Memorandum

To: Amanda Leith (Remarkable Planning), Dan Wells (RCL Group)

From: Ned Norton (LWP)

Date: 30 August 2025

Subject: Summary assessment of effects on water quality and aquatic ecology, resulting from wastewater and stormwater, during construction and in the long term, from proposed Homestead Bay housing development

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Summary conclusions

I conclude the overall risk of adverse effects of stormwater and wastewater on water quality and aquatic ecology in ephemeral streams, Māori Jack Stream and Lake Wakatipu is low and is manageable through the construction and operation requirements imposed in the proposed consent conditions. I have identified several small revisions to the consent conditions originally proposed with the consent application, to address some matters raised by the SLR Limited peer reviewers of the application. Revisions to construction and operation-related conditions are identified in section 5.1. Revisions to monitoring conditions are explained in section 7 and provided in Attachment 2.

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1. Background

RCL Group (the Applicant) has lodged applications via the Environmental Protection Authority's Fast-track process for the Homestead Bay housing development.

Assessments of effects of the Homestead proposal on water quality and aquatic ecology were provided in various parts of the Homestead application, prepared by several experts who assessed various separate aspects at various stages of preparation of the application material. The main relevant reports and the aspects they covered are listed in Attachment 1a.

Otago Regional Council contracted SLR Consulting Limited to peer review the application and several different SLR experts provided reviews and recommendations on different parts of the application. The main relevant SLR review reports and the aspects they covered relevant to water quality and aquatic ecology are listed in Attachment 1b.

2. Purpose

The purpose of this memo is to summarize the earlier assessments in the Homestead application and simultaneously address comments relevant to effects on water quality and aquatic ecology from the SLR peer reviewers.

3. Scope

This summary is arranged under headings for each type of surface water receiving environment and sub-headings to recognize the wastewater and stormwater aspects as well as an overall assessment of effects.

The three types of receiving surface waters I assessed are shown in Figure 1 (reproduced from my first memo; LWP 20 March 2025). These include "unnamed ephemeral streams" which include Unnamed Water Courses 1 and 2 in the south part of the site (note in some application reports these are variously referred to as "gullies", Southern Creek and Southwestern Creek) and two unnamed ephemeral tributaries to Māori Jack Stream that run as grassed swales across the north part of the site (see Figure 1). Māori Jack Stream (also known as Jacks Point Stream) arises outside and to the west of the site and flows south picking up ephemeral flow at times from its grassed swale tributaries and probably groundwater flowing west south-west under the site (Figure 1). Lake Wakatipu is the ultimate receiver of flow from Māori Jack Stream, the two southern unnamed water courses and groundwater moving generally west south-west from the site (Figure 1).

My conclusions on effects laid out below assume that the development will be constructed and managed as proposed in the application material and in the proposed consent conditions (Appendix T to the application), with the few noted revisions arising from SLR peer review as specifically identified in my assessment below. The revisions to construction and operation-related conditions are identified in section 5.1. Revisions to the proposed monitoring conditions for stormwater are detailed in section 7.

I have not considered effects or peer review comments on wetlands as I consider these are addressed along with effects on terrestrial ecology in the report by Wildland Consultants Limited (Appendix Y to the application). I've also not considered effects or peer review comments on public health from microbiological aspects of the proposed wastewater treatment, as I consider those are addressed in other assessments (e.g., LEI report Appendix HH to the application).

4. Effects on unnamed ephemeral streams within the site

4.1 Stormwater

I agree with the Stantec assessment that the overall level of effect of stormwater discharges on ephemeral streams within the site is likely to be no more than low (Appendix F of the Engineering Feasibility Report – Volume 2; Table 4 page 489; following the EIANZ Ecological Impact Assessment Guidelines). The SLR Stormwater Discharges Peer Review also agreed with this assessment.

For the ephemeral tributaries within the site that are essentially grassed swales to upper Māori Jack Stream I think the risk of effects is negligible because these unnamed ephemeral water courses within the site have no surface stream aquatic ecological value at all, as described in my LWP Memo 1 (LWP, 20 March 2025). I recognize that absence of stream aquatic habitat does

not preclude the existence of wetland ecological value, which is outside my scope and has been assessed by Wildland Consultants Limited (Appendix Y to the application).

4.2 Wastewater

I think the risk of adverse effects from wastewater on ephemeral streams within the site is negligible for the reasons described in my LWP Memo 1 (LWP, 20 March 2025).

4.3 Overall effects on unnamed ephemeral streams

I conclude the overall effects of stormwater and wastewater on water quality and aquatic ecology in the ephemeral streams is low.

This of course assumes that construction and operation will be as proposed in the application with small amendments to the consent conditions as defined in this memo.

5. Effects on Māori Jack Stream

5.1 Stormwater

I assess the overall level of effect of stormwater discharges on Māori Jack Stream is likely to be similar to that concluded above for ephemeral streams within the site; i.e., no more than low, provided that several comments raised by three separate SLR reviewers are addressed as laid out below.

The ***SLR Stormwater Discharges Peer Review*** (Wilson, August 2025) recommended several small changes to the Proposed Consent Conditions, as follows:

i) Proposed Condition 27: The SLR Reviewer agreed with this condition but suggested that regular (e.g., suggested quarterly) inspection of the stormwater treatment devices continue ongoing post-construction to ensure they are working properly and identify if maintenance is required. I understand the Applicant proposes that the stormwater network infrastructure (including treatment devices) will be constructed to meet the permitted activity rules of the Otago Water Plan (Rules 12.B.1.8 and 12.B.1.9) and will then, at the end of each construction stage, be either vested with the Queenstown Lakes District Council (QLDC) or taken over by an incorporated society. Hence it would not be possible to impose an extension of Proposed Condition 27 beyond the construction stages. I agree with the SLR reviewer that on-going inspection monitoring and maintenance of stormwater treatment devices is very important, and indeed necessary to be confident that the conditions of the stated OWP permitted activity rules can be met. I assume QLDC has an inspection and maintenance programme for all council-vested stormwater infrastructure and that any future incorporated society could be required to have a similar programme. I assume this situation can be resolved between planners of the Applicant, ORC and QLDC.

ii) The SLR Reviewer proposed a new condition prohibiting the use of zinc and non-aluminium roofing materials throughout the subdivision. I suspect it was unknown to the Peer Reviewer that such a condition is already proposed (Proposed Condition 42(m) but just not in the section of conditions specifically related to stormwater. That Condition 42(m) satisfies the concern in my view.

iii) The SLR Reviewer proposed some additional stormwater receiving environment monitoring is needed, in addition to the stormwater discharge monitoring proposed during the construction phase as detailed in the Stantec CMP section 5.7. To satisfy this SLR Reviewer concern I have recommended specific additions to the existing proposed monitoring conditions in section 7 below. The monitoring additions laid out in section 7 below address this SLR Reviewer concern with respect to both Māori Jack Stream and Lake Wakatipu.

The ***SLR Earthworks Peer Review*** (Kam, August 2025) also recommended several changes to the Proposed Consent Conditions, as follows:

i) Alterations to Proposed Condition 8: The SLR Reviewer generally supported this condition but provided some specific marked-up changes in red (section 4.1 of the SLR Earthworks Peer Review). I understand the Applicant accepts these changes.

ii) Proposed new conditions to address points 1-5 listed in section 4.2 of the SLR Earthworks Peer Review. I understand the Applicant accepts these additional conditions.

iii) Proposed new condition to address point 6 – specifically relating to “Wetland 3” – described in section 4.2 of the SLR Earthworks Peer Review. I understand the Applicant accepts this and Stantec and Wildland Consultants limited who authored the earlier report assessing terrestrial and wetland ecology (Appendix Y to the Homestead application) will be addressing this separately.

iv) Proposed new condition to address point 7 – specifically relating to some site-specific construction methods that should be included in the ESCP prior to works commencing – described in section 4.2(7) of the SLR Earthworks Peer Review. I understand the Applicant accepts these points and Stantec are developing this methodology and ESC practices in response to these points.

The ***SLR Review of Aquatic Ecology and Wetlands*** (Pyper and Dean, August 2015) also raised a number of areas where further information was considered necessary in order to be satisfied that potential adverse effects would be managed to an acceptable level, including:

i) An information gap with respect to there being no overall assessment of effects on aquatic ecology values, notably both within the site bounds and down-gradient to Lake Wakatipu and including both stormwater and wastewater effects and cumulative effects (section 2.3.2 of the SLR Review). The purpose of my present Memo includes providing this overall assessment.

ii) More information to ascertain that best practice stormwater design, management and treatment will be applied to meet Proposed Condition 17w(i). I have found such information in other parts of the application material listed in Attachment 1a; the Stantec Engineering Feasibility Report (Appendix B to the application), particularly section 4 Drainage and Flood Mitigation, and including the appendices particularly Appendix F, and its proposed Construction Management Plan (CMP) including an Environmental Management Plan (EMP) (section 6 of the CMP) and Erosion and Sediment Control Plan (ESCP).

iii) The SLR Review did recognize and support the concept of the ESCP mentioned above, required by Proposed Condition 11(b) (Management Plans) to be submitted prior to each construction phase, but the SLR reviewers recommended that a draft ESCP be submitted with the application so that the general principles of erosion and sediment control could be reviewed. I suspect it may be that the SLR reviewers were not aware of all the material listed above and the Construction Management Plan (Appendix X to the application) and its appendices A (Master Plan ESCP) and B (Template EMP). When pointed out to me I found material in these gave me confidence the design principles of erosion and sediment control have been considered in some depth already and can be effectively refined in more detailed stage-specific plans under Proposed Condition 11(b).

iv) The SLR reviewers noted that "*effects on aquatic ecology within the site bounds are likely to be minimal due to the nature of the waterbodies on site, as well as the face that the northern gullies are to be retained, planted and vested as reserves*" but suggested this should be addressed more explicitly. They also noted that "*effects of stormwater discharges and any increase in flows during storm events (i.e., peak flows or a flashier' hydrograph) need to be addressed*" and should be addressed as part a formal assessment of ecological effects. I have now looked at these aspects and consider that the risks have been adequately addressed in the Stantec Engineering Feasibility Assessment (Appendix B to the application; e.g., section 4) and appropriately mitigated with attenuation ponds to manage peak flows from the north of the site to Māori Jack Stream (i.e., they have been designed to match pre-development peak discharges with a 1% AEP (Annual Exceedance Probability) allowing for climate change under an RCP8.5 rainfall scenario to the year 2100; section 4.5.2), and erosion control to manage peak flow effects in the southern Unnamed Water Courses 1 and 2 (i.e., the "gullies" of Southern Creek and Southwestern Creek). I consider these mitigations to be appropriate for ensuring a low risk of adverse effects on water quality and aquatic ecology.

v) With regard to the SLR reviewers' suggested potential use of treatment wetlands. I understand wetlands were considered in early engineering assessments but were not included in the ultimately proposed treatment system, for several reasons that have now been explained in the Stantec response to SLR peer reviews. In addition, from my reading of the Stantec reports and my site visits I can see the grassed swale unnamed watercourses that drain to Māori Jack Stream are part of the designed stormwater system (Figure 4-2 in Stantec Engineering Feasibility Report - Volume 1) and will infiltrate some of the stormwater flow and its contaminants through grassed soil to groundwater, before

the remaining (pond-attenuated) surface flow as well as groundwater flow reaches the mid-section of Māori Jack Stream. In my Memo 1 (LWP 20 March 2025) I described that mid-section as having wetland treatment characteristics. I consider that mid-section of Māori Jack Stream to be a useful additional aspect of the stormwater flow pathway before reaching the lower section of Māori Jack Stream and Lake Wakatipu.

5.2 Wastewater

The SLR Wastewater Discharge Peer Review (Baker, August 2025) raised the question of whether increased hydraulic loading of the application of wastewater to land might change the flow regime of streams (i.e., making them flow more often) and whether this would affect contaminant transport to the lake.

I did consider this in my LWP Memo 1 (LWP, 20 March 2025) but it is not particularly clear so I will explain it here in response to the question.

- The hydraulic loading to land will definitely increase due to application of wastewater as the SLR Reviewer notes and as explained in section 7.2.1 of the LEI Wastewater Assessment Report (Appendix HH to the application).

- Considering overland surface flow first, I think it is unlikely that this will lead to significantly increased overland surface flow in the ephemeral grassed swale tributaries to Māori Jack Stream because the proposed application rates to the land treatment areas are substantially less than the assessed assimilative capacity of the topsoil in those areas and ponding is not expected to be a concern (Section 7.2.1 and 7.2.5 of the LEI Wastewater Assessment Report). Proposed Condition 29 requires that no ponding or surface run-off of effluent shall occur; surveillance monitoring is proposed during operation of the wastewater treatment system to ensure this. It follows there would be no adverse effect from increased hydraulic loading on aquatic ecology in the grassed swale tributaries (which have no aquatic ecology value anyway) or on surface flow from those tributaries through into Māori Jack Stream.

- Considering groundwater baseflow, I agree there is certainly potential for increased groundwater contribution to flow in Māori Jack Stream. It is difficult to predict exactly how much of the increased groundwater will flow to different points along Māori Jack Stream and how much will flow directly to Lake Wakatipu, but we can estimate that the increase is relatively small. If we consider the increased drainage resulting from irrigation is approximately 2,600 mm over the 28 ha LTA (as noted by the SLR reviewer) this amounts to approximately 25 L/s additional flow over a year. That additional 25 L/s will likely be offset to some extent by the decreased drainage from hardstand areas in the new subdivision (e.g., roads, roofs and paved areas) so I consider the 25 L/s to be an indicative maximum. Fractions of the extra 25/L groundwater baseflow could enter progressively along the length of Māori Jack Stream and some portion may directly enter below ground surface to the Lake. In general terms, from an ecological perspective, this would slightly increase the baseflow in the mid-section of Māori Jack Stream and also slightly increase the size and duration of wetted channel pools in the intermittent lower

section of Māori Jack Stream. I view these as slight positive effects from the perspective of aquatic habitat quantity. I will consider water quality effects next.

- The LEI Wastewater Assessment Report (Section 7.4.2-7.4.4) predicted approximately an 11% increase in the total mass load of nitrogen leaving the site via groundwater, but predicted (based on OverseerFM modelling provided in their Appendix F) that the overall nitrogen concentration in drainage would actually decrease compared to the current land use due to increased drainage volume from wastewater irrigation adding to the water balance as described in the bullet above (LEI Wastewater Assessment Report page 71). Hence, I would expect a slightly positive effect from dilution of nitrogen concentrations in Māori Jack Stream compared to the current situation, even though the total mass load of nitrogen increases slightly. Proposed Conditions 17 to 19 establish a monitoring programme and set contaminant concentration criteria to be achieved in samples collected from Māori Jack Stream, with reporting and remedial action required if these are breached (Proposed Condition 20).

- The 11% increase in total mass load of nitrogen is assumed to reach the lake via either via Māori Jack Stream or direct groundwater flow to the Lake. I consider this a worst-case assumption for environmental effects as it is possible some of this increased load will be assimilated along its transport path, such as through the mid-section of Māori Jack Stream that has wetland treatment characteristics. I have already assessed the potential effects of the increased nitrogen load in some detail in my LWP Memo 1 (LWP, 20 March 2025); I will summarise that in the next section on Lake Wakatipu.

It follows from above that the risk of adverse effects from wastewater on water quality and aquatic ecology in Māori Jack Stream is low and may even include some slight positive effects,

5.3 Overall effects on Māori Jack Stream

I conclude the overall risk of adverse effects of stormwater and wastewater on water quality and aquatic ecology in Māori Jack Stream is low.

This of course assumes that construction and operation will be as proposed in the application with small amendments to the consent conditions as defined in this memo.

6. Effects on Lake Wakatipu

6.1 Stormwater

I agree with the Stantec assessment that the overall level of effect of stormwater discharges on water quality in Lake Wakatipu is likely to be low (Appendix F of the Engineering Feasibility Report – Volume 2; Table 4 page 489; following the EIANZ Ecological Impact Assessment Guidelines). The SLR Stormwater Discharges Peer Review also agreed with this assessment.

The stormwater-related concerns raised by three separate SLR reviewers that I addressed in section 5.1 above for Māori Jack Stream are all also relevant for establishing further confidence

in the management of stormwater and the assessment of low risk of effects on water quality and aquatic ecology in Lake Wakatipu.

6.2 Wastewater

I think the risk of adverse effects from wastewater on water quality and aquatic ecology in Lake Wakatipu is low, for the reasons I described in detail in my LWP Memo 1 (LWP, 20 March 2025),

6.3 Overall effects on Lake Wakatipu

I conclude the overall risk of adverse effects of stormwater and wastewater on water quality and aquatic ecology in Lake Wakatipu is low and manageable. Water quality is the main driver of aquatic ecosystem health potentially affected by the Homestead development; I have not identified any other potentially significant effects on aquatic ecosystems in the Lake. I consider it is plausible to maintain the current very high water quality of Lake Wakatipu, provided the development is constructed and operated as proposed, and according to the Proposed Conditions with the few revisions arising from SLR reviews as identified in section 5.1 and amendments to the monitoring conditions detailed in section 7 below.

7. Monitoring

The SLR Stormwater Discharges Peer Review (Wilson, August 2025) recommended that additional stormwater receiving environment monitoring is needed in the event that the proposed on-site stormwater monitoring during construction described in section 5.7.1 of the Construction Management Plan (CMP) is non-conformant. The SLR Review recommended a minimum list of water sampling parameters to be measured and discussed two options for the new monitoring (section 4.2 of the SLR Stormwater Review). One option is to monitor the receiving waters (i.e., Māori Jack Stream and Lake Wakatipu) and use the Otago Regional Water Plan limits and ANZG (2018) dissolved metal guidelines for setting compliance criteria. A second option is to monitor the site stormwater discharges at end-of-pipe(s) and develop adjusted compliance criteria for the undiluted discharge(s) by estimating the reasonable mixing available to achieve the aforementioned criteria in Māori Jack Stream and Lake Wakatipu.

I have considered these recommendations and arrived at the view that the option to monitor receiving waters is preferable for several reasons. Briefly, the receiving waters are the ultimate concern and a monitoring programme with proposed reasonable mixing zone and compliance criteria have already been established in the consent conditions for managing the risk of wastewater effects (Proposed Conditions 17 and 19), including most of the parameters the SLR Stormwater Review recommended. The main additional parameters relevant for stormwater but not as relevant for wastewater are dissolved metals (copper, lead and zinc). On the other hand, monitoring at the end of stormwater discharge pipe(s) would require multiple sampling points with multiple repeat laboratory analyses of a list of parameters with modest value (i.e., the nutrients) and uncertain estimates of the dilution available in receiving waters to set criteria for action. I therefore favour leaving the construction monitoring and action responses described in section

5.7.1 and 5.7.3 of the CMP as they are, and adding stormwater contaminants (i.e., dissolved metals) to the existing receiving environment monitoring.

I have made suggested amendments to Proposed Conditions 17 and 19 as shown in Attachment 2. Some commentary to help understand my rationale for the amendments in Attachment 2 are:

- Of the minimum list of parameters suggested by the SLR Stormwater Review, the only ones not already covered in the conditions designed for wastewater receiving environment monitoring are the dissolved metals (copper, lead, zinc), pH and conductivity.
- Total suspended solids is covered by the water clarity monitoring (measured as turbidity in NTU) and assessed against the Otago Regional Water Plan limit of 3 NTU already defined in Proposed Condition19(a).
- For the dissolved metal criteria added to Condition 19, I have used the latest available website Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG) chronic toxicity DGVs (default guideline values) for the 95% level of species protection, as also identified by both Appendix F of the Stantec (2025) Engineering Feasibility Assessment – Voume 2 and the SLR Stormwater Review.
- For defining a compliant pH range, I have simply adopted the range of 5.5-8.5 from section 5.7.1 of the Construction Management Plan (CMP). I do not recommend any compliance criteria be set for conductivity. Conductivity and pH are potentially useful and cheap additional parameters to include in the monitoring list that may prove useful if there is ever a need to diagnose the location origin and cause of problems using all available receiving environment monitoring together with on-site monitoring.

ATTACHMENT 1a: Homestead consent application reports I considered

Stantec (11 April 2025). Homestead Bay Development Consent Application: Engineering Feasibility Assessment: Volume 1 – Report [Appendix B to the Application]

Stantec (11 April 2025). Homestead Bay Development Consent Application: Engineering Feasibility Assessment: Volume 2 – Appendices (A to J) [Appendix B to the Application]

Stantec (11 April 2025). Homestead Bay Development Consent Application: Engineering Feasibility Assessment: Volume 3 – Drawings [Appendix B to the Application]

Stantec (11 April 2025). Homestead Bay Development Consent Application: Engineering Feasibility Assessment: Volume 4 – Drawings [Appendix B to the Application]

Stantec (March 2025). Homestead Bay Development Construction Management Plan [Appendix X to the Application], including its appendices:

- Appendix A: Master Plan ESCP
- Appendix B: Template EMP

LEI (April 2025). Assessment of Environmental Effects for the Discharge of Wastewater to Land [Appendix HH to the Application], including its appendices A to H

LWP (Norton, 20 March 2025). Assessment of sensitivity and water quality criteria for Lake Wakatipu and its tributary streams, and of risks to manage for the treatment and discharge of wastewater from Homestead Bay housing development. [Appendix C of Appendix HH to the Application]

Water Ways Consulting (Allibone, 2023). Homestead Bay Aquatic Ecology Assessment. Water Ways Consulting Report No. 127-23, November 2023. [Appendix D of Appendix HH to the Application]

Wildland Consultants (March 2025). Ecological effects assessment for a proposed subdivision at Homestead Bay, Queenstown. Wildland Consultants Report No. 7255 [Appendix Y to the Application]

Remarkable Planning (April 2025). Proposed Consent Conditions [Appendix T to the Application]

ATTACHMENT 1b: SLR reviews I considered for water quality and aquatic ecology

SLR Consulting (Wilson, 7 August 2025). Stormwater Discharges Technical Peer Review

SLR Consulting (Kam, 1 August 2025). Earthworks Technical Peer Review

SLR Consulting (Pyper & Dean, 6 August 2025). Technical review (including ecology & wetlands)

SLR Consulting (Baker, 13 August 2025). Wastewater Discharge (Effects on Groundwater) Peer Review

ATTACHMENT 2: Amendments to already proposed monitoring conditions

17 Prior to commencing construction, the following surface water quality monitoring programme shall commence in Māori Jack Stream and Lake Wakatipu:

a. Monthly sampling of Māori Jack Stream at the two locations shown on the plan attached as Plan X to this consent. The "Lower" site is for monitoring attainment of water quality criteria defined in condition 19(b) ~~17(b)~~ below. The "Mid" site is to provide a dataset that may assist with understanding nutrient transport and transformation processes occurring in the anaerobic wetland mid-section of Māori Jack Stream, hence potentially assisting future interpretation of results and reporting when acting in accordance with conditions requiring an Assessment Report (17(c)e and 17(c)f) and a Remedial Action Plan (17(d)). Sampling of the "Lower" site need only occur if, at the time of each monthly field visit, there is continuous connected surface water flowing in the lower-most 100m of Māori Jack Stream down to the landward edge of the gravel beach barrier, but not necessarily through the barrier to Lake Wakatipu. Sampling of the "Mid" site need only occur if, at the time of each monthly field visit, there is surface water present at the site. The samples must be analysed for:

i. *Escherichia coli* – at "Lower" site only;
ii. Total phosphorus,
iii. Dissolved reactive phosphorus
iv. Total nitrogen;
v. Nitrate-nitrogen;
vi. Ammoniacal nitrogen;
vii. Total Kjeldahl nitrogen; and
viii. Dissolved inorganic nitrogen;~~.~~
ix. Dissolved metals (copper, lead, zinc) – at "Lower" site only;
x. pH; and
xi. Conductivity.

c. Monthly sampling of the Lake Wakātipu lake margin at three locations 5 metres from the lakeshore at 0.5 metres depth, at the locations shown on the plan attached as "Monitoring" prepared by Lowe Environmental Impact, dated 26.03.2025 to this consent. Only the central of the three Homestead Bay waterfront sites need be sampled for dissolved metals as indicated below. The samples must be analysed for:

i. Chlorophyll-a;
ii. Water clarity;
iii. Escherichia coli;
iv. Total phosphorus;
v. Total nitrogen;
vi. Nitrate-nitrogen;
vii. Ammoniacal nitrogen;
viii. Total Kjeldahl nitrogen; and
ix. Calculation of Lake Trophic Level Index (TLI).
x. Dissolved metals (copper, lead, zinc) – at the one central site only on Homestead Bay waterfront
xi. pH
xii. Conductivity

19 If the monitoring undertaken in accordance with Condition 17(a) and (c) shows that:

a. More than 20 percent of the samples collected at the lake margin sites, in any single year or over a rolling 5-year period, exceed the following parameter limits:

i. Water clarity – 3 nephelometric turbidity units;
ii. Escherichia coli – 10 coliform forming units per 100 millilitres;
iii. Total phosphorus – 0.005 milligrams per litre;
iv. Total nitrogen – 0.1 milligrams per litre;
v. Ammoniacal nitrogen – 0.01 milligrams per litre; ~~or~~
vi. Dissolved copper - 0.00047 milligrams per litre (ANZG DGV 95%);
vii. Dissolved lead - 0.0034 milligrams per litre (ANZG DGV 95%);
viii. Dissolved zinc - 0.0041 milligrams per litre (ANZG DGV 95%); or
ix. pH – compliant if in range 5.5-8.5.

b. More than 20 percent of the samples in Māori Jack Stream "Lower" sampling site exceed the following parameter limits:

i. Escherichia coli - 50 coliform forming units per 100 millilitres;
ii. Dissolved reactive phosphorus - 0.005 milligrams per litre,
iii. Nitrate nitrogen - 0.075 milligrams per litre;
iv. Ammoniacal nitrogen – 0.01 milligrams per litre; and
v. total phosphorus 0.1392 milligrams per litre*see note below;
vi. total nitrogen 0.636 milligrams per litre*see note below; ~~or~~
vii. Dissolved copper - 0.00047 milligrams per litre (ANZG DGV 95%);
viii. Dissolved lead - 0.0034 milligrams per litre (ANZG DGV 95%); or
ix. Dissolved zinc - 0.0041 milligrams per litre (ANZG DGV 95%).

c. Any of the lake chlorophyll-a, total nitrogen or total phosphorus attribute state bands as detailed in the NPS-FM 2020 have decreased from the Jacks Point Consent RM2009.312.V1 e3Scientific (2020) "baseline study" level of "A" band for all three attributes at all three lake-edge sites (SMP-4, SMP-5, SMP-6).

Then the Consent Holder must:

d. Prepare a report for the Consent Authority by 31 August of the same year as the breach. The report must be prepared by an appropriately qualified and experienced freshwater ecologist. The report must include, but is not limited to:
   i. Changes in the nutrient concentrations in any groundwater monitoring bores;
   ii. Changes in nutrient concentrations or ecological conditions in Māori Jack Stream;
   iii. Changes in nutrient concentrations or ecological conditions in the near-shore (5 metre) margins of Lake Wakatipu within the 1.8 km stretch of shoreline between Māori Jack Stream and the jetty at the end of Lakeshore Drive in Drift Bay;
   iv. Chlorophyll-a levels in the lake margin and potential for phytoplankton blooms;
   v. Comparison of parameters to relevant regional plan criteria and guidelines where relevant.
   vi. Relationship of any changes observed as listed above with monitoring over the same time period of Homestead Bay wastewater treatment plant effluent quality and the application rate of effluent to land treatment areas.
e. Prepare an implement a Remedial Action Plan in accordance with Condition 20.

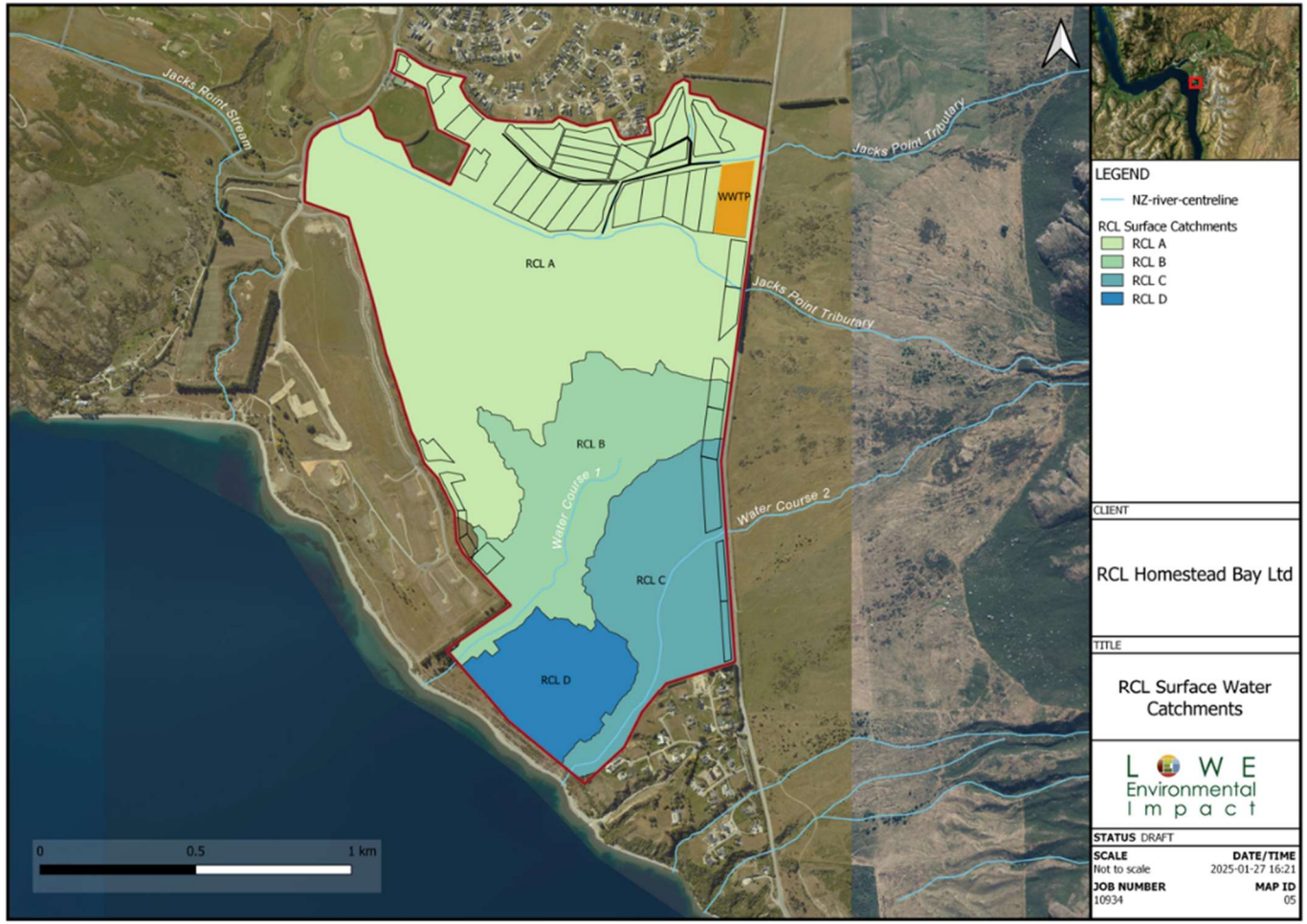

Figure 1: Location plan showing outline of Homestead Bay development block land (red outline) next to the southern edge of existing Jacks Point residential subdivision (housing visible top centre of satellite image). Coloured areas show the topographically estimated surface water catchments within the development block; these are labelled RCL A for Māori Jack Stream catchment, RCL B and C for unnamed ephemeral watercourse catchments, and RCL D for a largely flat area sloping generally towards the lake. Note that Māori Jack Stream is also known as Jacks Point Stream as labelled here; it has two ephemeral tributaries labelled here that resemble grassed swales. Māori Jack Stream is a tributary to Lake Wakatipu (dark blue area bottom left of satellite image).