MOTT MACDONALD

Shotover WWTP Consent Application Audit

Initial review of documentation

Project:	Shotover Wastewater Treatment Plant – Process and Options Review		
Our reference:	705100894-004	**Your reference:**	RM26.297
Prepared by:	Nick Dempsey	**Date:**	26 August 2026
Approved by:	-	**Checked by:**	-
Subject:	Initial high-level review of discharge consent application documents		

1 Introduction

Queenstown Lakes District Council (QLDC) owns and operates the Shotover Wastewater Treatment Plant (WWTP) located at the confluence of the Shotover and Kawarau Rivers, and adjacent to Queenstown Airport. Following continued poor performance of the disposal field d from 2020, Otago Regional Council (ORC) issued an abatement notice obliging QLDC to (a) apply for a short term discharge consent to address the failings of the plant that led to the breaches of consent, and (b) apply for a long term consent, permitting QLDC to discharge long term. The application was made in June 2026.

ORC has now engaged Mott MacDonald to assist with reviewing the application, specifically aspects of the application that relate to the wastewater treatment process. ORC has also requested that Mott MacDonald assess the alternative treatment and disposal options that have been investigated by QLDC. A full description of ORC's requirements are provided in the scope given in the proposal email dated Wednesday 26 August 2026, from Nick Dempsey (Mott MacDonald) to Hannah Gosling (ORC).

This memo fulfils the first part of ORC 's requirements, namely that it provides a high level review and audit of the applciation information provided. Documents that have been reviewed are:

- The AEE, in particular Sections (2), (3) and (5) - insofar as they relate to our area of expertise;
- Appendix A - Surface Water and Groundwater assessment (in particular Sections 2.2, 2.3 and 2.4);
- Appendix F, G and I (Assessments of alternative options);
- Appendix O - Proposed consent conditions.

This memo is comprised of three sections:

1. High level responses to a number of process questions raised by ORC in the scope;
2. High level response to a number of "alternative options" presented by QLDC; and
3. General high level comments.

This memo will be followed by a full and final review of the application documents, together with a further Request for Information (RFI) where outstanding questions and queries will be clearly outlined.

2 Process Response

The following are the process responses to questions raised in the scope of work:

1. **Will the WWTP consistently achieve the proposed discharge limited and performance standards?**

   There is little design detail provided on sizing of the wastewater treatment plant. However, the existing processes along with the proposed new processes are conventional methods that, provided the WWTP is appropriately sized, operated and maintained, are frequently used to meet the proposed discharge limits and prformance standards.

2. **Are there any contaminants or parameters that may be difficult to treat realiably?**

   The Total Phosphorous (TP) limit (at 1mg/L) is low but, as above, provided the appropriate controls are maintained it can feasibly meet the proposed limit. The proposed Total Nitrogen (TN) limit, at 10 mg/L should be achievable, but is very dependent on “sludge age” and control of that parameter. This will become more difficult to control as the population and flow to the plant increases. We understand that sludge age is controlled in a particular way that must be extremely carefully managed; we will elaborate in our full and final RFI.

3. **Is the WWTP appropriately sized to accomodate the proposed inflow projections over the duration of the resource consent sought?**

   No. The existing treatment plant (MLE1 and MLE2 and associated clarifiers) are sized for flows up to the year 2048, while the proposed consent provides for treatment for flows at the 2060 design horizon. In Section 2.2.1 of the “Surface Water and Groundwater Assessment” it is acknowledged that a “...further capacity upgrade will be required within the consent duration when the capacity is reached.” However, this isn’t alluded to in the proposed conditions.

4. **Will the WWTP operate reliably over the duration of resource consent sought?**

   There are few reasons to think that it shouldn’t, notwithstanding the question we have around control of sludge age, and the need to upgrade the plant within the lifetime of the consent. The existing technologies are relatively simple and well established and the new processes (disc filter, disinfection plant, and chemical dosing for phosphorous removal) are also well established technologies. Reliability should not be an issue any more or less than it is at most other WWTPs of a similar size with similar technologies, providing the appropriate monitoring and operating control procedure are in place.

5. **Are there any maintenance or operation risks that could compromise treatment performance?**

   The main maintenance and operation risks are likely to arise from sludge age control and chemical dosing for phosphorous removal (the risk being residual aluminium in the treated wastewater and bioslids). The addition of a phosphorous reducing chemical will also generate more sludge, which will affect the whole plant (recycle rates, operating parameters for the MLE reactors, sludge dewatering and thickening, and sludge volumes, amongst others), and this will need to be addressed in the design, with follow through into opertion and maintenance.

6. **Is the proposed operation and monitoring regime appropriate? Are there any additions required?**

   A full operating and monitoring regime wasn’t provided. Proposed conditions 15 to 21 address operations and maintenance by requiring an “Operations and Maintenance (O&M) manual (which will also include Contingency and Incident Response Plan (CIRP)), and this will include details on how to operate the plant. The proposed conditions include the requirement that QLDC submit the O&M Plan to ORC at least one month prior to exercise of the consent for “certification”. This is not unusual and a full review of the operating and monitoring regime can be undertaken then.

7. The proposed consent conditions also provide for sampling and monitoring of the discharge and the receiving environment in conditions 5 (general environmental impact), 10 to 14 (treated wastewater), and 22 to 25 (receiving environment). At a high level, the sampling frequency and discharge parameters to

be analysed appear reasonable. We have concerns around the only required monitoring for pathogens being *Escherichia coli* (*E.Coli)*, and we are likely to recommend a condition requiring ongoing montoring of the the UV plant to ensure the required dose is being met (see comments on UV disinfection in Section 4 below).

8. Receiving enviromnment monitoring also appears reasonable, but while the sampling frequency (monthly) is good, we question why key parameters like nitrogen, phosphorous, *E.Coli*, and aluminium weren't included. Condition 24 also triggers additional action to be taken if there is a change of more than 20% in some measurables. Is 20% an arbitrary number, or is it based on more substantive information?
9. **Are contingency measures appropriate in the event of equipment failure or process upsets?**

   The applicant is constructing an emergency "calamity" pond for treated wastewater that will provide for 48 hours storage at the 2060 average daily flow (ADF), which we consider appropriate at this stage. There is also an emergency pond for raw wastewater. However, it is unclear how the use of the calamaty pond will be triggered without the use of continuous online monitoring of key discharge parameters to inform operators when out of spec wastewater is exiting the wastewater treatment plant.
10. The proposal states that three tertiary filters will be provided for the 2060 flow of 60,000 m^3/d, with a space for a fourth for additonal redundancy. Similarly, two UV disinfection units are proposed for the peak discharge volume of 60,000 m^3/d with provision for a third as the population and flow grows. In both cases it appears there is a one unit redundancy, which is adequate.
11. **Has sufficient information been provided to demonstrate the treatment plant will perform as proposed?**

    No, there is little or no sizing information. If appropriately sized, however, the technologies proposed are capable of achieveing the proposed limits.
12. **Are there any assumptions requiring further justification?**

    The conditon requiring reduction in *E.Coli* assumes that the health risk assessment in Section 7 of the Surface Water and Groundwater Assessment is sufficient to enable a pathogen or bacterial consent limit to be imposed. However, as the application acknowledges, viruses also need to be considered, and these tend to be harder to 'kill' than bacteria. Section 2.4.3 of the Resource Consent Application document suggests the UV plant will be sized for a 2-log reduction of viruses, but the resistivity of viruses is highly variable. So justification for the *E.Coli* limit, and any other disinfection monitoring, needs to be supported by a quantitative microbial health risk assessment (QMHRA). There may be other assumptions that require further justification as we review the applicatiuon in more detail, but key asumptions appear to be correct in that the proposed solution appears reasonable.
13. **What additional information should ORC request before the application can be fully assessed?**

    See general comments below.
14. **Are there any additional conditions (beyond those in Appendix O) that you would recommend be adopted?**

    Yes, there will be, and these are likely to be around (a) monitoring of the new UV system, (b) monitoring for aluminium in the receiving environment, and (c) staging of any future upgrades. We will suggest wording in our full and final response.

3 Alternative Options Response

15. **Are the range of disposal options considered appropriate and sufficiently comprehensive?**

The applicant originally interrogated 12 disposal options which included a range of possibilities; including direct discharge to river, discharge to river via wetland, discharge to land using slow rate irrigation, discharge to land via trenches, discharge to land groundwater via well injections, discharge to land via soakage holes, and discharge to land via low rate spray or drip irrigation.

The land disposal options were later supplemented by an additional study which investigated possible sites for slow to moderate irrigation; this investigated the feasibility of six possible sites around Queenstown. In effect, 18 possible options have been considered, across a range of locations and methods. We consider that the options investigated are appropriate and sufficiently comprehensive.

16. **Have the technical feasibility and limitations of alternative disposal methods have been appropriately assessed?**

In our opinion, yes. The process by which the preferred option was reached was thorough, comprising a long list of the 12 original options (plus the options for slow to moderate land disposal), which were then narrowed down to a shortlist of five via a multi criteria analysis (MCA). Stakeholders had an opportunity to input to the selection of the shortlisted option via a workshop. Further work was done by the applicant's engineer to refine the shortlisted options, which were again the subject of another workshop attended by key stakeholders. We consider that the process by which the Applicant has arrived at the preferred option is appropriate. In addition, and in brief, we consider that sufficient design work has been conducted in order to fairly assess each of the options at the appropriate stages, with more work being undertaken for the shortlisted options. We consider the selection process approriate; we will provide more detail in our full report.

17. **Have any potentially feasible disposal alternatives have been overlooked or insufficiently assessed?**

As above, the options assessment appears thorough. The only comment we have (which may be outside our remit) is why was the wetland option limited to 3ha (it is actually shown as larger on some of the plans)? We acknowledge that the hydraulic retention time of a wetland of that size will not be sufficietnt for any notable additonal treatment, particularly as it relates to nutrients. However, polishing wetlands, with an appropriate hydraulic retention time, can be effective at removing metals (such as aluminium), per- and poly-fluoroalkyl substances (PFAS), pharmaceuticals, microplastics, and other emerging organic contaminants. If sufficiently sized, nitrate could also be reduced further.

In Section 9 of the Short List Report, Kai Tahu give a position statement in which Ka Runaka "...support options that will use natural processes to treat the wastewater and absorb and remove contaminants.", and that "...superficial or token contact..." with whenua that does not provide any additional treatment "..is not sufficient." We are therefore curious about how this has been address, and may develop the following queries:

a. Could the likely effectiveness of the proposed wetland under option B (at 3ha) at removing additional contaminants been considered, and brought into the Assessment of Environmental Effects (AEE);
b. Could the wetland be increased in size to further reduce nitrate and the other contaninants listed above;
c. Could such a wetland be located away from the delta if necessary; and
d. If additional treatment could be provided through the wetland, would this be acceptable to Kai Tahu? Such a solution could potentially have the dual benefit of the support of Mana Whenua goals as well as removing additional contaminants from the treated wastewater.

4 General Comments

18. **UV disinfection**

The applicant has offered a consent condition with an *E.Coli* limit, but this does not adequately address risks associated with viruses. Furthermore, the current design suggests that the new UV plant will be configured to achieve a 2-log reduction in viruses. However, different viruses have different resistivities to disinfection, so the required UV dose remains unknown. Furthermore, a microbial health risk assessment (MHRA) has not yet been completed (although the applicant intends to undertake one), so the risks around contact with the river downstream of the discharge are not as well defined as they could be (acknowledging that a basic risk assessment has been provided in the application documents). It is likely we will request a MHRA be conducted and verified against the proposed solution prior to consent being granted, as well as conditions requiring ongoing monitoring of the wastewater flow, UV transmissivity, and intensity at the UV plant as these can be used as a bettter measure of plant performance than a grab sample for *E.Coli*.

19. **Addition of alum or polyaluminium chloride (PACl)**

The addition of alum or polyaluminim chloride (PACl) to remove phosphorous, while effective, will have other consequences. Adding the chemical will result in greater sludge production (this could be an increase of 20% to 30%, or more) and will also lower the pH of wastewater. The application doesn't mention how this will affect operation or affect the process life of the existing infrastructure. There are several issues associated with this which we are likely to ask further questuons about:

a. The increase in sludge will mean more pressure on the solids processing system. Will it be able to cope?;
b. The thickened sludge will contain a higher concentration of aluminium. Does this impact on what can be done with it e.g. will landfills accept it? Will it limit beneficial reuse of biosolids in the region?;
c. The increase in sludge and possible reduction in pH may impact on the MLE process. How will this affect the ability of the MLE reactors to achieve the required wastewater quality;
d. What residual aluminum can be expected in the treated wastewater and what are the risks of it being so high that it is unacceptable for the receiving environment?; and
e. Similarly, what is the risk of the additon of alum or PACl reducing the pH of the treated wastewater to unacceptably low levels?

20. **Sludge age and ability to remove nitrogen**

As alluded to earlier in this memo, we understand that sludge age at the plant is currently controlled by wasting from the clarifier underflow, which is usually a more 'difficult' and less precise means of controlling sludge age.

a. How well is this currently controlled, and how will this be continued into the future?
b. Will the increase in sludge production affect the control of sludge age or process life span of the MLE reactors? In other words, what is the possibility that a third reactor may need to be constructed at an earlier date than currently anticipated.

21. **General presentation of impact on water quality**

Section 8.3 in the Surface Water and Groundwater Assessment states that, after complete mixing, nutrient levels in the river will still be at NPSFM Attribute A levels and that metal concentration will still meet the ANZG 99% protection level. While we tend to agree at this stage with the overarching comment that the impact will be less than minor, Appendix D of the Surface Water and Groundwater Assessment shows that background concentrations of the river will increase notably after the discharge. Indeed, monitoring data at the Kawarau river shows this, even as the river concentration after mixing may be at or below Attribute A levels. This fact isn't really discussed, and the comparison of the background river concentration with what they are likely to be after the discharge is not clearly presented. More

commentary around the increase in contaminant concentration and clear presentation of it would be helpful.

22. **Other scenarios**

Further to the above, we note theat a conservative approach in the water balance model was taken. It would be useful to run the model and assess the impact of the discharge under a very extreme condition to assess if there will be any severe, acute impacts under those very rare (say once every five years) conditions. This could be assuming:

a. A very low 7 day Mean Annual Low Flow;
b. Peak discharge flow;
c. 75%ile discharge contaminant concentrations; and
d. 75%ile river background contaminant concentrations.