
>
> (ii) 20 kgN/ha/year for the total area of land managed by a landholder that is located over the relevant Nitrogen Sensitive Zone identified in Maps H1 to H4; and
>
> (iii) 30 kgN/ha/year for the total area of land managed by a landholder that is located outside any Nitrogen Sensitive Zone identified in Maps H1 to H6,
>
> as calculated using OVERSEER® version 6 by a Certified Nutrient Management Advisor in accordance with OVERSEER® Best Practice Data Input Standards; ….

6.15 Rule 12.C.1.3 applies to the application of nitrogen for agricultural purposes. I note that it is an important distinction that the limit of 15 kg N/ha/year does not require the limit to be achieved for every ha, but at a rate of 15 kg N/ha/year averaged over the total area managed by a landowner that is located over the relevant nitrogen sensitive area. This enables substantially greater discharges in some parts of a property if across the total area managed the discharge maintains the threshold rate.

6.16 The applicant has assessed the potential for a discharge to air from the operation of the proposed WWTP against the rules of the Regional Plan: Air for Otago in Section 5.5.2 of the application document. This assessment concluded that the proposal will comply with the requirements of permitted activity rule 16.3.7.1 and no consent is needed for a discharge to air.

7 S104 Consideration of Applications

7.1 When considering an application for a resource consent and any submissions received, the consent authority must, subject to part 2, have regard to the matters listed in s104 of the RMA. I discuss these matters in the following sections.

S104(1)(a) - Actual and potential effects on the environment

Nature of the discharge

7.2 The Applicant has designed the proposed WWTP to be modified to efficiently and effectively respond to increased volumes of predominantly domestic effluent produced as the community of Kingston grows by staging the system.

7.3 As described in the evidence of Dr Ellwood at section 5.5-5.9 this design utilisations an oxidation pond which is effective for smaller volumes and variations in load during the initial development, before upgrading to a sequencing batch reactor system.

7.4 Staging the improvements to the system is linked to the number of properties that are connected to the WWTP. Once the number of connections exceeds 450 properties the discharge standards must comply with the limits for Stage 2. This is established by the discharge quality limits in Condition 18 and monitoring requirements in proposed condition 19.

7.5 Staging will result in a change in the quality of output from the WWTP and the expected raw and final effluent quality anticipated is stated in Table 3 of Mr Ellwood's evidence.

7.6 The treatment quality achieved by the WWTP will be similar for total suspended solids (TSS), total phosphorus (TP) and faecal coliforms for both Stage 1 and Stage 2. The introduction of Stage 2 will result in an improvement in the treatment of biochemical oxygen demand (BOD) and total nitrogen (TN).

7.7 From my experience processing consents for the discharge of domestic wastewater I consider the level of treatment achieved by the WWTP is likely to be significantly higher than that achieved by most on-site treatment systems in Kingston township and particularly septic tank systems.

7.8 I touch briefly on the discharge of TSS, TP, BOD and faecal coliforms from the WWTP below, but I understand there is general consensus between the QLDC and ORC's technical experts that the effects of these contaminants will be less than minor.

7.9 The area of principal uncertainty between the experts is around the effects and management of the discharge nitrogen.

Total suspended solids

7.10 The deposition and build-up of suspended solids from discharge flows can result in the blockage of dripper systems and can clog soil pores.

7.11 The proposed WWTP will result in the discharge of TSS at relatively low concentrations.

7.12 I understand that there is consensus between the technical experts that the effects of TSS on soil will be no more than minor and this will reduce the risk of ponding or overland discharge from the LTA.[8]

Biological Oxygen Demand (BOD_5)

7.13 The effluent BOD5 concentration after treatment is estimated to be 50 mg/L at Stage 1, reducing to 20 mg/L at Stage 2. I note the ORC have accepted the capacity of the LTA to assimilate the discharge of BOD^5 at the rates proposed and this is not a matter of contention between experts.[9]

[8] ORC Notification Report, Section 5.1.2
[9] ORC Notification Report, Section 6.2.2

Total phosphorus

7.14 Phosphorus is a nutrient that can result in increased plant growth in waterbodies with potential adverse effects on dissolved oxygen and aquatic habitats. Phosphorus is non-soluble and often carried bound to sediment.

7.15 The proposed operation of the LTA as a cut and carry system is designed to reduce the volume of nutrients, including phosphorus, retained in the receiving environment.

7.16 It is estimated that the total loading of phosphorus to the receiving soils will be 186 kg P/ha/year.

7.17 Soil analysis undertaken by Lowe Environmental Impact Limited (LEI) estimates that there is capacity within the first 1.5 m of the soil profile to retain phosphorus loadings for the first 54 years of operation. Hydrogeological testing under the LTA has estimated the depth to groundwater to be 30 to 60 m which indicates the storage potential of underlying soils to be significantly longer than the term of consent which I consider appropriate for infrastructure of this type.

7.18 I consider the Application has demonstrated that, due to the proximity of on-site systems within the existing township of Kingston to ground and surface water, the connection of existing properties will result in a reduction of phosphorus to water within the catchment.

Faecal coliforms & pathogens

7.19 The tertiary treatment of effluent through the WWTP results in a high degree of treatment for faecal coliforms. This treatment is further enhanced by the low rate of application to soils in the LTA which can result in further reduction through filtration, absorption and natural attrition.

7.20 As the depth to groundwater is approximately 30 - 60 m and the nearest surface point of possible interception to surface water is Kingston Creek, approximately 0.5 km, way and has been estimated to take between 150 and 1500 days. As a consequence, I agree with the conclusion of Dr Ellwood that the effects of faecal coliforms and pathogens on ground and surface water will be no more than minor and this discharge presents a low risk to downstream ground or surface water users.[10] I also note that Public Health South have not raised any concerns in this regard and have submitted in support of the proposal.

7.21 Notwithstanding this position, I do support ongoing monitoring to provide certainty around the ongoing management of the effects of faecal coliforms and pathogens and note this has been proposed by the Applicant through proposed Condition 16.

7.22 Due to the lower level of treatment achieved by on-site wastewater systems, high groundwater table and proximity of surface water I consider a significant reduction in faecal coliforms and pathogens entering surface water will be achieved when properties in Kingston connect to the reticulated system.

[10] LEI, Further Information, LEI, March 2021, P14

Nitrogen

7.23 Nitrogen is a nutrient and is soluble and mobile through soils. The leaching of nitrogen into groundwater can decrease groundwater quality and can affect connected surface water bodies.

7.24 I consider the management of the potential effects of nitrogen to be the main source of divergence between the technical experts in relation to this application.

7.25 The Applicant initially utilised Overseer to model nitrogen inputs into the system as this is the method identified in Rule 12.C.1.3 to measure the discharge of nitrogen in a Nitrogen Sensitive Zone. The ORC has noted that the use of Overseer as a regulatory tool has recently been criticised by the Ministry for Primary Industries and the Ministry for the Environment. The Applicant accepts the limitations of Overseer in this regard but notes its use is directed by the current rules in the RPW.

7.26 At the request of the ORC the Applicant has undertaken additional modelling using a mass balance calculation of nitrogen.

7.27 The Applicant has proposed to limit the nitrogen load from the WWTP based on to the LTA to of a maximum of 450 kg N/ha/year the proposed treatment level for nitrogen. The modelling data discussed in the evidence of Mr Ellwood indicates this loading is likely to result in a leaching rate of 142 kg N/ha/year after any reductions as a result of plant uptake from crop growth and removal.

Effects of nitrogen on groundwater

7.28 Nitrogen from the LTA will be leached through the soils below the site until a connection with groundwater is reached and from there will travel down gradient towards Lake Wakatipu. The LTA is elevated approximately 60 m above lake level and is located approximately 1.5 km from the lake's southern shoreline.

7.29 Nitrogen can affect drinking water quality and the current New Zealand drinking water standard specifies a maximum acceptable value for nitrate-nitrogen of 11.3 mg/L.[11]

7.30 Kingston has a high concentration of bores. It is uncertain how may are used for potable use and it is anticipated most dwellings rely upon rainwater tanks for potable use and utilise bore water for non-potable purposes due to awareness of existing water quality issues.

7.31 LEI undertook sampling of groundwater from sampling bores in the subject area. This sampling identified nitrogen concentrations reflective of the use of the area for agricultural activities but below the maximum acceptable value for nitrate nitrogen in the Drinking Water Standard for New Zealand.

7.32 I note both LEI and Pattle Delamore Partners Limited (PDP) concur that the effects in terms of potable supply from groundwater should be no more than

[11] New Zealand Drinking Water Standard 2005 (revised 2008)

minor due to the proposed condition not to increase baseline nitrogen leaching and Overseer monitoring.[12]

7.33 The evidence of Mr Court-Patience discusses a parallel project the Applicant is undertaking to provide reticulated water to the plan change area and the Kingston Community. The connection of the existing township will greatly reduce the risk of adverse effects on nitrogen on potable drinking water supplies as the proposed water source for the Community supply is located outside of the area affected by the proposed discharge.

Effects of nitrogen on surface water

7.34 Lake Wakatipu is the receiving environment for groundwater flows originating in the LTA, although some flow gauging undertaken by NIWA has indicated potential ground/surface water connections between the LTA, Kingston Creek and the unnamed tributary on the northern side of the LTA prior to connection with the lake.

7.35 The results of the sampling of tributaries of Lake Wakatipu is discussed in the evidence of Dr Goldsmith. Her conclusions with respect to these water bodies is that, due to the current health of these habitats the existing aquatic communities are likely to be tolerant of potential nitrogen leaching, should this occur.[13] E3S Limited (E3S) agree with the conclusion of Dr Goldsmith in regards to the characterisation of the existing surface water bodies exhibiting degraded water quality and aquatic habitat condition.[14]

7.36 Overall, Dr Goldsmith's conclusion was that, the adverse effects of the proposal on aquatic communities within surface water will be less than minor and that the proposed monitoring will enable compliance with the proposed volume and nutrient loading limits to be managed.[15]

Cumulative effects of nitrogen

7.37 Cumulative effects can result from the combination of discharges from a number of sources collectively exceeding the ability of the environment to absorb the resulting contamination. I consider the effects of the existing discharges from Kingston township reflect this situation.

7.38 Cumulative effects are managed by the RPW which includes nitrogen limits on rural activities in areas sensitive to the discharge of nitrogen (Rule 12.C.1.3) and identified limits for freshwater quality to recognise effects that are occurring across a catchment (Schedule 15).

7.39 I believe that potential cumulative effects are one of the key concerns identified in Section 6.1 of the Council planner's s42A Report, including;

(a) The potential that not all properties in the township will connect to the new scheme resulting in discharges from both the WWTP and from the existing on-site systems.

[12] PDP, April 2021
[13] Evidence of Dr Goldsmith 5.3-5.5
[14] E3S, April 2021
[15] REL, November, 2020

(b) The contribution of nitrogen from the proposed discharge to water quality on a catchment level.

7.40 The receiving environment for nitrogen from the WWTP will be Lake Wakatipu. Schedule 15 of the RPW sets water quality limits that are to be achieved in Lake Wakatipu[16] and in the tributaries of Lake Wakatipu[17]. The ORC Notification Report indicated concerns regarding the ability of the proposal to comply with the limits set in Schedule 15, stating:

> There is insufficient data to confirm if water quality meets Schedule 15 limits.[18]

7.41 However, as noted in the evidence of Dr Goldsmith, because the Schedule 15 limits for Lake Wakatipu are based on 80% of samples over a rolling 5 year period meeting the identified limit, there is insufficient to provide a true assessment against the Schedule 15 limits in either direction.[19]

7.42 In my view the proposal adopts a pragmatic approach to ensuring that Schedule 15 limits can be met and that cumulative effects can be managed. The proposal includes an ongoing program of surface and groundwater sampling to enable trends in environmental quality to be compared against baseline conditions and Schedule 15 limits. In the event monitoring indicated deteriorating trends attributable to the WWTP the proposed system can be modified to improve performance through management of the LTA or the WWTP itself.

7.43 The s42A Report provides little commentary in relation to Schedule 15 limits and at Section 6.1:

> I consider the recommended monitoring conditions will adequately deal with any potential adverse effects the discharge may have on water quality and the ecology of receiving water bodies and groundwater quality.

7.44 The modelling of nitrogen is a complex area and I defer to the experience of Mr Ellwood in this regard. The modelling has used both Overseer and a mass balance approach to manage the discharge of nitrogen at similar levels to those that are currently occurring.

7.45 To ensure the discharge from the proposed WWTP and the existing discharges from Kingston do not cumulatively occur the Applicant has proposed conditions of consent limiting the level of development in the plan change area to a reduction in on-site systems in Kingston. Condition 11 limits the annual discharge from the WWTP to 1,050 until existing properties with the township discharge to the WWTP. For each property that connects an additional 5.2 kg N/year can be discharged from the WWTP which reflects the reduction in discharges that are occurring in the township.

7.46 The annual mass balance calculation undertaken as Condition 10 will enable a comparison of the discharge loadings and the volume of nitrogen removed each year by harvesting. Quarterly sampling of ground and surface water as required by Condition 17 and 19 will enable monitoring of the effects of the discharge on

[16] RPW, Schedule 15, Receiving Group 5
[17] RPW, Schedule 15, Receiving Group 3
[18] ORC s42A Report, Section 6.1, P16
[19] Evidence of Dr Goldsmith, paragraph 4.9

the downstream environment. The Applicant is required to provide monitoring data and commentary on performance against the past years results and baseline monitoring (Condition 22). I think Condition 22 could be strengthened by the requirement to identify any trends in monitoring and a comparison of surface water sampling against Schedule 15 limits.

7.47 In the event monitoring indicated environmental limits were a concern the Applicant has the ability to improve performance by increasing the area of LTA over which treatment may occur or by increasing the level of treatment achieved by the WWTP.

7.48 I agree with the concern of the ORC officers and the submitter Kingston Community Association Incorporated (KCA) that there is the potential that not all property owners in the township will want to connect to the township. There is a cost to treating wastewater to achieve an acceptable quality for it to be discharged into the environment in a sustainable way. Many of the property owners in the existing township do not currently pay this cost and this is reflected in the quality of the discharge.

7.49 I consider that the voluntary uptake of properties in Kingston Township would likely increase if there was a greater requirement for property owners to meet minimum system quality or discharge standards and the cost difference between operating a system with no minimum discharge standards or maintenance requirements and a community system was not as great.

7.50 QLDC could also encourage the uptake connections to the proposed system by way of financial assistance or incentives. Alternatively, QLDC could require private property owners to connect to the public system under section 459 of the Local Government Act.

7.51 I also note both the ORC and QLDC have the ability to influence the rate at which this uptake can occur. Changes to the permitted activity standards for on-site wastewater discharges in the RPW would reduce the adverse effects of these discharges but I consider this would also encourage the decommissioning of old systems and the connection to the reticulated system due to the likelihood of increased administrative and maintenance costs. The situation in Kingston where the permitted activity standard has resulted in ongoing degradation of the surface water environment and potential risks to human health indicates the permitted activity rule is not effective in sustainably managing the adverse effects of these activities.

7.52 Overall, I consider a combined approach from both Council's would be the ideal result.

7.53 With regards to the measures proposed by the Applicant to address potential cumulative effects Council's reporting planner concludes:

> I consider the applicant has adequately addressed the potential cumulative effects of both the proposed discharge and existing permitted activity discharges through an adopted nutrient balance calculation, and with further clarification I consider this condition will address cumulative effects.[20]

[20] ORC s42A Report, Section 6.1, P18

7.54 In summary, I consider that the management of the discharge of nitrogen from the proposed WWTP has been a key concern of the Applicant in the development of this proposal as this was, from the beginning, one of the key drivers for action from the community of Kingston. In my view, the methods to manage cumulative effects are robust and enable a flexible response to address issues that may arise.

Effects on cultural values

7.55 The cultural significance of the area to tangata whenua has been described in Section 2.10 of the application AEE and the Applicant consulted directly with local Rūnaka regarding the proposal.

7.56 The proposal is consistent with the direction for the discharge of human wastewater as set out in Iwi management plans for Otago and Southland as it provides for the discharge of treated wastewater to a land treatment area where it will be further treated before reaching ground or surface water bodies.[21]

7.57 The outcomes of these discussions are documented in the April 2021 response to the request for further information by REI.[22] Affected party approval has been obtained from both Aukaha and Te Ao Marama Incorporated (TAMI) and it is considered the effects of the proposal on cultural values are no more than minor.

Effects on neighbouring properties and public perception

7.58 The ORC Notification Report concluded that the effects on the area enabled for development by the plan change would be more than minor. This matter has not been expanded on in the S42A report. I found the rationale for this position unclear and disagree with this conclusion.

7.59 I do not consider the visual effects of the LTA will be more than minor. The area will be cropped for much of the year as part of the cut and carry operation and will by and large have the appearance of rural land.

7.60 The design of the discharge to the LTA is discussed in Mr Ellwood's evidence and I consider the depth of discharge, width of dripper lines, spacing of discharge outlets and low discharge rate all militate against any potential for surface ponding or runoff. The applicant has volunteered conditions of consent to this effect. I consider this reflects the conclusion of the Notification Report in relation to potential effects on soils, TSS, BOD and drainage are all less than minor and I note the S42A report has adopted these conclusions.[23]

7.61 I consider the current property owner of the plan change land is a direct beneficiary of the proposal, as development in accordance with the current zoning under the Queenstown Lakes District Plan necessitates reticulated servicing. However, I accept that the property owner has had the opportunity to

[21] Te Tangi a Tauira, The Cry of the People, Ngāi Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan 2008; Kāi Tahu ki Otago Natural Resource Management Plan 2005

[22] REI, April 2021, Appendix 1.

[23] ORC s42A Report, Section 6.1, P14

provide written approval or submitted in support of the application and has not done so.

7.62 I accept there can be a perceptual effect that the location of a WWTP may affect property values. However, I note that residential activity in the plan change area will be staged and will develop from the existing township south, due to the need to connect to existing roading networks and for the logical provision of infrastructure. As a consequence, development of the area in closest proximity to the LTA will occur well after the LTA has become an established and recognised feature of the local environment and not an unknown or new eventuality. Consequently, any impacts on residential property values will already be established and any potential purchasers are fully aware of its presence.

Effect of discharge to land on soils

7.63 The discharge of wastewater to land can result in the clogging of soil pores which can affect the infiltration capacity of soils and increases the risk of ponding or overland flow.

7.64 Soil sampling of the proposed LTA was used to determine saturated and unsaturated loading rates. The design spacing of dripper lines at approximately 1 m and spacing of discharge outlets at 0.6 m result in a diffused discharge into the soils underlying the LTA.

7.65 The design irrigation rate for application within the LTA is proposed to be 6 mm / day for dry weather and a maximum rate of 12 mm. This is less than half the unsaturated hydraulic loading for soils within the LTA.

7.66 I consider that the Applicant has appropriately designed the LTA area and dripper lines to minimise adverse effects on soils and to avoid the potential for surface runoff of the discharge from the LTA.

7.67 It is my understanding that there is general consensus between the technical experts for the Applicant and for the ORC that the effects of the loading rate on soils and soil drainage be no more than minor.

7.68 I also understand that due to the depth at which the discharge will occur and management of loading rates discussed above there is also consensus that the potential for surface ponding or an overland discharge from the LTA is less than minor.

Positive effects

7.69 The assessment of effects required under Section 104(1)(a) includes the requirement to assess the positive effects of a proposal.

7.70 I consider the provision of a reticulated wastewater system servicing Kingston township and the plan change area will enable the local community to better provide for the cultural, social and economic well-being. The provision of services will enable the community to grow, facilitating other services including a school to cater for the local community.

7.71 The proposal will enable existing properties to connect to a reticulated system (and decommission aging septic tanks) which will result in a reduction in the discharges of contaminants within the existing township and close to existing surface water bodies and the lake.

7.72 The reduction in contaminants discharged from the existing township as properties connect to the reticulated system will improve the quality of surface water in Lake Wakatipu and its tributaries. A reduction in faecal coliforms will reduce actual and perceived concerns about the use of the lake for contact recreation.

7.73 As discussed above in relation to potential effects on cultural values, the reduction in the discharge of contaminants to Lake Wakatipu will have a positive effect for Kāi Tahu who place cultural value on Lake Wakatipu and who find the discharge of human waste to water or to land in a manner that it may enter water culturally offensive.

7.74 The current proposal creates an economy of scale to improve the affordability of a wastewater treatment system for the existing community. Although I acknowledge such connections are not likely to be inexpensive, I consider the cost will be reduced by the scale of system proposed.

7.75 The development of the plan change area for residential activity will contribute to the provision of affordable housing in the Queenstown Lakes District.

Consideration of alternatives

7.76 The application AEE included a detailed assessment of alternatives in Section 4. These alternatives included: the continued adoption of individual on-site wastewater treatment plants, alternative disposal sites, alternative options to discharge to land, discharging to an existing community WWTP and a discharge to surface water.

7.77 I consider the assessment undertaken in Section 4 of the AEE to be suitably comprehensive, however I note a further alternative exists.

7.78 The ORC has a range of regulatory options that could potentially reduce the impact of discharges from on-site systems in Kingston which could range from requiring individual on site systems to meet certain discharge standards to requiring systems to be regularly inspected, maintained and pumped out.

7.79 Individual systems are unlikely to achieve the level of treatment of the system proposed by the Applicant and as a consequence the potential impacts on the quality of the lake may continue to occur.

7.80 It is my opinion that a combination of the provision of a reticulated community wastewater system and a review of the permitted status for on-site discharges will be the most effective option to improve the health of waterways in this area. Even at the lower end of a regulatory response, the costs associated with an increased obligation for maintenance and management of individual systems would likely increase the rate at which connections to the reticulated system occur. Through this approach there would be a greater certainty that a reduction in the discharge of contaminants closer to the lake would be achieved in a timely manner. Such an approach would support territorial local authorities

seeking to provide reticulated services to communities by making it clear that low cost low effectiveness systems had a finite lifespan.

S104(1)(ab)

7.81 Section 104(ab) requires regard to be had to 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.

7.82 The applicant has not proposed any measures for offsetting or compensating adverse effects.

S104(1)(b) Analysis of Relevant Planning Documents

7.83 Section 104(1)(b) of the RMA requires the consent authority to have regard to any relevant provisions of planning documents, including:

> (i) a national environmental standard:
>
> (ii) other regulations:
>
> (iii) a national policy statement:
>
> (iv) a New Zealand coastal policy statement:
>
> (v) a regional policy statement or proposed regional policy statement:
>
> (vi) a plan or proposed plan; and
>
> (c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.

7.84 I discuss what I consider the relevant provisions of planning applicable to this application documents in the following sections.

National Policy Statement for Freshwater Management 2020

7.85 The NPS-FM came into force on 3 September 2020 and replaced the previous 2014 NPS-FM. The discharge application was lodged on 2 June 2020 prior to the NPS-FM having legal effect however s104(1)(b) is still considered to be relevant to the proposal.

7.86 Part 2 of the NPS-FM sets out a single national objective for freshwater management and 15 separate policies that support this objective. The objective on the NPS-FM 2020 is:

> … to ensure that natural and physical resources are managed in a way that prioritises:
>
> (a) first, the health and well-being of water bodies and freshwater ecosystems
>
> (b) second, the health needs of people (such as drinking water)
>
> (c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future

7.87 This objective establishes a hierarchy that requires decisions being made under the NES-FM to prioritise the health and wellbeing of water bodies, then the essential needs of people, followed by other uses.

7.88 The purpose of the application is to obtain a discharge permit for the discharge of treated domestic wastewater to enable the development of a reticulated wastewater treatment and disposal system for the community of Kingston. I consider the treatment and disposal of human wastewater as an activity that is primarily undertaken to ensure the health of the community. This activity and the manner in which it is undertaken is also revenant in terms of enabling communities to provide for their economic, social and cultural well-being. The provision of reticulated wastewater in Kingston will enable additional residential development and a wider range of housing options and opportunities. As discussed above, the design of the proposed system as a land based discharge also recognises the cultural importance of this issue to tangata whenua.

7.89 However, notwithstanding the above, I find it challenging to entirely separate the priorities identified in relation to this project. The original drivers behind the desire of the community related to the health needs of people and of the lake. There was a concern the lack of a community wastewater system was affecting the water quality of groundwater and the lake and as a consequence it was a risk to the health of the people of Kingston who use this water resource for domestic purposes, but also for recreational, social, economic and cultural purposes.

7.90 As is common with many lakeside communities, Lake Wakatipu sits at the centre of recreational, social, cultural and economic activities in the township. I think the importance of the lake to the community of Kingston, and indeed the wider community of the Queenstown Lakes District, has been reflected in the applicant's efforts to design a system that will maintain its health and well-being.

7.91 Although the purpose of this application is primarily to ensure the health needs of people (the community of Kingston), and the ability of the community the proposed wastewater treatment and land management system have been design in a way that prioritises the health and well-being of water bodies and freshwater ecosystems over other matters.

7.92 Details of the design of the proposed system are presented in the evidence of Mr Ellwood, and Mr Ellwood and Dr Goldsmith have assessed the effects of the proposal on groundwater and surface water respectively.

7.93 I rely on this evidence to conclude the proposed treatment and land application system has been conservatively designed to ensure that the effects of the proposed discharge will not result in adverse effects on the health and well-being of water bodies and freshwater ecosystems beyond those that may currently be anticipated.

7.94 Further, over time it is reasonable to anticipate that, older septic tanks in Kingston will be decommissioned and properties will connect to the community system. However, it is uncertain how quickly this will occur and this to a large extent may be determined by the affordability of the system.

7.95 The potential benefits of the reduction on individual wastewater plants are hard to quantify accurately but I consider this will result in a higher degree of

treatment of the wastewater discharged and the discharge will occur in a location significantly further from any surface water bodies and water sources. These benefits are likely to occur in the medium to longer term.

7.96 Overall, I consider the proposal aligns with the objective of the NPS-FM.

7.97 I consider the following policies of the NPS-FW to also be relevant.

> Policy 1: Freshwater is managed in a way that gives effect to Te Mana o te Wai.

7.98 The NPS-FM defines the concepts of Te Mana o Wai as:

> "Te Mana o te Wai is a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. It protects the mauri of the wai. Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community."

7.99 Te Mana o Te Wai is a holistic concept. The mauri of the waterway, the health of the environment (including in relation to the concept of ki uta ki tai) and the waterbody were considered as part of the assessment of effects of the proposal on the environment that has accompanied this application and in my evidence. This supports a conclusion that the proposal will protect the health of freshwater by ensuring the discharge will be managed to, at a minimum, maintain nutrient discharges to those currently anticipated, and potentially improve the health of freshwater in the area as the number of individual wastewater discharges is reduced.

> Policy 2: Tangata whenua are actively involved in freshwater management (including decision making processes), and Māori freshwater values are identified and provided for.

7.100 The Applicant has actively consulted with tangata whenua during the development of this proposal and has recognised the preference of tangata whenua for land based disposal of human wastewater as identified in iwi management plans. Affected party approval has been provided by Aukaha and Te Ao Marama Incorporated.

> Policy 3: 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.

7.101 I consider the approach to this proposal reflects a desire to manage freshwater in a more integrated way than is currently occurring. I question the sustainability of the existing situation in Kingston township where domestic water is sourced in such close proximity to wastewater discharges, particularly given the nature of the receiving environment. Although this situation is allowed under the current regulatory regime of the RPW this appears to be having detrimental effects on the environment and has potential adverse effects on the health and well-being of the community, and the health of water.

7.102 In modelling the potential effects of the proposal Mr Ellwood has considered the effects of the uses of land within the Kingston catchment and have modelled the

system design to achieve a discharge of what might be reasonably expected to occur under the permitted standards for activities in the development area.

7.103 I note that Council have suggested that the proposal will likely be the largest discharge in the catchment and will therefore contribute to cumulative effects in relation to the discharge of nitrogen.

7.104 I accept that the proposal would be one of the largest consented discharges in the catchment, however, I consider this potentially misleading as farming activities in the catchment can discharge a similar level of nitrogen to land and over substantially larger areas as a permitted activity and would not require a consent. The permitted activity threshold for 15 kg of nitrogen per hectare is intended to be implemented from 2026 and is intended to be a threshold at which cumulative effects should not occur.

> Policy 5: 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.

7.105 The national objectives framework (NOF) establishes a process for identifying and monitoring the state of freshwater management units (FMU) in the region.

7.106 The process for establishing a national objectives framework requires the regional council identify freshwater management units in the region and the values for each FMU. Attributes and baseline states are to be established for each FMU to enable monitoring of water bodies and freshwater ecosystems and to enable action to be taken if degredation is detected.

7.107 The Proposed Regional Policy Statement 2021 (PRPS) has identified FMU within the region and the NOF is proposed to be implemented comprehensively through the proposed water and land plan that is currently under preparation.

> Policy 6: There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.

7.108 The Applicant has identified the presence of wetlands/ponds within the area of works. The Ecological Report indicated the quality of these bodies is degraded.[24] The proposal will not develop or reduce the extent of these wetlands and the Applicant has volunteered a condition to setback dripper lines 10 m from any permanent wetland or pond and to maintain a native riparian vegetation within this area. Proposed planting includes flax, kowhai, toe toe, pohuehue and other native species may assist in the restoration of these features.

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

7.109 The proposed discharge does not result in any loss of river extent. The assessment of effects details the potential effects on river values. Based on the Ryder survey in October 2020, the existing aquatic communities in the vicinity of

[24] Ryder, Chapter 4, 2020

the application area are expected to be tolerant of any potential contaminant input should leaching from groundwater occur.[25]

7.110 E3S have reviewed the surface water quality assessment on behalf of the ORC.[26] E3S accepted the conclusions of Ryder Environmental Limited (Ryder) with regard to surface water quality and ecology but proposed conditions of consent to provide additional baseline data is collected prior to commissioning the plant to ensure the proposed discharge will not increase adverse effects on the surrounding ecology and water quality of the water body. The Applicant has addressed the recommendations of E3S in relation to ground and surface water monitoring through proposed Condition 19.

> Policy 8: The significant values of outstanding water bodies are protected.

7.111 The process of identifying outstanding water bodies under the NPS-FM has not yet been completed in the Otago region however I note that Lake Wakatipu is recognised in Schedule 1A of the RPW for outstanding values and is similarly recognised in Schedule 2 of the Water Conservation (Kawarau) Order for the protection of the outstanding characteristics.

7.112 The proposal will ensure wastewater from new development in the Kingston is treated to a high standard and will provide an alternative method of wastewater disposal for the existing community that may reduce current effects on water quality in the Kingston area. I consider the evidence from Mr Ellwood and Dr Goldsmith supports the proposition that, as proposed, the discharge will at least maintain current environmental conditions in the lake. However, as a reduction in domestic discharges in the township occurs there will be a reduction in sources of potential contamination to the lake. I consider that the shifting of wastewater treatment away from the lake will particularly reduce the risk of faecal bacterial contamination of lake waters and will reduce cultural concerns regarding this activity.

> Policy 9: The habitats of indigenous freshwater species are protected.

7.113 The effects of the proposal on the habitats of freshwater species have been assessed in the report by Ryder and the evidence of Dr Goldsmith. The Ecological Report surveyed surface water bodies in the subject area and Dr Goldsmith concluded that overall, any adverse effects on aquatic communities within surface water bodies will therefore be less than minor.[27]

> Policy 13: 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.

7.114 I consider that Policy 13 provides two key directions. The first is that water bodies should be systematically monitored over time. The second is that action should be undertaken to reverse deteriorating trends where freshwater is degraded.

---

[25] Ryder Environmental Limited, 2020, Kingston Township Community Wastewater Aquatic Ecology Assessment, Prepared for Queenstown Lakes District Council by Ruth Goldsmith, November 2020

[26] E3S, 2021, Kingston Wastewater Discharge Application RM20.164 s92 Response - Aquatic Ecological and Surface Water Technical Review, E3S, April 2021.

[27] Ryder, 2020

7.115 I consider the direction of Policy 13 to monitor the condition of water bodies and freshwater ecosystems is primarily intended to be applied at a wider scale than in relation to individual discharges. I do consider the monitoring of consents to be an important component of environmental management, however, it is my observation that monitoring for compliance may not be effective for monitoring the wider condition of the wider water body.

7.116 Notwithstanding my comments above I note the applicant has volunteered a suite of conditions that include systematic monitoring of groundwater and surface water. This monitoring will be initiated prior to the commissioning of the proposed treatment plant to establish a baseline and includes control sites outside areas where the effects of the discharge will occur to enable comparison or results between monitoring sites.

7.117 The proposed monitoring locations are shown on Figure 1 and include six groundwater monitoring sites and eight surface water monitoring sites. Monitoring is proposed to be undertaken quarterly and monitoring data will be analysed against the results of previous years monitoring and the baseline data. Proposed conditions include the annual reporting of the results of monitoring analysis and any corrective action undertaken to the Consent Authority.

7.118 I consider the monitoring proposed will be effective in enabling the state of the receiving environment and the effects of the proposed discharge to be monitored and is generally consistent with the intent of Policy 13.

7.119 The submission by KCA raised Policy 13 and sought a minimum of 5 years baseline monitoring under this policy before the discharge could commence. I consider that the evidence of Mr Ellwood has reasonably demonstrated that the effects of the proposed discharge on the quality of on the wider groundwater catchment can be reasonably maintained to at or below current levels through the combination of the proposed WWTP, LTA and conditions of consent.

7.120 Improvements in water quality is likely to increase if wastewater treatment in Kingston township moves to the reticulated system. The applicant can provide a reticulated system for the existing community to connect to however it does not regulate wastewater discharges and has limited ability to require connection for many of the older properties.

7.121 In relation to the degradation of an FMU, Section 3.20 of the NPS-FM states that:

> If a regional council detects that an FMU or part of an FMU is degraded or degrading, it must, as soon as practicable, take action to halt or reverse the degradation (for example, by making or changing a regional plan, or preparing an action plan).

7.122 As discussed in the evidence of Dr Goldsmith there is currently no evidence that Lake Wakatipu or the tributaries in this represent a degraded catchment.[28] However, the proposal includes comprehensive environmental condition to monitor changes to the environment and a review condition to enable amendments to the proposed WWTP and LTA discharge to address any issues that may arise in the future.

[28] Evidence of Dr Goldsmith, paragraph 4.9

7.123 I consider the proposed approach will enable

7.124 Mr Court-Patience's evidence explains the rationale for the provision of the proposed reticulated wastewater system to Kingston and the associated provision of water supply infrastructure. The provision of this infrastructure will enable the Kingston community to grow and will help address existing environmental issues in the Kingston township that can affect community wellbeing. Overall, I consider the proposal achieves this in a manner that is consistent with the direction of the NPS-FM.

National Environmental Standard for Sources of Human Drinking Water 2007.

7.125 The purpose of the Drinking Water NES is to reduce the risk of contamination of drinking water sources by requiring regional councils to consider the effects of certain activities on drinking water sources. The regulations only apply to registered drinking-waters supplies and the regulations vary depending upon the number of people supplied by the drinking water supply.

7.126 There is one registered drinking water supply in the township of Kingston. The Kingston Motels and Holiday Park has a registered water supply (TP02552) with an identified population of 25.

7.127 Regulation 12 of the Drinking Water NES applies to activities with the potential to affect registered drinking water supplies that supply 25 or more people with drinking water for 60 or more days of a calendar year.

7.128 Under Regulation 12(1) the consent authority must consider whether the activity to which the application relates may itself lead to an even to occurring that may have a significant adverse effect on the quality of the water at the point of abstraction, or as a consequence of an event, such as heavy rainfall, have a significant adverse effect on the quality of the water at the point of abstraction.

7.129 If the circumstances identified in Regulation 12(1) apply the consent authority must impose a condition on any consent granted that requires the consent holder to notify registered drinking water supply operators of the occurrence of any event described in Regulation 12(1) as soon as reasonably practicable.

Proposed Regional Policy Statement and Partially Operative Regional Policy Statement

7.130 Section 104 requires regard to be had to any regional policy statement or proposed regional policy statement.[29]

7.131 The Otago Regional Policy Statement (RPS) has been under review during the assessment of the proposed WWTP. The partially operative regional policy statement (PO-RPS) was made partially operative on 14 January 2019. The provisions of the PO-RPS that have not yet been made operative are limited to Policy 4.3.7 which relates to 'regionally and nationally significant infrastructure' and specific methods identified in Chapter 3 of the PO-RPS which are not considered relevant to this application. As none of these provisions are

[29] S104(a)(b)(v)

applicable to the application it is considered full weight can be given to the PO-RPS.

7.132 In 2021 the ORC notified a Proposed Regional Policy Statement (PRPS) to give effect to the requirements of the NPS-FM 2020. As the PRPS has been notified regard must also be had to this document.

Partially Operative Regional Policy Statement (PO-RPS)

7.133 The following objectives and their associated policies of the PO-RPS are considered to be of most relevance to the application and the matters under contention.

> Objective 1.1 Otago's resources are used sustainably to promote economic, social, and cultural wellbeing for its people and communities
>
> Policy 1.1.1 Provide for the economic wellbeing of Otago's people and communities by enabling the resilient and sustainable use and development of natural and physical resources
>
> Policy 1.1.2 Provide for the social and cultural wellbeing and health and safety of Otago's people and communities when undertaking the subdivision, use, development and protection of natural and physical resources by all of the following:
>
> a) Recognising and providing for Kāi Tahu values;
>
> b) Taking into account the values of other cultures;
>
> c) Taking into account the diverse needs of Otago's people and communities;
>
> d) Avoiding significant adverse effects of activities on human health;
>
> e) Promoting community resilience and the need to secure resources for the reasonable needs for human wellbeing;
>
> f) Promoting good quality and accessible infrastructure and public services.
>
> Objective 1.2 Recognise and provide for the integrated management of natural and physical resources to support the wellbeing of people and communities in Otago.
>
> Policy 1.2.1 Achieve integrated management of Otago's natural and physical resources by all of the following:
>
> a) Coordinating the management of interconnected natural and physical resources;
>
> b) Taking into account the impacts of management of one natural or physical resource on the values of another, or on the environment;
>
> c) Recognising that the value and function of a natural or physical resource may extend beyond the immediate, or directly adjacent, area of interest;
>
> d) Ensuring that resource management approaches across administrative boundaries are consistent and complementary;

e) Ensuring that effects of activities on the whole of a natural or physical resource are considered when that resource is managed as subunits.

f) Managing adverse effects of activities to give effect to the objectives and policies of the Regional Policy Statement.

g) Promoting healthy ecosystems and ecosystem services;

h) Promoting methods that reduce or negate the risk of exceeding sustainable resource limits.

7.134 I consider the long term planning undertaken by the applicant for the community of Kingston reflects the intent of Objective 1.1 and 1.2 and their associated policies. This process is discussed in the evidence of Mr Court-Patience and illustrates a process of strategic planning to address the effects existing development is having on the environment and potentially on the health of the Kingston community through managed growth. This approach is articulated in the Kingston 2020 community plan[30] and the GMS[31] and sought integrated planning for residential expansion with the provision of reticulated servicing to community.

7.135 These processes recognised that, although the disposal of domestic wastewater was the likely cause of water quality issues experienced in the township, these discharges are permitted under the Regional Plan Water for Otago.

7.136 As QLDC does not regulate the disposal of wastewater under the RMA an alternative approach was required to address this issue. The provision of additional residential land provides for the economic and social growth of the community but was also essential to provide an economy of scale to improve the affordability of the proposed system.

7.137 Policy 1.1.2.a) requires recognition and provision for Kāi Tahu values. This is also required by policies 2.1.2 and 2.2.1. Policy 2.1.2 seeks to ensure that Kāi Tahu values are taken into account in resource management decision making, including by taking into account iwi management plans. Policy 2.2.1 seeks to ensure that managing freshwater and the natural environment supports Kāi Tahu well-being providing for customary uses and cultural values and safeguarding the life supporting capacity of natural resources. Policy 5.4.1 is particularly relevant as it reflects the views of Kāi Tahu in relation to the discharges of human effluent to water.

Policy 5.4.1 Manage offensive or objectionable discharges to land, water and air by:

a) Avoiding significant adverse effects of those discharges;

b) Avoiding significant adverse effects of discharges of human or animal waste directly, or in close proximity, to water or mahika kai sites;

c) Avoiding, remedying or mitigating other adverse effects of those discharges.

7.138 The discharge of human wastewater is generally considered offensive or objectionable and the discharge of human wastewater to water is an issue of cultural concern to Kāi Tahu.

[30] Kingston 2020, November 2003

[31] QLDC Growth Management Strategy – Final, QLDC, April 2007

7.139 The proposed WWTP has been designed as a land based discharge and located to avoid any runoff to surface water. In addition to the depth at which the subsurface discharge will occur the applicant has volunteered conditions to establish 10 metre buffers from the small ponds within the disposal area. The evidence of Mr Ellwood and Dr Goldsmith speak to the adverse effects of the discharge and both conclude that the effects are no more than minor.

7.140 Overall, in my view, the proposal has been undertaken in a manner that is consistent with the intent of policies seeking the recognition and provision for the values of Kāi Tahu. The Applicant has consulted with local Iwi, and as discussed in the evidence of Mr Court-Patience, affected party approval has been obtained from Aukaha and Te Ao Marama Incorporated on behalf of local hapu.

> Objective 3.1.1 The values (including intrinsic values) of ecosystems and natural resources are recognised and maintained, or enhanced where degraded.
>
> Policy 3.1.1 Safeguard the life supporting capacity of fresh water and manage fresh water to:
>
> a) Maintain good quality water and enhance water quality where it is degraded, including for:
>
> i. Important recreation values, including contact recreation; and,
>
> ii. Existing drinking and stock water supplies;
>
> b) Maintain or enhance aquatic:
>
> i. Ecosystem health;
>
> ii. Indigenous habitats; and,
>
> iii. Indigenous species and their migratory patterns.
>
> c) Avoid aquifer compaction and seawater intrusion;
>
> d) Maintain or enhance, as far as practicable:
>
> i. Natural functioning of rivers, lakes, and wetlands, their riparian margins, and aquifers;
>
> ii. Coastal values supported by fresh water;
>
> iii. The habitat of trout and salmon unless detrimental to indigenous biological diversity; and
>
> iv. Amenity and landscape values of rivers, lakes, and wetlands;
>
> e) Control the adverse effects of pest species, prevent their introduction and reduce their spread;
>
> f) Avoid, remedy or mitigate the adverse effects of natural hazards, including flooding and erosion; and,
>
> g) Avoid, remedy or mitigate adverse effects on existing infrastructure that is reliant on fresh water.

7.141 The proposed WWTP has been designed as a land based treatment system to reduce the potential for adverse effects on surface water bodies. Based on the evidence of Mr Ellwood it is considered that the design of the WWTP and proposed conditions will at least maintain good water quality. The evidence of Dr Goldsmith is that the proposal will have less than a minor effect on the habitat of surface water bodies in the subject area.

7.142 The connection of the existing township to the proposed WWTP has the potential to result in improved water quality and enhance the amenity of Lake Wakatipu at Kingston as wastewater from the township will be treated to a higher standard and will be discharged further from surface water bodies and the lake.

7.143 Policy 3.1.7 seeks to safeguard the life-supporting capacity of soil. The effects of the proposed discharge on soils have been assessed in the application documents as being no more than minor. I note that this has not been challenged by Council and I therefore considered the application is consistent with the intent of this policy.

> Policy 5.4.2 Apply an adaptive management approach, to avoid, remedy or mitigate actual and potential adverse effects that might arise and that can be remedied before they become irreversible, by both:
>
> a) Setting appropriate indicators for effective monitoring of those adverse effects; and
>
> b) Setting thresholds to trigger remedial action before the effects result in irreversible damage.
>
> Policy 5.4.3 Apply a precautionary approach to activities where adverse effects may be uncertain, not able to be determined, or poorly understood but are potentially significant or irreversible.

7.144 Policy 5.4.2 requires the application of an adaptive management approach to avoid, remedy or mitigate effects by setting indicators for monitoring adverse effects and thresholds to trigger remedial action. Policy 5.4.3 requires a precautionary approach to be adopted where effects may be uncertain but are potentially significant or irreversible.

7.145 An adaptive management approach has been adopted into the design and management of the proposed WWTP. This is reflected by the capacity to adapt the WWTP and LTA to respond to changes in wastewater inputs or the impact of the output on the receiving environment. The proposed conditions outline a suite of groundwater and surface water sampling sites to monitor the effects of the discharge on the receiving environment. This information can be compared against discharge quality and baseline data from before the plant is commissioned and from sites outside the treatment area. I consider this approach is consistent with the direction of Policy 5.4.2 and the precautionary approach required by Policy 5.4.3, although I note the evidence of Mr Ellwood and Dr Goldsmith suggest the effects of the proposed discharge will be less than minor, rather than significant or irreversible.

7.146 Overall, I consider the proposal is generally consistent with direction of the PO-RPS.

Proposed Regional Policy Statement (PRPS)

7.147 Policy IM-O2 reflects the decision making hierarchy introduced by the NPS-FM, but applies this hierarchy more widely to the natural environment. The policy requires that all decision making under the PRPS shall:

> first, secure the long-term life-supporting capacity and mauri of the natural environment,

> secondly, promote the health needs of people, and
>
> thirdly, safeguard the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

7.148 As discussed in the evidence of Mr Court-Patience the original driver behind this project has been to provide reticulated infrastructure for the community of Kingston to provide for the health needs of the community and address the effects of the community on the environment Providing for the growth of Kingston was both a method to achieve the provision of this infrastructure and an objective in itself, to provide for the social, economic and cultural wellbeing. The value placed on Lake Wakatipu by the community of Kingston is reflected in the Kingston 2020 Community Plan and has always been one of the key drivers behind the community desire for a reticulated wastewater system. Due to the location of the proposed system upslope of the township and Lake Wakatipu providing a WWTP that protected the life-supporting capacity and mauri of the environment into which it was discharged. The assessment of effects accompanying the application and the evidence provided by Mr Ellwood and Dr Goldsmith indicates the effects of the proposal on the long-term life-supporting capacity of the environment will be less than minor.

7.149 Policy LF-WAI-P4 requires policies fundamental to giving effect to the concept of Te Mana o te Wai are given effect to. These policies include policies LF-WAI-O1, LF-WAI-P1, LF-WAI-P2 and LF-WAI-P3.

7.150 The PRPS includes a suite of policies requiring resource management process give effect to the principles of Te Tiriti o Waitangi and the natural environment is managed to support Kāi Tahu well-being. These include policies MW-O1, MW-P1-3 and IM-O2. I consider these requirements substantially the same as those established under the PO-RPS and as affected party approval has been obtained from Aukaha and TAMI on behalf of local Rūnaka consider the proposal is consistent with the direction of these policies.

> Policy IM-P6 Avoid unreasonable delays in decision-making processes by using the best information available at the time, including but not limited to mātauraka Māori, local knowledge, and reliable partial data.
>
> IM–P15 Adopt a precautionary approach towards proposed activities whose effects are uncertain, unknown or little understood, but could be significantly adverse, particularly where the areas and values within Otago have not been identified in plans as required by this RPS.

7.151 I consider that, based on the evidence of Mr Ellwood and Dr Goldsmith, the Applicant has used the best information available by way of alternative modelling methods to demonstrate the adverse effects of the proposal will be no more than minor. The Applicant has adopted a precautionary approach to the design and management of the proposed discharge to address possible variations in rates of growth, changes in discharge volumes and in particular to the difficulties of assessing the effects of the discharge of nitrogen. I therefore consider the direction of Policy IM-P6 and IM-P15 supports a decision to consent the proposed discharge by adopting the precautionary methods proposed.

7.152 The PRPS introduces specific policies to give effect to the NPS-FM. LF-WAI-O1 *Te Mana o te Wai* requires that the mauri, health and well-being of Otago's water bodies is protected, and restored where it is degraded. LF-WAI-P3 requires the integrated management of freshwater and land, including:

> 3. sustains and, wherever possible, restores the habitats of mahika kai and indigenous species, including taoka species associated with the water body,
>
> 4. manages the effects of the use and development of land to maintain or enhance the health and well-being of freshwater and coastal water,
>
> 7. has regard to cumulative effects and the need to apply a precautionary approach where there is limited available information or uncertainty about potential adverse effects.

7.153 Policy LF-FW-O8 also requires that the health of the wai supports the health of the people and the significant and outstanding values of Otago's outstanding water bodies are protected.

7.154 Policy LF-VM-P5 identifies freshwater management units (FMU) within Otago and includes Lake Wakatipu as part of the Upper Lakes rohe within the Clutha Mata-Au FMU. Policy LF-VM-O2 establishes a specific vision for the Clutha Mata-Au FMU, which states at LF-VM-O2(1)(a):

> in the Upper Lakes rohe, the high quality waters of the lakes and their tributaries are protected, recognising the significance of the purity of these waters to Kāi Tahu and to the wider community …

7.155 The assessment of environmental effects and evidence of Mr Ellwood and Dr Goldsmith indicate the discharge will be managed to at least maintain the health and wellbeing of fresh water and may enhance water quality if properties in the existing township connect to the proposed system. The assessment by Dr Goldsmith also indicated that the effects of the discharge in freshwater habitats will be less than minor and is therefore consistent with the direction of this policy. The submission from KCA aligns with the direction of Policy LF-WAI-P3 in suggesting that the habitat of the waterway should not only be sustained but restored.

7.156 I agree with the sentiment of the KCA but note that the applicant is not currently the landowner where the streams are located and therefore cannot undertake direct action such as requiring riparian setbacks or planting, nor is it the regulator of discharges and therefore cannot directly stop residents from discharging wastewater to land.

7.157 It is the applicant's intent to encourage as many of the residents of Kingston township to connect to the reticulated system as possible and based on the evidence of Mr Ellwood and Dr Goldsmith the reduction of discharges from individual on-site systems should reduce contamination of these waterways over time.

7.158 In addition to a reduction in existing discharges, if implemented the development of the master plan for the Kingston Village Special zone will create additional opportunities to improve water quality. The development includes the requirement to establish swales to manage stormwater and it is anticipated that through the master planned development and vesting of land in Council there is potential for greater self-ownership and management of waterways by the community. This offers potential improvements in water quality through the exclusion of stock from these areas and the enhancement of riparian habitat through planting. However, I do acknowledge that urban areas can also result in discharges to nearby waterways.

7.159 Policy LF–FW–P7

> LF–FW–P7 – Freshwater Environmental outcomes, attribute states (including target attribute states) and limits ensure that:
>
> (1) the health and well-being of water bodies is maintained or, if degraded, improved,
>
> (2) the habitats of indigenous species associated with water bodies are protected, including by providing for fish passage,
>
> (3) specified rivers and lakes are suitable for primary contact within the following timeframes:
>
> > (a) by 2030, 90% of rivers and 98% of lakes, and
> >
> > (b) by 2040, 95% of rivers and 100% of lakes, and
>
> (4) mahika kai and drinking water are safe for human consumption,
>
> (5) existing over-allocation is phased out and future over-allocation is avoided, and
>
> (6) freshwater is allocated within environmental limits and used efficiently.

7.160 The evidence of Dr Goldsmith discusses the health of waterbodies that may receive the discharge from the WWTP. Her analysis of surface water bodies suggested that the tributaries of Lake Wakatipu in the subject area indicated a degraded habitat. Sampling of Lake Wakatipu indicated some criteria that did not meet Schedule 15 limits, but these limits are based on a sampling over an extended period and a single exceedance is not reflective of either good or poor water quality. We therefore cannot conclude that Lake Wakatipu is degraded but it is appropriate that ongoing monitoring occur to ensure this is not a trend. Overall, the assessment of Dr Goldsmith was that the proposal will have less than a minor effect on the habitat of surface water bodies in the subject area and I consider this is consistent with the direction to maintain the health and well-being of the lake.

7.161 Policy LF–FW–P12

> LF–FW–P12 The significant and outstanding values of outstanding water bodies are:
>
> (1) identified in the relevant regional and district plans, and
>
> (2) protected by avoiding adverse effects on those values.

7.162 The process of identifying outstanding water bodies under the PRPS has not yet been completed as discussed in relation to similar polices in the NPS-FM, I consider Lake Wakatipu would likely merit consideration as an outstanding waterbody based on existing recognised in Schedule 1A of the RPW for outstanding values and inclusion in Schedule 2 of the Water Conservation (Kawarau) Order for the protection of the outstanding characteristics.

7.163 The proposal will ensure wastewater from new development in the Kingston is treated to a high standard and will provide an alternative method of wastewater disposal for the existing community that may reduce current effects on water quality in the Kingston area. I consider the evidence from Mr Ellwood and Dr Goldsmith supports the proposition that, as proposed, the discharge will at least maintain current environmental conditions in the lake in terms of nitrogen. However, as a reduction in domestic discharges in the township occurs it is anticipated that there will be a reduction in sources of potential contamination

in close proximity to the lake. The removal of discharges of phosphorus and *E.coli* in particular will reduce the risk of contamination of surface and groundwater that may affect lake quality and will reduce cultural concerns regarding this activity.

7.164 Policy LF–FW–P15 relates specifically to wastewater discharges and provides the following direction:

> Policy LF–FW–P15 Minimise the adverse effects of direct and indirect discharges of stormwater and wastewater to freshwater by:
>
> (1) except as required by LF–VM–O2 and LF–VM–O4, preferring discharges of wastewater to land over discharges to water, unless adverse effects associated with a discharge to land are greater than a discharge to water, and
>
> (2) requiring:
>
> (a) all sewage, industrial or trade waste to be discharged into a reticulated wastewater system, where one is available,
>
> (b) all stormwater to be discharged into a reticulated system, where one is available,
>
> (c) implementation of methods to progressively reduce the frequency and volume of wet weather overflows and minimise the likelihood of dry weather overflows occurring for reticulated stormwater and wastewater systems,
>
> (d) on-site wastewater systems to be designed and operated in accordance with best practice standards,
>
> (e) stormwater and wastewater discharges to meet any applicable water quality standards set for FMUs and/or rohe, and
>
> (f) the use of water sensitive urban design techniques to avoid or mitigate the potential adverse effects of contaminants on receiving water bodies from the subdivision, use or development of land, wherever practicable, and
>
> (3) promoting the reticulation of stormwater and wastewater in urban areas.

7.165 The proposal is considered to be consistent with the direction of Policy LF–FW–P15. The proposal will enable reticulation of a currently un-serviced settlement and the proposed discharge will occur to a land treatment area.

7.166 The provision of the infrastructure associated with the discharge is consistent with Policy EIT-INF-O4 which supports the provision of effective, efficient and resilient infrastructure to provide for the social and cultural well-being, and the health and safety of the Kingston community within environmental limits.

7.167 I also consider the location of the proposed infrastructure to be consistent with the requirements of Policy EIT–INF–P13 which requires avoidance of the location of infrastructure in the following locations:

> (1) avoid, as the first priority, locating infrastructure in all of the following:
>
> (a) significant natural areas,
>
> (b) outstanding natural features and landscapes,
>
> (c) natural wetlands,

(d) outstanding water bodies,

(e) areas of high or outstanding natural character,

(f) areas or places of significant or outstanding historic heritage,

(g) wāhi tapu, wāhi taoka, and areas with protected customary rights, and

(h) areas of high recreational and high amenity value, and

7.168 Policy EIT–INF–P14 requires that when considering proposals to develop or upgrade infrastructure:

(1) require consideration of alternative sites, methods and designs if adverse effects are potentially significant or irreversible, and

(2) utilise the opportunity of substantial upgrades of infrastructure to reduce adverse effects that result from the existing infrastructure, including on sensitive activities.

7.169 A discussion of alternative sites, methods and designs has been included in the assessment of effects accompanying the application. As discussed previously a discharge to land from the WWTP was considered the most appropriate option for cultural and environmental reasons. The proposed location is considered most appropriate site as it is not connected to any surface water body and is as distant from the lake as is practicable without entering a different catchment. The development of the proposed WWTP creates the opportunity for properties in town to connect to the system which will potentially reduce the adverse effects of existing domestic infrastructure on the environment.

7.170 Overall, I consider the application is generally consistent with direction of the PO-RPS and the specific policies for wastewater disposal and infrastructure support the proposal.

Regional Plan: Water for Otago

7.171 The following objectives and policies of the RPW considered relevant to the proposed discharge.

Objective 5.3.1 To maintain or enhance the natural and human use values, identified in Schedules 1A, 1B and 1C, that are supported by Otago's lakes and rivers.

Objective 5.3.6 To provide for the sustainable use and development of Otago's water bodies, and the beds and margins of Otago's lakes and rivers.

7.172 Policy 5.4.1 requires the identification of natural and human use values in Schedule 1 of the RPW. Policy 5.4.2 requires that priority be given to avoiding, in preference to remedying or mitigating adverse effects on the following values of relevance to this application:

(a) Natural values identified in Schedule 1A;

(b) Water supply values identified in Schedule 1B;

(c) Registered historic places identified in Schedule 1C, or archaeological sites in, on, under or over the bed or margin of a lake or river;

(d) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu identified in Schedule 1D;

(e) The natural character of any lake or river, or its margins;

(f) Amenity values supported by any water body; and

7.173 The matters identified in Policy 5.4.2 have been assessed in the application documents and the evidence provided by Mr Ellwood and Dr Goldsmith. The natural and human use values of Lake Wakatipu are recognised in Schedule 1A of the RPW and are discussed in section 2.12.2 of the application. These values include significant aquatic habitats and the presence of indigenous and sports fish values, water clarity and recreational uses. The assessment by Ryder[32] and the evidence of Dr Goldsmith concludes that the effects of the proposed discharge to land on surface water habitat will be less than minor. There are no Schedule 1B or 1C values in the area of proposed works.

7.174 Lake Wakatipu is identified in Schedule 1D in terms of values of significance to Kāi Tahu however as affected party approval has been obtained from Aukaha and TAMI on behalf of local Rūnaka it is considered the application is consistent with, or not incompatible with, these values. The proposed discharge is to land and will not affect the natural character of the lake or its tributaries or amenity values supported by a waterbody in the subject area. Based on these technical assessments supporting the application I consider the proposal is consistent with the direction of Policy 5.4.2 and Objective 5.3.1.

7.175 Policy 5.4.5 requires recognition of the Water Conservation (Kawarau) Order and protection of the outstanding characteristics of water set out in schedule 2 of the order. Lake Wakatipu is listed in Schedule 2 of the water conservation order due to outstanding characteristics. Schedule 2 for Lake Wakatipu include:

(b) fishery;

(c) scenic characteristics;

(d) scientific value, in particular water clarity, and bryophyte community;

(e) recreational purposes, in particular boating;

(g) significance in accordance with tikanga Maori, in particular sites at the head of the lake, and the legend of the lake itself.

7.176 The Ecological Report noted that there is no direct surface water connection between the LTA and identified surface water bodies in the vicinity. Therefore, the most likely way that surface water bodies could be affected by the discharge is via a groundwater connection. The combination of secondary treatment plant, low application rate and large depth of soil and subsoil will significantly reduce the potential for contaminants leaching to groundwater and for subsequent connection to a surface water body and overall, any adverse effects on aquatic communities within surface water bodies will be less than minor. In addition, the potential reduction in existing domestic wastewater systems in Kingston may have a positive effect by reducing the risk of contamination of the lake due to limited treatment. This will reduce the risk of contaminants such as faecal coliforms entering the lake, which is of particular concern for recreational and cultural activities.

Policy 5.4.4 To recognise Kai Tahu's interests in Otago's lakes and rivers by promoting opportunities for their involvement in resource consent processing.

[32] Ryder, 2020

7.177 The values Kāi Tahu place on Lake Wakatipu and the management of the natural and physical resources has been outlined in Section 6.6 of the application and the relevant Iwi natural resource management plans are discussed in Section 7.4.1. The applicant has consulted with Iwi during the planning process for the expansion of Kingston and regarding the establishment of water and wastewater services for the township and have obtained affected party approval from both Aukaha and TAMI.

> Objective 7.A.1 To maintain water quality in Otago lakes, rivers, wetlands, and groundwater, but enhance water quality where it is degraded.
>
> Objective 7.A.2 To enable the discharge of water or contaminants to water or land, in a way that maintains water quality and supports natural and human use values, including Kai Tahu values.
>
> Objective 7.A.3 To have individuals and communities manage their discharges to reduce adverse effects, including cumulative effects, on water quality.

7.178 I consider the application is consistent with the direction of Objective 7.A.3 and 7.A.2. As discussed in the evidence of Mr Court-Patience, one of the original drivers behind the provision of water and wastewater infrastructure to Kingston purpose of the application is to enable the community of Kingston manage their discharges to reduce cumulative effects on water quality. The assessment of environmental effects and the evidence of Mr Ellwood and Dr Goldsmith indicates that the discharge of contaminants to land will, at a minimum, maintain water quality and the proposal will support the natural and human use values of surface and groundwater at Kingston. In terms of Policy 7.A.1 I the application assessments indicated that the surface water quality of some of the tributaries of Lake Wakatipu in the Kingston area may be poor and therefore may be considered degraded. This proposal does not provide a direct opportunity to enhance the water quality of these tributaries I consider there are associated benefits that will indirectly improve the quality through the process of stock removal and the establishment of setbacks and planting in riparian areas as part of the master planned development of this area.

7.179 Policy 7.B.1 identifies methods by which the water quality of lakes, rivers and groundwater will be managed. These methods include the setting of receiving water targets in Schedule 15, enhancing water quality where it does not meet Schedule 15 limits. Policy 7.B.1 also seeks to recognise the difference between point source discharges and non-point source discharges and promoting the discharge of contaminants to land in preference to water. Policy 7.B.2 requires that objectional discharges of contaminants to rivers, lakes and groundwater be avoided to maintain the natural and human use values, including Kāi Tahu values.

7.180 The proposed WWTP has been designed with a treatment and disposal system to land and is therefore considered consistent with Policy 7.B.2. The assessment of effects by Mr Ellwood and supplementary material has assessed volume of nitrogen that will be discharged into the environment after treatment though the WWTP and LTA as a point source discharge when compared with the volume of nitrogen that may reasonably considered to have occurred through non-point source discharges of agricultural use for the area of proposed development and treatment.

7.181 Mr Ellwood based his assessments against the relevant rules in the RPW for the discharge of nitrogen in a nitrogen sensitive zone which will apply from 1 April 2026[33] and the system has been designed to ensure the development does not result in an increase in nitrogen when compared with reasonably anticipated agricultural uses. In response to the requests for further information from Council LEI provided a mass balance equation to supplement the modelling undertaken using Overseer and at the suggestion of PDP an annual mass balance limit for the discharge has been included as a Condition of consent.[34]

7.182 Policy 7.B.4 relates specifically to the discharge of contaminants to land and states:

> Policy 7.B.4 In considering the discharge of any contaminant to land, to have regard to
>
> a) the ability of the land to assimilate the water or contaminants;
>
> b) any potential for soil contamination;
>
> c) any potential for land instability;
>
> d) any potential adverse effects on water quality; and
>
> e) any potential adverse effects on use of any proximate coastal marine area for contact recreation and seafood gathering.

7.183 Regard has been had to the discharge of contaminants and the matters identified in Policy 7.B.4 have been addressed in the assessment of effects and the evidence of Mr Ellwood and Dr Goldsmith and overall are considered to be no more than minor.

7.184 Policy 7.C.2 requires regard to be had to the following matters when considering the effects of discharges to land in a manner that may result in a contaminant entering water

> a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects;
>
> b) the financial implications, and the effects on the environment of the proposed method of discharge when compared with alternative means; and
>
> c) the current state of technical knowledge and the likelihood that the proposed method of discharge can be successfully applied.
>
> Lake Wakatipu is recognised in Schedule 1A of the RPW for outstanding qualities and is considered a sensitive receiving environment. An assessment of alternative systems is included in Section 4 of the assessment of effects. This assessment considered the financial implications of alternative methods of discharge and required levels of treatment. In addition, the subsequent treatment by dispersal through LTA is a key part of the overall 'treatment train' to reduce effects. Higher levels of treatment are possible through the application of additional technology. This would increase the cost of the proposed system on the local community. The proposed system is tested technology that has been successfully applied elsewhere in the district and has been designed to enable the system to be upgraded to improve the level of treatment on the discharge at a later stage if necessary. However, based on the assessment of effects undertaken in

[33] Rule 12.C.1.3 of the RPW

[34] Proposed Condition 11.

> the AEE and supported by the evidence of Mr Ellwood and Dr Goldsmith higher levels of treatment are not required to protect the environment. Policy 7.C.3 When considering any resource consent to discharge a contaminant to water, to have regard to any relevant standards and guidelines in imposing conditions on the discharge consent

7.185 The applicant has volunteered a suite of conditions establishing discharge standards and environmental monitoring to ensure the discharge is consistent with the established standards in the RPW.

7.186 Policies 5.4.3 and 9.4.1 seek to ensure that the suitability of aquifers to support recognised uses of groundwater is maintained when contaminants are discharged into the environment. The principal use of groundwater in the subject area is for domestic water supply. A single consented groundwater take (RM17.100.01) is identified as being located within the subject area, however the recommending officers report as a shallow take that is hydraulically connected to surface water. A number of consented bores are located within Kingston township and it is assumed these access water for domestic purposes.

7.187 The application addressed the effects on existing water takes at section 6.3.8 of the assessment of environmental effects and concluded that the effects on other users will be less than minor. I therefore considered the proposal is not adversely affecting the suitability of the aquifer in this area to support the its current use.

7.188 Policy 9.4.18 requires the identification of land at high risk in terms of the vulnerability of underlying groundwater to leachate contamination. The soils and geology of the proposed discharge area have been assessed and are not considered to increase the vulnerability of the aquifer to leachate contamination.[35]

Proposed Plan Change 8 to the Regional Plan Water for Otago

7.189 The Otago Regional Council notified Proposed Plan Change 8 to the RPW on 6 July 2020 and had immediate legal effect in accordance with section 86B(3) of the Act.

7.190 Policy 7.C.12 is relevant.

> 7.C.12: Reduce the adverse effects of discharges of human sewage from reticulated wastewater systems by:
>
> (a) Requiring reticulated wastewater systems to be designed, operated, maintained and monitored in accordance with recognised industry standards; and
>
> (b) Requiring the implementation of measures to:
>
> (i) Progressively reduce the frequency and volume of wet weather overflows; and
>
> (ii) Minimise the likelihood of dry weather overflows occurring; and
>
> (c) Preferring discharges to land over discharges to water, unless adverse effects associated with a discharge to land are greater than a discharge to water; and

[35] AEE, Section 2.5

(d) Having particular regard to any adverse effects on cultural values.

7.191 I consider the proposed WWTP has been designed in accordance with current industry standards and I am aware of a similar system utilising a LTA operating a cut and carry system to manage nutrients that has been consented by the ORC for the disposal of wastewater from the township of Cardrona and the Mt Cardrona Station Special zone (2009.348.V3). In considering the design of the proposed system regard was had to the potential effects on the cultural values of Iwi and of the local community and as a consequence a land based discharge was adopted.

7.192 Overall, I consider the proposal is consistent with the policies and objectives of the RPW and of Plan Change 8 to the RPW.

Section 104(1)(c) Any other matters

7.193 Iwi management plans have been prepared for papatipu Rūnaka in Southland and Otago. I consider it appropriate that regard is had to these plans as 'other matters' under Section 104(1)(c).

7.194 The content of the Kai Tahu ki Otago Natural Resource Management Plan (2005) and Te Tangi a Tauira - Ngai Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan (2008) was considered in Sections 7.4.1 and 7.4.2 of the assessment of environmental effects by LEI. The proposal is considered consistent with key directions of these plans, particularly the avoidance of areas of cultural significance, the preference for land based discharges, and ongoing monitoring of discharges. The applicant has consulted with both Aukaha and TAMI who represent papatipu Rūnaka in Otago and Southland and both parties have provided affected party approval for the proposal.

Section 104(2D) Considering consenting of a wastewater network

7.195 Section 104(2D) was inserted into the RMA on 15 November 2021, by section 206(1) of the Water Services Act 2021 (2021 No 36) and states:

> When considering a resource consent application that relates to a wastewater network, as defined in section 5 of the Water Services Act 2021, a consent authority—
>
> (a) must not grant the consent contrary to a wastewater environmental performance standard made under section 138 of that Act; and
>
> (b) must include, as a condition of granting the consent, requirements that are no less restrictive than is necessary to give effect to the wastewater environmental performance standard.

7.196 Section 138 of the Water Services Act 2021 enables the provision of environmental performance standards for wastewater networks by Taumata Arowai.

7.197 I have reviewed the Taumata Arowai website and note no information is currently provided in relation to wastewater environmental performance standards.[36]

7.198 As no environmental performance standards have been established by Taumata Arowai I consider the proposal cannot be contrary to any wastewater environmental standard or include any standard as a condition of consent and no further consideration of s104(2D) is required.

8 s105

8.1 Section 105 requires that, if an application is for a discharge, in addition to the matters in section 104(1) the consent authority to have regard to the following matters:

> (a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
>
> (b) the applicant's reasons for the proposed choice; and
>
> (c) any possible alternative methods of discharge, including discharge into any other receiving environment.

8.2 I consider appropriate regard has been had to the sensitivity of the receiving environment as described in Section 2 of the application documents prepared by LEI, and the additional information provided by Ryder and LEI in response to the section 92 requests from the ORC.

8.3 The details of the proposed WWTP is included in Section 3 of the application. An assessment of alternative methods of treatment including discharges into other receiving environments is included in Section 4 of the AEE.[37]

8.4 Additional analysis was undertaken on some options in responding to the Second s 92 request. Table 1 of the further information provided by LEI illustrates additional modelling scenarios as requested by the ORC.[38]

8.5 Column F represents nitrogen loadings which could occur if a WWTP cannot be consented and development of the plan change area does not proceed and remains in productive use. This assumes the continued infill development of residentially zoned land within Kingston township utilising on-site wastewater systems under the permitted activity rules of the RPW. This scenario estimates an increase of 3,250 kg N/year over the existing levels of nitrogen leaching in the environment.

8.6 Having had regard to the alternative options I consider the current proposal represent the most practicable option to manage the provision of a community supply for Kingston.

[36] https://www.taumataarowai.govt.nz/for-water-suppliers/new-compliance-rules-and-standards/

[37] AEE, LEI, May 2020

[38] Further information (Final), LEI, June 2021

9 s107

9.1 In accordance with Section 107 a consent authority shall not grant a discharge permit into land in circumstances which may result in a contaminant entering water, if after reasonable mixing the contaminant is likely to give rise to the following effects:

> (c) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:
>
> (d) any conspicuous change in the colour or visual clarity:
>
> (e) any emission of objectionable odour:
>
> (f) the rendering of fresh water unsuitable for consumption by farm animals:
>
> (g) any significant adverse effects on aquatic life.

9.2 Based on the evidenced provided by Mr Ellwood and Dr Goldsmith I consider the effects identified in S107 to be unlikely to occur when the discharge meets surface water. The design of the proposed system is for a discharge of treated wastewater to land by subsurface drippers and there is no existing connection between the discharge area and any surface water body. As noted in the report by LEI dated 15 March 2021 the discharge will likely travel through 15 to 40 m of unsaturated till prior to reaching any flowing groundwater system. Once the treated discharge is entrained in groundwater it is estimated that the travel time for groundwater flow to the nearest surface water bodies has been estimated at between 150 and 1,500 days. The depth of subsurface material through which the discharge will pass and the time period over which this travel will occur is likely to further reduce any adverse effects of the discharge. The Ecological Report indicated that the existing aquatic communities in the vicinity of the application area are expected to be tolerant of any potential contaminant input should leaching occur.[39]

10 Part II of the RMA

10.1 Under Section 104(1) of the RMA, a consent authority must consider resource consent applications "subject to Part 2" of the RMA, specifically, sections 5, 6, 7 and 8.

10.2 I consider the proposed discharge is consistent with the purpose and principles of the Act as set out in Sections 5-8.

10.3 I consider the proposal promotes the sustainable management of natural and physical resources in a way that enables the community to provide for their social, economic and cultural well being and for their health while safeguarding the life supporting capacity of the environment.

10.4 The development of a communal WWTP will provide for the growth of the community of Kingston to meet the demands of housing for current and future generations in a manner that will mitigate the adverse effects of the proposal on the environment and will reduce the impacts of existing wastewater discharges from the township over time.

[39] REL, Kingston Township Community Wastewater Aquatic Ecology Assessment, November 2020

10.5 The principles of the Treaty of Waitangi have been taken into account through the involvement of Iwi in the planning for the proposed system. Iwi have provided affected party approval for the design of the proposed system.

10.6 is consistent with the purpose of sustaining the potential of natural resources to mee the needs of future generations

10.7 Overall, I consider the application is consistent with Part 2 of the Act, given the proposal will reduce the effects of existing wastewater discharges on the environment in Kingston and will improve the ability of the community to provide for their current and future health and wellbeing.

11 Submissions

11.1 Two submissions were received; Southern District Health Board (**SDHB)** and KCA. In this section of my evidence I have addressed issues raised that relate to my area of expertise.

Public Health South on behalf of Southern District Health Board

11.2 Southern District Health Board have raised concerns about:

> a) The existing township on-site wastewater systems (not to be connected to reticulation).
>
> b) The adequacy of the proposed monitoring conditions.

11.3 The SDHB have amended their submission to fully support the proposal as discussed in the evidence of Mr Court-Patience.[40]

11.4 The proposed conditions of consent enable the connection of the properties within the existing township to connect to the WWTP. The connection of existing on-site treatment systems in the existing township is encouraged by limiting the leaching mass that can occur prior to the connection properties in the township . This will limit the extent to which development can occur in the plan change area without the effects of individual discharges in the existing township being reduced (Condition 11).

11.5 Conditions of consent include the requirements for baseline monitoring to establish current environmental conditions and ongoing monitoring of discharge quality and surface and groundwater to identify any changes in conditions for the duration of the consent (Conditions 16 and 19). These conditions will enable the Applicant and the Consent Authority to respond to any changing trends in water quality.

Kingston Community Association

11.6 The Kingston Community Association lodged a submission on the application and raised concerns about various matters.[41]

11.7 It is my understanding that following a consultation meeting with KCA in Kingston on 24 November 2021 the majority of these issues were resolved and

[40] Evidence of Mr Court-Patience, Section 11.
[41] Submission by KCA

in a letter to the ORC dated 9 December 2021 KCA identified three outstanding matters of concern.[42] I have summarised these as:

(a) The effects of any potential delay between the LTA failing to perform as expected and mitigation being undertaken, with a particular concern in relation to performance in winter.

(b) The proposal should do more to improve the degraded quality of the receiving environment in the streams and lake in the short term.

(c) KCA seek that the nitrogen mass allowance in Condition 11 be reduced provide for only 217 lots prior to connection of the township.

11.8 The concerns regarding the performance in winter relating to the reduced ability of plant growth to remove nitrogen due to poor growing conditions and the potential for higher rainfall during this time resulting in increased leaching is outside my area of expertise and will be addressed by Mr Ellwood . However, I do consider the proposed monitoring and reporting conditions to be robust and the ongoing monitoring from before commissioning of consent will provide valuable information on the performance of the WWTP and LTA systems as loads increase.

11.9 In relation to the poor quality of the existing streams through the township and the plan change area the Applicant is not the landowner of these areas and does not regulate the quality of water in this area. Key contributors to poor water quality in these streams are likely to be stock effluent, disturbance of streams by animals and the on-site septic tank discharges.

11.10 The development of the plan change area will remove stock from this area and the proposed WWTP provides an opportunity for the community to improve water quality by connecting to the reticulated system. I acknowledge that urban areas can also contribute to poor water quality but also note this development included policies seeking a low impact stormwater system and will provide opportunities for riparian planting that may further contribute to improvements in stream health.

11.11 The submitter requests that the condition establishing a nitrogen mass balance limit that will restrict development in the plan change area until properties within the existing township begin to connect be linked to the number of lots (217) currently consented for subdivision in this area. The rationale presented by KCA for this position is to reduce the risk of discharges increasing from the plan change area while discharges are still occurring from within the township, and to create additional motivation for QLDC to include wastewater reticulation for Kingston in the next 10 year plan.

11.12 The evidence of Mr Ellwood illustrates alternative examples of nitrogen leaching outcomes based on different development scenarios in Table 7. Scenario 5 in Table 7 reflects the concerns raised by KCA and is discussed in paragraphs 6.23-6.25. Mr Ellwood concludes at paragraph 6.33 that:

> My conclusion for nitrogen losses is that under the likely development scenarios presented, the proposed WWTP and LTA area will reduce the

[42] Evidence of Mr Court-Patience, Section 11

nitrogen loading entering Lake Wakatipu when compared to the Village without the community wastewater treatment system.

11.13 This is ensured by a combination of discharge quality standards (Condition 16), by capping the nitrogen discharge to the LTA at 450 kg N/ha/year for all stages (Condition 18) and the mass balance limits (Condition 23). On the basis of Mr Ellwood's evidence and the proposed conditions, I consider the environmental effects do not support a more restrictive approach to the mass balance condition.

11.14 I do not consider the current consent is the appropriate method to encourage QLDC to change the timing of funding for reticulation in its 10 year plan as this is not an RMA process. KCA can submit on the annual plan process in relation to that matter and I note that if a consent is secured QLDC will need to give effect to it within the timeframes set by the consent.

12 Section 42A report

12.1 I have reviewed the s 42A Report and additional technical memorandum from PDP.

12.2 I note that, having regard to any actual and potential effects on the environment of allowing the activity the Council planner has concluded that the effects are minor and can be appropriately managed by conditions of consent.[43]

12.3 In relation to s104(1)(b), having regard to the provisions of policy documents, I note that the assessments in Chapter 6.3 of the s42A report indicate that the Council planner has not concluded that the proposal is inconsistent with any relevant policies or objectives of these documents.

12.4 I agree with the conclusions of Council's planner on these matters and the following sections relate to a number of points raised by the Council Planner and technical advisors from PDP regarding appropriate conditions.

Effects on Soil

12.5 The Council planner has adopted the previous assessment of the effects on soils undertaken in the Notification Report and considers the maximum hydraulic loading rate for soils to be appropriate for the available water retention capacity of the soils and the proposed conditions for soil monitoring appropriate to deal with any potential adverse effects on soils that may arise unexpectedly.

12.6 The Council planner has noted that the effects of climate change in terms of the effectiveness of land treatment area over the proposed term of the consent has not been discussed in the application. I rely on the evidence of Mr Ellwood in relation to this matter, and his response is provided at paragraph 8.3 and 8.4 of his evidence.

[43] S42A Report, Section 6.1

Requirements for additional monitoring of ground and surface water

12.7 The Council planner has indicated the frequency of ground and surface water monitoring proposed is inadequate to ensure an accurate environmental baseline against which future monitoring can be compared.

12.8 The Council planner has proposed to address this by conditions of consent requiring monthly sampling for 12 months prior to giving effect to the consent. The Applicant accepts this proposal in principle but has concerns that completing consecutive monthly monitoring may be difficult due to high demands of technical staff to undertake this work and failure to monitor any one month would restrict the progress of the project. I defer to the evidence of Mr Court-Patience on this matter but note that the Applicant seeks baseline monitoring be undertaken on a bi-monthly basis.

12.9 The Council planner has identified concerns that the monitoring of groundwater wells is proposed to be developed in relation to the commencement of development of each LTA and the number of sites proposed for monitoring groundwater.

12.10 I rely on the evidence of Mr Ellwood in relation to the appropriateness of the proposed groundwater monitoring sites and he addresses this issue in paragraph 8.6. The proposed groundwater monitoring sites are shown in Figure 2. I note Mr Ellwood's conclusion that:

> The three bores that are monitored are down-gradient of the LTA and will provide baseline and long term monitoring data to support the management of effects from the LTA.[44]

Wastewater nitrogen concentration

12.11 The Council planner has indicated a concern that the nitrogen limit of 50 mg/L for stage 1 is too high. I note there is some inconsistency between this figure and condition proposed by the Council planner to manage discharge quality which proposes a limit of 50 mg/L for nitrogen (Condition 16).

12.12 This area is outside my area of expertise and has been addressed by Mr Ellwood at paragraph 9.8 of his evidence.

12.13 The modelling of Mr Ellwood has indicated that environmental effects of the discharge of stage 1 can be effectively managed and the proposed sampling conditions will enable the trends in environmental performance to be monitored and further mitigation can be undertaken if required.

12.14 I note the technical memorandum provided by PDP accompanying the s42A report also acknowledges the limits proposed may achieve the goal of not increasing leaching to the lake.[45]

Term of consent

12.15 The Council Planner discusses the proposed term of consent in Section 11 of the S42A Report and proposed a term of 15 years.

[44] Evidence of Mr Ellwood, paragraph 8.7

[45] PDP, Technical Memorandum, December 2021

12.16 I consider a number of factors identified by the Council Planner militate in favour of granting a 35 year term of consent as sought by the Applicant. These factors include the significant capital investment required to construct the proposed reticulation, treatment and disposal systems, the life expectancy of the proposed systems which is well beyond the proposed term of consent and the extent of the mitigation measures included by way of consent conditions.

12.17 I agree with the Council Planner that we are operating in an evolving policy environment, however I that this also presents a rationale to provide certainty to consent holders where positive environmental conditions are being achieved.

12.18 The Applicant has demonstrated that the proposed discharge is consistent with what is permitted under the RPW for the area of land being retired from productive activity and it is therefore considered the unexpected adverse effects of the discharge are within the threshold of what is already anticipated by the plan and a reduced term of consent is not necessary.

13 Commentary on proposed conditions

13.1 The conditions use various terms to describe the area to which the wastewater will be discharged from the WWTP to land. For the purposes of clarity, I consider that this should be referred to consistently. Based on the system proposed I consider the most appropriate term would be Land Treatment Area (LTA) as it is not just a discharge field but an essential component of the treatment system.

Condition 1

13.2 With respect to Condition 1, I acknowledge that this is a relatively standard condition but I consider it is not particularly helpful for Council or the Applicant when applied to an application such as this when there has been so much information supplied. The Applicant's legal submissions recommend deleting this conditions or an amendment to clarify the more recent information supersedes earlier reports. I have included the proposed amendment to Condition 1 in the attached conditions to illustrate this alternative in the event this condition is retained.

Condition 2

13.3 Condition 2 is not currently framed as a condition. I recommend the deletion of the first sentence to reframe this as a condition.

13.4 Condition 2(b) would be better framed as a rolling 7-day average to manage minor variations in flow. This is addressed in the evidence of Mr Ellwood at paragraph 8.22.

Condition 3

13.5 Condition 3(a)(i) I recommend this clause be deleted. Condition 3(a)(i) is addressed in our legal submissions. In brief we consider Condition 3(a)(i) to be ultra vires as it relates to properties and activities outside the scope of application.

13.6 Condition 3(a)(ii) and (iii) I recommend these clauses be amended. These clauses link the staging to the number of units. I consider this inappropriate as the staging should be linked to the effects of the discharge not to the number of properties discharging to it. The current condition would prevent Stage 2 being implemented early if this was considered appropriate, or later if the effects were being managed well within the proposed limits.

13.7 I recommend that Condition 3(a)(iii) be amended to change the reference to 'sequencing batch reactor' to refer to the broader category of 'activated sludge technology' to provide flexibility for the applicant to use similar technologies that achieve the outcomes prescribed by other conditions.

13.8 Mr Ellwood addresses Condition 3(a)(ii) and (iii) at paragraph 8.23 of his evidence.

13.9 Condition 3(a)(iv) I recommend this be deleted. Mr Ellwood addresses this at paragraph 8.24 of his evidence.

13.10 This repeats Condition 12 but does not provide any detail as to what is required. Please delete this clause for the purposes of clarity.

13.11 Condition 3(a)(v) I recommend this be deleted. This would serve no purpose as the site is not manned and will be monitored remotely. Please delete this clause.

13.12 Condition 3(a)(vi) I recommend this be amended. The proposed system will provide 24 hours average daily flow volume as storage. Mr Ellwood discusses this at paragraph 8.24 of his evidence.

13.13 Condition 3(b)(i) I recommend this be amended. The proposed LTA requires a minimum of 5 ha for Stage 1 not 7.5. The LTA only requires a minimum of 15 ha when at full capacity not when Stage 2 begins.

13.14 Condition 3(b)(ii) I recommend this be amended. The applicant would prefer the depth to be 150 mm as this will be closer to the root zone of most plants proposed for growth in the LTA and will facilitate absorption of nutrients as part of the cut and carry operation. Mr Ellwood discusses this at paragraph 8.25 of his evidence.

13.15 Condition 3(b)(v) I recommend this be deleted. This clause is unnecessary as the LTA is identified on plans and required to be in accordance with them under Condition 1. Condition 4 requires the setback of the dripper lines from all relevant water bodies. There are no roadside drains, subsurface or stormwater drains, bores or property boundaries near the proposed LTAs. Clauses 2, 6 and 7 are contradictory and the setbacks from ponds or wetlands is dealt with more appropriately by Condition 4.

Condition 4(b)

13.16 Condition 4(b) I recommend this condition be amended. Condition 5(b) refers to parts of the LTA as 'zones'. I think the use of this term to describe subsections of the LTA is useful and could be applied to Condition 4(b) so the requirement only applies to the relevant area of LTA under development.

Condition 5

13.17 Condition 5(c) and (d) I recommend these clauses be amended. The maximum volume discharge to each zone can be established through the maximum discharge rate (Condition 2(b)) and the area of each LTA zone. The application rates, durations and frequencies at the time of commissioning that are intended to vary based on changing operational requirements through staging and should not be defined at commissioning.

Condition 6(e)

13.18 Condition 6(e) permits the grazing of sheep on the LTA. This should be excluded as it was not sought by way of the application. Sheep would add nitrogen to the LTA rather than remove it and are therefore inappropriate. Mr Ellwood discusses this at paragraph 8.26 of his evidence.

Condition 7

13.19 I recommend the LTA areas and all monitoring locations be included on a single map (Map 1) and will provide a map covering all these features to assist. I have changed all references to Map 1 in these proposed conditions to reflect this and an example of Map 1 is provided as Figure 2 to this report.

13.20 Condition 7(a) I recommend this clause be amended for the reasons stated in the evidence of Mr Ellwood at paragraph 8.27.

13.21 Condition 7(b) I recommend clause 7(b) be amended so it reads logically as an extension of the primary clause for English language reasons.

13.22 Clause 7(c) refers to surface water monitoring sites on Map 3. I recommend this clause be amended to refer to the sites identified on Map 1. The sites on Map 3 of the s42A report differ from those proposed by the Applicant and include site SW5. SW5 was an artificial pond created by the landowner and has since been drained. Consequently, surface water cannot be monitored in that location. I consider it is appropriate to identify the monitoring points on the consent and to remove reference to the original monitoring report.

13.23 Clause 7(c) requires a water level staff for each site to enable water measurements during each survey. The evidence of Dr Goldsmith indicates that establishing and maintaining a staff at several locations would be difficult. Dr Goldsmith recommends the following locations:[46]

(i) Kingston Creek - at the culvert located near SW4.

(ii) Unnamed tributary - at the culvert near SW3 and at the culvert near SW7.

(iii) Pond near SW6 - a water level staff must be installed in a stable location towards the northern end of the pond.

[46] Evidence of Dr Goldsmith, paragraph 6.1

Condition 9(a)

13.24 I recommend this clause be amended. Clause 9(a) requires monitoring to be undertaken monthly for 12 months prior to the discharge occurring. The Applicant has expressed concerns that the availability of monitoring staff is limited at present and the failure to measure on consecutive months may prevent the project advancing. It is requested that this be amended to bi-monthly monitoring. I rely on the evidence of Mr Court-Patience on this matter.

Condition 10

13.25 Clause 10(a) I recommend this clause be amended. Clause 10(a) requires a report be prepared within one month of baseline monitoring being completed. This places an unnecessary level of constraint on the Applicant. One month may not be sufficient for this task and I consider there is little risk in a longer duration being provided for this process to be completed and approved.

13.26 Clause 10(a) does not define what trigger levels are required to be established in this process. The Applicant's legal submissions discuss our concerns regarding the extent to which this defers the exercise of responsibility most appropriately undertaken during the consent process.[47]

13.27 Clause 10(a) requires approval of the trigger levels by the Consent Authority but provides no direction on how that decision will be made. I consider that the approval of the Consent Authority be deleted, or alternatively, the basis on which the approval will be granted is defined. I rely upon the evidence of Mr Ellwood and Dr Goldsmith[48] in relation to the appropriate trigger levels to be set in relation to monitoring data as discussed in his evidence at paragraph 8.28. The proposed amendments to Condition 10 reflect an attempt to provide more certainty regarding what is required from the Applicant and the Consent Authority.

13.28 Clause 10(b) I recommend this clause be amended and note that Clause 10(b) should be split into two sections; the requirement for additional sampling, and the notification of the Consent Authority of any exceedances.

13.29 Clause 10(b) requires a copy of the assessment undertaken to be provided to the Consent Authority within 30 working days. Whilst the Applicant would make best endeavours to meet such timeframes, they have identified concerns that this may be insufficient time to meet reporting requirements where internal approvals are required and seeks this be amended to 40 working days.

Condition 11

13.30 I recommend Condition 11 be amended. The Applicant considers that 2 working days may be insufficient time in which to advise the Consent Authority that remedial actions as set out in the assessment provided under Condition 10 will be implemented if remedial action requires funding or other approval from Council. It is requested that this be amended to 20 working days.

[47] Legal submissions, Paragraph 6.4
[48] Evidence of Dr Goldsmith at 6.7-6.9

Condition 15

13.31 I recommend Condition 15 be amended to include analysis for E.Coli as this is a key component of the discharge that can have adverse environmental effects and should be monitored.

Condition 16

13.32 I recommend Condition 16 be amended.

13.33 I note that clause (a) provides for connections less than 450 and clause (b) provides for connections over 450 but neither clause provides for the 450th connection. I recommend clause (b) be amended to provide for 450 or greater connections.

13.34 The evidence of the Council Planner suggested amending the proposed Stage 1 limit for nitrogen to 30 mg/L. I note the conditions provided do not reflect this position however for the avoidance of doubt the evidence of Mr Ellwood recommends the concentration of nitrogen discharged during stage 1 be retained at 50 mg/L as proposed by the Applicant. I rely on the evidence of Mr Ellwood in aragraph 8.29 of his evidence on this matter.

13.35 Mr Ellwood recommends the limits applied in Condition 16(a) and 16(b) be based on a rolling mean or 8 out of 12 samples.[49] I consider the approach recommended by Mr Ellwood to be consistent with the NZ Municipal Wastewater Monitoring Guidelines 2002[50] and has been adopted by the ORC for other municipal wastewater discharge decisions.[51]

13.36 I recommend amending the measurement applied to Escherichia coli in Condition 16(a)(v) and 16(b)(v) from 'colony forming units' to the 'most probably number' which is considered current best practise. I rely on the evidence of Mr Ellwood at paragraph 8.31 on this matter.

Condition 18

13.37 I recommend the advice note to Condition 18 be deleted. It was provided by the Applicant for information purposes in the proposed conditions but is not required as this information is also set out in Condition 22(b).

Condition 19 and 20

13.38 I recommend conditions 19 and 20 be deleted. Based on soil sampling of the LTA Mr Ellwood has estimated the absorption capacity of the top 1.5 m of soil to be between 9 and 11 tonnes of phosphorus per ha.[52] The S42A Report estimates phosphorus loading after plant uptake at 186 kg P/ha/year across the LTA.[53] At this rate of loading the soils within the first 1.5 m depth of the LTA have storage capacity for approximately 48 years of activity. This is longer than

[49] Evidence of Mr Ellwood, paragraph 8.29-30
[50] NZWERF (2002). New Zealand Municipal Wastewater Monitoring Guidelines, NZ Water Environment Research Foundation. Wellington, New Zealand
[51] ORC Discharge Permit RM17.092
[52] Evidence of Mr Ellwood, paragraph 4.12, 8.32
[53] S42A Report, Section 2.5

the proposed term of consent sought and will be monitored by conditions of consent during that period. Changes to phosphorus will be slow to occur and trends will be picked up in soil monitoring and annual reporting conditions. This is discussed in the evidence of Mr Ellwood at paragraphs 4.12 and 9.29.

Condition 21(a)

13.39 I recommend Condition 21(a) be amended to remove the monitoring of phosphorus in 22(a)(ii) and (iv). I rely on the evidence of Mr Ellwood, who notes that, as the purpose of this methodology is to measure nitrogen, the introduction of phosphorus monitoring in Condition 21 does not add value to this condition and is an unnecessary cost to the Applicant.[54] The purpose of Condition 21 is to establish the monitoring regime to calculate the nitrogen removed from the LTA as a result of the harvesting of grass or lucerne. This information is then used to annually calculate the nitrogen mass balance as required in Condition 22.

Condition 22

13.40 Mr Ellwood recommends that Condition 22(b) retain the 15% loss that may be attributable to factors other than leaching or harvesting. I rely on Mr Ellwood's evidence at paragraph 8.36 in this regard.

13.41 I consider that the reference in Condition 22(d) to Condition 22(a) is incorrect and this reference should correctly be Condition 21(a).

Condition 23

13.42 I recommend Condition 23 be amended for the purpose of clarity.

Condition 24

13.43 I recommend Condition 24(b) be deleted. Clause (b) requires a report to be prepared by a suitably qualified person in response to a contaminant exceeding a threshold limit. This replicates what is required by Conditions 10 and 11 in the event of an exceedance and should be deleted.

Condition 25

13.44 Mr Ellwood recommends a number of changes to Condition 25(a)-(c). These areas are outside my expertise and I rely on the expertise of Mr Ellwood in relation to the changes proposed for condition 25. The rationale for this position is provided at paragraphs 8.37-39 of his evidence.

13.45 Mr Ellwood recommends Condition 25 is amended to change the frequency at which an assessment of soil conditions is undertaken to once every two years rather than annually as soil conditions will change slowly in response to the applied discharge.

13.46 Mr Ellwood notes a number of additional elements have been added to Condition 25(b) for soil analysis and the rationale behind the inclusion of these

[54] Evidence of Mr Ellwood, paragraph8.35

elements has not been adequately explained. While these elements could be sampled for this increases monitoring costs and the purpose has not been identified. Mr Ellwood recommends the removal of these elements as shown on the amended conditions.

13.47 Mr Ellwood recommends Condition 25(c) be amended to change the requirement for Ksat testing to a visual soil assessment.

13.48 I recommend Condition 25(d) be amended. The references in Condition 25(d) refer to Condition 27(a), and Conditions 20(b) and 20(c). I consider these conditions should refer to Condition 25(a)-(c).

Condition 26

13.49 I recommend Condition 26 be amended. Condition 26 addresses the contents to be included in the annual monitoring report. However, Condition 27 also include identifies the contents to be included. I consider the section of Condition 27 relating to 'additional methods or improvements' should be included in Condition 26.

13.50 I recommend Condition 26(e) be amended. Condition 26(e) requires the analysis of effects of the discharges. The AEE indicates the discharge will have effects and these have been accounted for. Consequently, we consider a separate clause should refer to an analysis of 'unexpected effects' when compared to effects predicted by the AEE when having regard to baseline monitoring.

13.51 The consideration of mitigation measures should relate to the need to reduce 'unexpected contaminants', as expected contaminants have been accounted for, or in the event of an exceedance, addressed under Conditions 10 and 11.

Condition 27

13.52 I recommend Condition 27 be amended. The reference to certification should be deleted. The provision of an annual report is not a matter for certification.

13.53 I request Condition 27 be amended to include the KCA as a recipient of the annual report to reflect the Applicants agreement with the KCA.

Condition 28

13.54 I recommend Condition 28 be amended. Condition 28(e) should refer to lucerne or grass as either is a potential crop for the cut and carry operation.

13.55 The purpose of Condition 28(f) is unclear and appears unnecessary.

Condition 30

13.56 I recommend Condition 30 be deleted. Condition 30 requires the establishment of a servicing and maintenance contract to maintain the WWTP. The Applicant considers this condition is intended for smaller WWTP and is not relevant to a larger scale WWTP that will be managed by the Local Authority itself and will therefore not have an external service provider. In addition, I note the information on servicing and maintenance is required to be provided in the annual report as part of Condition 26.

Condition 31(b)

13.57 I recommend Condition 31(b) be amended. Regular auditing of the performance of the plant against the levels predicted is appropriate and ensures the system is operating as anticipated. This condition, in combination with a review condition, provides a high degree of certainty to the Consent Authority that the effects of the proposed system can be managed for the term of the consent.

Condition 33

13.58 I recommend Condition 33 be deleted. It is unclear how the 'safe and efficient' operation of the proposed system will be determined. In the event that there is a disagreement regarding the implementations of recommendations in the audit report regarding the scope of amendments it more appropriate that this is addressed through the mechanism created by the proposed review condition.

Condition 34

13.59 I recommend Condition 34 be amended.

13.60 In relation to Condition 34(c) Mr Ellwood notes that, due to the sloping nature of the LTA, there is the potential for surface seepage (breakout) to occur temporarily when heavily saturated. This is discussed in the evidence of Mr Ellwood at paragraph 8.40.

13.61 Condition 34(e) I recommend a minor change to correct minor typographical error.

13.62 Condition 34(f) I recommend deleting Condition 34(f) as it duplicates Condition 6(f) and is not needed.

Condition 35

13.63 I recommend Condition 35 be deleted as it duplicates Condition 29.

Condition 36

13.64 I recommend Condition 36 be deleted as it duplicates Condition 29.

Condition 38

13.65 I recommend Condition 38 be amended. The lapse period of 5 years is appropriate for a standard consent however I consider a 10 year lapse period is appropriate for a project of this size, the complexity of funding the proposal and the uncertainties created by the changing policy environment and the government's proposed three waters reform programme. Access to funding could be subject to limitations that are not currently anticipated and providing flexibility for development is considered appropriate.

14 Conclusions

14.1 The current proposal represents the outcome of a strategic planning process by the Applicant to address the concerns of the community of Kingston regarding

the effects of wastewater discharges on the health of the community and the quality of Lake Wakatipu.

14.2 The proposed WWTP and LTA system has been designed to enable growth over time to reflect the changing needs of the community and is sensitive to cultural concerns regarding the receiving environment for the disposal of human wastewater.

14.3 The proposal has the potential to deliver positive outcomes through the reduction of existing septic systems from the township of Kingston and shift of disposal away from Lake Wakatipu.

14.4 Overall, I consider the Applicant has appropriately modelled the proposed WWTP and LTA to reflect the outcomes require by the RPW to ensure the adverse effects of the discharge can be managed commensurate with the sensitivity of the receiving environment. To provide certainty regarding the ongoing management of the discharge the Applicant has volunteered a suite of monitoring conditions to ensure these outcomes continue to be achieved.

Ralph Robert Henderson

23 December 2021

Appendix 1: Application Process to Notification

(a) Application:

  (i) Application form and assessment of environmental effects (AEE), Lowe Environmental Impact Limited (LEI), May 2020

(b) Technical assessments undertaken on behalf of the ORC

  (i) Groundwater Review, Pattle Delamore Partners Limited (PDP), July 2020

  (ii) Aquatic ecological and surface water Review, E3S Limited (E3S), July 2020

(c) Section 92 request: first stage

  (i) Request for further information, Otago Regional Council (ORC), April 2021

(d) Response by Applicant to first stage request for information

  (i) Further Information response letter, QLDC, 16 March 2021

  (ii) Further Information, LEI, 15 March 2021

  (iii) Aquatic Ecology Assessment, Ryder Environmental Limited (Ryder), November 2020

  (iv) Flow Gauging, NIWA, 16 November 2020

(e) Section 92 request: second stage

  (i) Final Groundwater Review, PD), April 2021

  (ii) Final Aquatic ecological and surface water Review, E3S, April 2021

(f) Response by Applicant to second stage request for information

  (i) Further Information (Final), LEI, 11 June 2021

  (ii) Amendment to Condition including proposed Nitrogen limits, LEI, 23 June 2021

(g) ORC Notification decision

  (i) Notification Recommendation Report, ORC, August 2021

Appendix 2: Amended Conditions from S42A Report

Appendix 2: Amended Conditions from S42A Report

The conditions from the Section 42A Report have been reproduced here with track changes showing amendments. Additions are shown underlined and deletions ~~struck through~~.

Specific

1. The discharge of treated wastewater to land from Kingston Township must be carried out in accordance with the plans and all information submitted with the application, detailed below, and all referenced by the Consent Authority as consent number RM20.164:
   a) Application form, and assessment of environmental effects dated May 2020.
   b) Further information response cover letter dated 16 March 2021;
   c) Further information memorandum by Lowe Environmental Impact dated 15 March 2021;
   d) Memorandum dated 11 June 2021 by Lowe Environmental Impact dated 11 June 2021; ~~and~~
   e) Email correspondence dated 23 June 2021 from Brian Ellwood; and
   ~~e)~~f) Evidence presented on behalf of the Consent Holder at the hearing on 26 January 2022.

   The evidence in (f) above presented the most up to date version of the application and supersedes the earlier documents. If there are any inconsistencies between the above information and the conditions of this consent, the conditions of this consent will prevail.

2. ~~treated municipal wastewater from Kingston Township onto the area shown in Map 1 attached to this consent and as shown in the application for consent dated May 2020.~~ The discharge must be managed so that:
   a) The maximum volume of wastewater discharged must not exceed 1,800 cubic metres per day.
   b) The rate of application does not exceed 12 mm per day in any part of the disposal area over a rolling 7 day average.
   c) The average daily total volume over a rolling 30-day period must not exceed 900 cubic metres per day.

3. The key components of the wastewater treatment plant (WWTP) and land treatment area (LTA) must be consistent with those described in the application; as shown on the attached plant schematic drawing in Appendix 1 and must comprise at least the following minimum, or additional, components, dimensions and standards:
   a) ~~Wastewater treatment system~~WWTP:
      i. ~~Grease traps must be installed at the outlets of all restaurants, cafés and commercial food producing facilities connecting to the wastewater treatment system;~~
      ii. tertiary level treatment and oxidation pond as described in the application ~~and shown in Appendix 1 for up to 450 connections~~ (Stage 1);
      iii. ~~sequence batch reactor~~activated sludge technology that provides tertiary level treatment, a calamity pond, sludge buffer tank, and sludge dewatering as

described in the application ~~and shown in Appendix 1 when there are 451 or more connections~~ (Stage 2);

iv. ~~A wastewater discharge flow meter must be installed for both Stage 1 and 2;~~

v. ~~An audio/visual alarm system must be incorporated for both Stage 1 and 2; and~~

~~vi.~~v. Emergency storage volume, equivalent to 24 hours average dry weather ~~peak~~ flow volume, above the high water alarm levels, within the ~~wastewater treatment system~~WWTP for both Stage 1 and 2.

b) Wastewater ~~land treatment area~~LTA:

i. A minimum of ~~7.5~~5 hectares of ~~land disposal area~~ LTA must be provided for Stage 1 and a minimum of 15 hectares must be provided ~~for Stage 2~~at maximum capacity;

ii. at least 25 hectares of total ~~land disposal area~~ LTA must be available for the discharge;

iii. subsurface pressure compensating drip irrigation buried to a depth greater than ~~200~~ 150 millimetres below the ground surface;

iv. dripper lines at a maximum of 1 metre spacing and emitters spaced at a maximum of 0.6 metre centres;

v. ~~the disposal area must be located in accordance with the approved plans, and must be:~~

~~1. a minimum distance of 10 metres from roadside drains;~~
~~2. a minimum distance of 50 metres from surface water bodies;~~
~~3. a minimum distance of 50 metres from subsurface and stormwater drains;~~
~~4. a minimum distance of 20 metres from property boundaries;~~
~~5. a minimum distance of 50metres from any bore (except monitoring bores);~~
~~6. a minimum of 5 metres from any ephemeral pond;~~
~~7. a minimum of 10 metres from any wetland and pond; and~~

~~vi.~~v. Managed by a cut and carry management regime designed and managed in a way that maximise plant uptake and removal of nutrients from the site.

4. Waterbody buffer zones must be established and maintained as follows:
   a) If ~~land treatment area~~ LTA dripper lines are located within 15 metres from any permanent wetland or pond, the consent holder must, prior to the application of wastewater establish and maintain a native riparian vegetation buffer of a width of 10 metres between the permanent wetland or pond and the nearest Land Treatment Area dripper line;
   b) Prior to application of wastewater any specific 'zone' of the LTA the ~~discharge area~~LTA, ephemeral ponding areas must be identified and the consent holder must establish a 5 metre non- irrigated buffer around any ephemeral pond; and
   c) The buffers must be maintained and any plantings that die must be replaced with native plantings in the next available planting season.

5. Prior to commissioning the treatment and disposal system, the Consent Holder must supply the Consent Authority with a Producer Statement 4, Code Compliance Certificate or Certificate of Acceptance, certifying that the treatment and disposal system has been installed in accordance with Condition 3. These must include, but are not limited to, the following for the new stage:
   a) plans of the treatment system described in Condition 3 of this consent;

b) plans of the land treatment area clearly showing all the irrigation zones;
c) details of the area of each LTA 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~~;
d) confirmation that the total installed and operational land treatment area is sufficient to meet the maximum application rate in Condition 2 for the total commissioned treatment plant capacity: and
e) photographs of each of the new irrigation zones.

6. Prior to commissioning the treatment and ~~land treatment areas~~LTA, the ~~land treatment areas~~LTA must be marked out by any means that ensures the extent is identifiable on the ground surface and must remain marked out for the duration of the consent. The ~~land treatment areas~~LTA must not be used:
   a) For roading whether sealed or unsealed;
   b) As a hardstanding area;
   c) For erecting buildings or any non-effluent systems structures;
   d) For activities that require intensively managed grass surfaces (e.g. grass tennis courts or bowling greens or golf tees and greens);
   e) For grazing stock~~, excluding sheep~~; and
   f) No vehicle must park or drive over the disposal field with the exception of harvest for the cut and carry and for maintenance.

Performance Monitoring

7. Prior to the discharge commencing the Consent Holder must establish a water quality monitoring network by:
   a) Installing groundwater monitoring wells in the locations identified in the attached monitoring bore location plan attached as Map ~~2~~1;
   b) Surveying, once installed, the bore locations and reference levels, and submitting borelogs and bore construction details to the Consent Authority confirming location, depth, groundwater levels and geology~~Once installed, the bore locations and reference levels should be surveyed, and borelogs and bore construction details must be submitted to the Consent Authority confirming location, depth, groundwater levels and geology~~; and
   c) Establishing surface water monitoring sites in the locations identified in the surface water sampling location plan attached as ~~Map 3~~Map 1 ~~and as identified in the Aquatic Ecology Assessment by Ryder Environmental Ltd dated November 2020~~. A water level staff must be surveyed at the following locations to ~~each site to~~ enable water level measurements during each survey:
      i. Tributary of Kingston Creek - at the culvert located near SW4.
      ii. Unnamed tributary - at the culvert near SW3 and at the culvert near SW7.
      iii. Pond near SW6 - a water level staff must be installed in a stable location towards the northern end of the pond.~~.~~

8. Representative surface water and groundwater samples must be taken or overseen by a suitably qualified professional from the monitoring network established in Condition 7. All

samples must be collected in accordance with AS/NZS 5667.11:1998. Groundwater and surface water samples must be analysed for the following parameters:

a) Temperature;
b) pH;
c) Dissolved oxygen;
d) Electrical conductivity;
e) Chloride;
f) Escherichia coli (E.coli);
g) CBOD5;
h) Total suspended solids;
i) Nitrate+Nitrite nitrogen (NNN);
j) Total ammoniacal nitrogen (NH_4-N); and
k) Total Kjeldahl Nitrogen (TKN)
l) Dissolved reactive phosphorus (DRP)
m) Total Phosphorus

Note: Temperature, pH, Dissolved oxygen, and electrical conductivity should be measured in the field with a calibrated water quality meter. Groundwater and surface water levels should be recorded at the time of sampling.

9. Samples must be collected and analysed under Condition 8 with the following frequency:
   a) For the purposes of establishing a baseline of existing effects, groundwater and surface water monitoring must be undertaken every two ~~monthly~~ months for at least 12 months prior to the discharge commencing, including at least one sample that represents a wet weather event.
   b) Following the commissioning of the ~~wastewater treatment plant~~WWTP and ~~land treatment areas~~LTA, groundwater and surface water monitoring should be conducted in February, April, July, and October each year, unless more frequent monitoring is required as specified in the report prepared under 10(a).

      Note: A wet weather event for the purposes of Condition 9(a) means 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.

10.
   a) Within ~~one~~ three months of collecting all baseline monitoring data in accordance with Condition 9 (a), a report ~~of the results and an interpretation~~interpreting ~~of~~ the results must be prepared and submitted to the Consent Authority. The report must be prepared by a suitably qualified and experienced person. The report must propose trigger levels for nitrate-nitrite nitrogen, dissolved reactive phosphorus, ammoniacal nitrogen and Escherichia coli at tributary monitoring sites, and trigger levels for total nitrogen, total phosphorus, ammoniacal nitrogen and E. coli at the pond and Lake Wakatipu monitoring sites. The purpose of the trigger levels is to identify if adverse effects that warrant further investigation may be occurring. The establishment of trigger levels must take into account the baseline monitoring data, and relevant Regional Plan Water for Otago Schedule 15 and NPS-FM Appendix 2A limits. When setting triggers levels consideration should be given to the monitoring timeframes over which the relevant Schedule 15 and NPS-FM limits apply. The trigger levels should be set so that values that reflect a reduction in the NPS-FM attribute band baseline for a monitoring site amount to a trigger.~~The report must propose appropriate trigger levels and the trigger levels must be approved by the Consent Authority.~~

b) The results of all samples taken in accordance with Condition 9(b) must be compared to the trigger levels presented in the report under Condition 10(a). Should the results exceed the trigger levels, an assessment, including further sampling as required, must be undertaken to determine whether the exceedance(s) are attributable to the discharge, and identify any potential adverse effects on water quality or aquatic ecology associated with the exceedances. The ~~report~~ assessment must also identify any immediate or longer-term remedial action that will be implemented.

c) The Consent Authority must be notified within 5 working days of the exceedance being identified and must be provide a copy of the assessment within ~~30~~ 40 working days.

11. Should the results of the assessment undertaken in accordance with Condition 10 (b) identify that the exceedance(s) in contaminant concentrations are attributable to the discharge activity, and adverse effects on water quality or aquatic ecology are occurring, then within 20 working days the Consent Authority must be provided with confirmation that the remedial actions set out in the report prepared in accordance with Condition 10(b) will be undertaken provided they are within scope of the consent.

12.

a) Prior to commissioning the ~~land treatment area~~LTA, the consent holder must install a flow meter and datalogger on the outlet pipe from the treatment system to record the volume of effluent discharged to the ~~land treatment area~~LTA. The flow meter must have an accuracy range of +/- 5%.

b) Once the flow meter and datalogger is installed, the consent holder must measure and record the daily volume of effluent discharged to the ~~land treatment area~~LTA.

c) The flow records must be forwarded to the Consent Authority with the annual report required under Condition 26 of this consent, and upon request. Data must be provided electronically giving the date, time and flow rates in no more than 15-minute increments of water and the datalogger downloaded annually and sent to Council with the annual report required under Condition 26 of this consent.

13. The Consent Holder must provide written verification to the Consent Authority that the discharge flow meter has been verified as accurate by a suitably qualified person by 31 July of the first year of the exercise of this consent and then at five-yearly intervals thereafter.

14. Prior to commissioning the treatment and ~~land treatment area~~LTA, the consent holder must establish adequate facility 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~~LTA.

15. Samples of treated wastewater prior to discharge from the tap/valve installed under Condition 14 must be collected on any one day of each month following the commissioning of the ~~wastewater treatment plant~~ WWTP and ~~land treatment area~~LTA and analysed for the following parameters:

a) pH;
b) Electrical conductivity;
c) Chloride;
d) BOD5;
e) Total suspended solids;
f) Nitrate+Nitrite nitrogen (NNN);

g) Total ammoniacal nitrogen (NH_4-N); and
h) Total Kjeldahl Nitrogen (TKN)
i) Dissolved reactive phosphorus (DRP)
j) Total Phosphorus
~~j)~~k) E.coli

Note: Total Nitrogen can be calculated by the sum of NNN and TKN.

16.

a) If the number of connections to the waste-water treatment plant (WWTP) is less than 450, the ~~results~~ samples collected under Condition 15 must not exceed the following limits in more than 8 out of 12 consecutive samples:
   i. 50 milligrams per litre of biochemical oxygen demand (5 day);
   ii. 30 milligrams per litre of total suspended solids;
   iii. 50 milligrams per litre of total nitrogen;
   iv. 10 milligrams per litre of total phosphorus;
   v. 10,000 ~~colony forming units~~ most probably number per 100 millilitres of Escherichia coli (rolling 12-month geometric mean).

b) If the number of property connections to the WWTP is ~~greater than~~ 450 or greater the ~~results~~ samples collected under Condition 15 ~~of this consent~~ must not exceed the following limits in more than 8 out of 12 consecutive samples:
   i. 20 milligrams per litre of biochemical oxygen demand (5 day);
   ii. 30 milligrams per litre of total suspended solids;
   iii. 30 milligrams per litre of total nitrogen;
   iv. 10 milligrams per litre of total phosphorus;
   v. 10,000 ~~colony forming units~~ most probably number per 100 millilitres of Escherichia coli (rolling 12-month geometric mean).

17. In the event of one or more of the limits set out in Condition 16 being exceeded, the Consent Holder must resample and/or retest that parameter to confirm the exceedance within 5 working days. In circumstances where one or more of the limits set out in Condition 16 are exceeded on two consecutive sampling occasions and these results are confirmed exceedances (i.e. it is not due to faulty testing or other parameters affecting the results), the Consent Holder must report to the Consent Authority as follows:
   a) The Consent Authority must be notified within 48 hours of any confirmed exceedance; and
   b) This notification must include advice of any corrective actions taken by the Consent Holder.
   c) An incident report must be provided to the Consent Authority within 20 working days of the notification of the exceedance. This report must include:
      i. identification of the likely cause of the limit exceedance;
      ii. the effects on the receiving environment likely to arise because of the limit exceedance;
      iii. the management responses undertaken, or which may be necessary to prevent any further limit exceedances occurring;
      iv. remedial action undertaken or which may be necessary and confirmation of implementation if the action required does not require resource consent.

18. The Total Nitrogen loading of the ~~land treatment area~~LTA must not exceed 450 kg N/ha/yr.

~~*Advice Note: The Land Treatment Area loading rate of 450 kg N/ha/yr is calculated based on the daily flow data collected under Condition 12 multiplied by the Total Nitrogen concentration sampling collected under Condition 16 of this consent and divided by the land treatment area.*~~

~~19. Olsen P of the land treatment area must not exceed 40mg/L for any samples as measured under Condition 24(b).~~

~~20. In the event any of the samples under Condition 24(b) of Olsen P limit has been exceeded, the Consent Holder must report to the Consent Authority as follows:~~

~~a) The Consent Authority must be notified within 48 hours of any confirmed exceedance; and~~

~~b) This notification must include advice of any corrective actions taken by the Consent Holder.~~

~~c) An incident report must be provided to the Consent Authority within 20 working days of the notification of the exceedance. This report must include:~~

~~i. identification of the likely cause of the limit exceedance;~~

~~ii. the effects on the receiving environment likely to arise because of the limit exceedance;~~

~~iii. the management responses undertaken, or which may be necessary to prevent any further limit exceedances occurring;~~

~~iv. remedial action undertaken or which may be necessary and confirmation of implementation if the action required does not require resource consent.~~

21.

a) During every grass/lucerne harvest event from the ~~land treatment area~~LTA, the consent holder must:
   i. obtain one composite sample of grass for every five hectares of the land application area harvested. A composite sample must consist of ten samples of cut grass
   ii. analyse the composite samples for total nitrogen ~~and total phosphorus~~ content;
   iii. record the weight of grass harvested in kilograms of dry matter; and
   iv. use the data obtained under Conditions 21(a)(ii) and 21(a)(iii) to determine the kilograms of nitrogen ~~and phosphorus~~ per hectare exported from the land application area via the cut and carry system.
b) The results of this analysis must be presented in the annual report required under Condition 26 of this consent.

22. The consent holder must annually calculate the nitrogen mass balance to provide an estimate of the mass of nitrogen lost to groundwater from the ~~land treatment area~~LTA as follows:
   a) Calculate the total nitrogen applied to land each year less the total nitrogen removed by harvesting each year;
   b) The total nitrogen applied to the ~~land treatment area~~LTA must 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 waste water treatment plant discharge in the same period less ammonia volatilisation (5% of the applied nitrogen) and less denitrification (10% of applied nitrogen).

c) The total nitrogen applied to the ~~land treatment area~~LTA for the yearly reporting period is the sum of total nitrogen in Condition 22(b)

d) The Total Nitrogen removal by harvesting grass or lucerne from the ~~land treatment area~~LTA each year must be estimated by obtaining dry matter content and total nitrogen content after each crop/plant harvest in accordance with Condition ~~22~~21(a).

23. The nitrogen mass balance calculated in accordance with Condition 22 must not exceed:
    a) 1,050 kg N/year prior to the connection of any existing properties within Kingston (as at the date of consent) to a reticulated wastewater system managed by Queenstown Lakes District Council;~~1,050 kg N/year while existing properties (as at the date of the consent) within Kingston have septic tanks discharging to the ground~~; or
    b) 1,050 kg N/year plus an additional 5.2 kg N/year for every connection of an existing property within Kingston (as at the date of consent) to a reticulated wastewater system managed by Queenstown Lakes District Council~~1,050 kg N/year plus 5.2 kg N/year for every existing property that has been connected and conveyed to the WWTP~~; and
    c) The results of the nitrogen mass balance calculation must be presented in the annual report required under Condition 26 Of this consent.

24. Ecological assessments of the surface water quality sampling sites established under Condition 7(c) and shown on Map 1~~3~~ must be undertaken following the sampling methodology in the Aquatic Ecology Assessment report prepared by Ryder Environmental Ltd dated November 2020 to provide a baseline of effects. Within three months of the assessment a report of the results and an interpretation of the results must be prepared and submitted to the Consent Authority. The report must be prepared by a suitably qualified and experienced person. The assessments should be completed~~:~~
    ~~a)~~ on any day of October in the first year following the commissioning of the ~~wastewater treatment plant~~ WWTP and ~~land treatment area~~LTA~~; and~~
    ~~on any day of October if exceedance(s) in contaminant concentrations have occurred that are attributable to the discharge activities under Condition 11.~~.

25. An assessment of the soil conditions must be undertaken by a suitably qualified and experienced practitioner ~~on an annual basis~~every two years. The assessment must include:
    a) Four soil samples must be collected at random from within the ~~Land Treatment Area~~LTA at the following depths:
        i. 0 -20 cm;
        ii. 30 – 50 or at the application depth; and
        iii. iii. 80 – 100 cm
    b) The four soil samples from each depth must then be composited and analysed for the following:
        i. Exchangeable Cations (Sodium, Potassium, Magnesium, Calcium);
        ~~ii. Exchangeable Sodium Percentage;~~
        ~~iii.~~ii. ~~-~~Olsen P;

~~iv.~~iii. Total Phosphorus
~~v. P retention (anion storage capacity)~~
~~vi.~~iv. Cation exchange capacity;
~~vii.~~v. Base saturation;
~~viii.~~vi. Total carbon;
~~ix. Organic Matter;~~
~~x.~~vii. Total Nitrogen;
~~xi. Available Nitrogen;~~
~~xii.~~viii. pH; and
~~xiii.~~ix. Suite of seven heavy metals (Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Zinc) every 5 years.

c) At the application depth, soil must also be tested for:
   i. in situ infiltration capacity (Ksat) at the application depth;
   ii. indications of oxidation reduction potential (gleying) of the soil;
   iii. an infield assessment of soil structure
d) A control site must be chosen outside of the ~~Land Treatment Area~~LTA, and samples collected and tested in accordance with Conditions 2~~5~~7(a), 2~~5~~0(b), and 2~~5~~0(c).
e) The results of the soil assessment must be submitted to the consent authority within the annual report required under Condition 26.

26. Every 12 months following the date of commencement of the discharge a monitoring report must be prepared relating to the activities authorised by this consent over the preceding calendar year. This report must be prepared by a suitably qualified person and must include, but not be limited to:
   a) Maintenance service records and malfunctions or breakdowns and the corrective action taken;
   b) Flow monitoring records;
   c) Discharge sampling and analysis;
   d) Copies of all analytical sample results collected under Conditions 8, 15, 21 and 25 of this consent;
   e) Groundwater, surface water and soil sampling and analysis of unexpected effects when compared to effects predicted by the Applicant, including identification of any effects and any mitigation measures necessary to reduce unexpected contaminants; and
   f) Maintenance service report and recommendations for improvements in the system;
   g) A comparison of wastewater quality and quantity results from the past calendar year with the results of the previous year and identification of any trends;
   h) Overview of compliance with all conditions of this consent including the OMM;
   i) Details of nitrogen balance including the number of existing septic tanks in Kingston that are connected to the ~~wastewater treatment plant~~WWTP;
   j) Details of the cut and carry operation including the number of harvests, mass harvested, dry matter nitrogen and phosphorous concentration;
   k) The number of connections to the ~~waste water treatment plant~~WWTP; and
   l) A summary of any complaints received.

27.

a) The report required by Condition 26 must be provided to the Consent Authority, Aukaha and Te Ao Marama Incorporated, within one month of its preparation. ~~certified by the Consent Authority and identify if there is a need to implement additional methods or improvements to the wastewater treatment and disposal system. All recommendations specified in the report and within scope of the consent must be implemented.~~

~~a)~~b) The report required by Condition 26 must be provided to the Kingston Community Association Incorporated, at its registered office address. The Consent Holder shall advise the Kingston Community Association Incorporated that it may request clarification of any of the technical details in the annual report to assist the community understanding of the operation of the treatment and disposal system in writing within 20 working days of receiving the annual report.

~~27.~~28. Prior to commissioning the treatment and land disposal system, the consent holder must prepare and forward to the Consent Authority, Aukaha and Te Ao Marama Incorporated, an Operations and Management Manual (OMM) for the treatment and land disposal system to ensure its effective and efficient operation at all times. The system must be operated in accordance with this manual at all times [unless required by other conditions of this consent which prevail over the manual], which must be updated as appropriate. The OMM must be to the satisfaction of the Consent Authority and include, as a minimum:

a) A brief description of the treatment and disposal system, including a site map that shows the location of the treatment system, discharge locations, sampling sites and the drainage network;

b) The date the discharge will commence;

c) Key operational matters including weekly, monthly and annual maintenance checks;

d) Monitoring requirements and procedures;

e) A management plan for the cut and carry operation including procedures for harvesting grass or lucerne from the site and for maximising ~~grass~~ growth and nitrogen and phosphorus uptake by ~~grass~~ the crop such as soil tests and pest and weed control.

~~f) A representative farm nutrient balance/budget for the land treatment area inclusive of wastewater applications;~~

~~g)~~f) Contingency plans in the event of system malfunctions or breakdowns (including provision for the removal and disposal of effluent by tanker truck should there be prolonged system failure);

~~h)~~g) The means of receiving and dealing with any complaints;

~~i)~~h) Key personnel and contact details; and

~~j)~~i) Emergency contact phone numbers

29. All discharges must comply with the certified OMM at all times. A copy of the certified OMM must be held on-site at all times.

~~30. Prior to the commissioning of the treatment and land disposal system, a maintenance service contract must be forwarded to the Consent Authority, which provides for the~~

~~servicing of the treatment and disposal system at least once every 12 months, must be entered into with a suitably qualified person/organisation. A maintenance service contract must be maintained for the duration of the consent. Any updates must be provided to the Consent Authority. Following every service, a written report must be prepared, and a copy provided to the Consent Authority with the annual report required under Condition 25 of this consent.~~

~~31.~~30. An audit of the condition, operation and performance of the ~~wastewater treatment~~ WWTP and ~~land disposal system~~LTA must be undertaken by a suitably qualified professional every 5 years following commencing the discharge. The audit must include:

a) An assessment of the condition of the ~~wastewater treatment~~WWTP and ~~land disposal system~~LTA.

b) An assessment of the adequacy of the system to treat and dispose the consented wastewater volume and ~~maximise~~ ensure removal of nutrients to the level predicted in the application.

c) An up to date list of the component of the ~~wastewater treatment system~~WWTP and ~~land disposal system~~LTA.

d) Recommendations including timeframes for any changes, upgrades, or remedial works to the ~~treatment~~ WWTP and ~~land disposal system~~ LTA or process.

~~32.~~31. A copy of the audit report must be provided to the Consent Authority no later than 30 working days after the assessment is undertaken.

~~33. All recommendations specified in the audit report and within scope of the consent must be implemented to ensure the efficient and safe operation of the wastewater treatment system and disposal field.~~

General

~~34.~~32. The discharge of wastewater to land must not result in:

a) Ponding of wastewater within or adjacent to the ~~land disposal area~~LTA;

b) Channelling of wastewater that results in overland runoff of wastewater beyond the ~~land disposal area~~LTA;

c) Surface seepage (breakout) of wastewater ~~within or~~ beyond the ~~land disposal area~~LTA;

d) Odour emission resulting from the ~~treatment~~ WWTP and ~~disposal system~~ LTA that is offensive or objectionable to such an extent that it has an adverse effect on the environment beyond the boundary of the property on which the consent is exercised;

e) Discharge ~~of~~ or sludge of grease to land or water; and

~~f) Vehicle access over any part of the land disposal area except during harvest and for maintenance.~~

~~35. The wastewater treatment and land disposal system must be maintained in good working order at all times and in accordance with the operations and management manual as required under Condition 28.~~

~~36. All discharges must comply with the certified OMM at all times. A copy of the certified OMM must be held on-site at all times.~~

~~37.~~35. In the event that an unidentified archaeological site is located during works, the following will apply;

a) Work must cease immediately at that place and within 20 metres around the site.
b) All machinery must be shut down, the area must be secured, and the Heritage New Zealand Pouhere Taonga Regional Archaeologist and the Consent Authority must be notified.
c) If the site is of Maori origin, the Consent Holder must also notify the appropriate iwi groups or kaitiaki representative of the discovery and ensure site access to enable appropriate cultural procedures and tikanga to be undertaken, as long as all statutory requirements under legislation are met (Heritage New Zealand Pouhere Taonga Act 2014, Protected Objects Act 1975).
d) If human remains (koiwi tangata) are uncovered the Consent Holder must advise the Heritage New Zealand Pouhere Taonga Regional Archaeologist, NZ Police, the Consent Authority and the appropriate iwi groups or kaitiaki representative and the above process under (c) will apply. Remains are not to be disturbed or moved until such time as iwi and Heritage New Zealand Pouhere Taonga have responded.
e) Works affecting the archaeological site and any human remains (koiwi tangata) must not resume until Heritage New Zealand Pouhere Taonga gives written approval for work to continue. Further assessment by an archaeologist may be required.

~~38.~~36. If this consent is not given effect to within a period of ~~5~~ 10 years from the date of commencement of this consent, this consent must lapse under Section 125 of the Resource Management Act 1991.

Review

~~39.~~37. 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:

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
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
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.
d) Reviewing the frequency of monitoring or reporting required under this consent;
e) Amending the monitoring programme set out in accordance with Conditions 7-33.

Map 1: Groundwater and surface water monitoring locations