

IN THE MATTER OF RESOURCE MANAGEMENT ACT 1991

KAIKOURA DISTRICT COUNCIL

RESOURCE CONSENT HEARING

CLUTHA DISTRICT COUNCIL

RM 15.364

PLANNING EVIDENCE OF RACHEL VAUGHAN

16 DECEMBER 2021

1. My name is Rachel Vaughan. I am an independent planning consultant engaged by Clutha District Council, hereafter the Applicant or CDC, to give planning evidence on a resource consent application for Waihola wastewater treatment plant .
2. My relevant expertise and experience are attached in Appendix 1 to this report.
3. I confirm that I have read the Code of Conduct for Expert Witness contained in the Environment Court Practice Notes and that I agree to comply with it.
4. I am obligated to disclose that I am engaged on behalf of the Applicant under a payment agreement.
5. I confirm that the issues and opinions in my evidence are within my area of expertise, where I am relying on the evidence or reports of another person that will be stated in my evidence.
6. This evidence gives my opinion to the Commission on the Planning Report prepared prepared by Ralph Henderson, under Section 42a of the Act.
7. I refer to reports of:
 - a. The application for resource consent and various documents forming the AEE.
 - b. Statement of Evidence of Ralph Henderson, Consultant Planner for Otago Regional Council
 - c. Statement of evidence of Dr Michael Greer on behalf of Otago regional council dated 10/12/2021.
8. I also considered the following documents in preparing my evidence:
 - The Resource Management Act (RMA)
 - The National Policy Statement for Freshwater Management.
 - The Otago Regional Plan Water.
 - The Otago Regional Policy Statement 2013.
9. I also refer to the Otago Regional Council in my report as ORC and the Clutha District Council as CDC.

Description of the Proposal

10. Clutha District Council (CDC) applied to the Otago Regional Council (ORC) to renew consent No. 2002.046, To discharge up to 680 cubic metres per day under normal flow and up to 1,020 cubic metres per day under wet weather conditions into the outflow channel of Lake Waihola for the purpose of disposing of treated sewage from Waihola township.

11. Consent No. 15.364 sought to renew the existing consent. The consent was received on 1 November 2017.
12. The location of activity is at the discharge point adjacent to Titri Road, Waihola.
13. The Waihola Resource Consent expired on 1 September 2017. A new 35-year consent was applied for.
14. Legal description of consent location: Sec 8\10 Pts II, 1 or 12 Blk 12 Waihola Survey District.
GPS location: Within a 20 metre radius of E1376630 N4902704 (NZTM2000)

Status of the Activity

15. I agree with Mr Henderson that the status of the activity is discretionary.

CONSIDERATION OF THE APPLICATION

16. The Waihola Resource Consent 2002.046 expired on 1 September 2017. A new 35-year consent has been applied for.
17. The application was notified in September 2019.
18. Te Runanga o Ngai Tahu, Te Runanga o Otakou (Aukaha) and the Sinclair wetland Trust opposed the application in its original format and wished to be heard.
19. Their submissions noted the importance of the receiving environment, the objection to the discharge of human waste into water, the degrading effects of the discharge on the environment and a range of other issues.
20. The Clutha District Council recognises these submissions as being adverse and as such wishes to amend its request to provide for a shorter term consent that will provide a period for it to improve the management of its existing discharge but also, importantly, allow for a new Water Plan that will be required by the National Policy Statement for Freshwater management 2020 which will provide guidance and standards on how a wastewater discharge such as this is to be managed.
21. A letter has since been received from both Te Runanga o Ngai Tahu and Te Rūnanga o Ōtākou. Further consultation will be undertaken with the submitters leading up to the hearing date.

Amended application

22. Discussions with staff at ORC and the Clutha District Council (CDC) have occurred, CDC is prepared to amend application RM15.364 for the renewal of the Waihola discharge to reduce the volume of discharge sought to the levels currently being discharged and to a reduced duration to enable the activity to continue while a more effective solution is sought.
23. The new Water Plan is required within 5 years and allowing for an additional time to gather information and apply for a new consent to meet this a short-term consent of 6 years for RM 15.364 is appropriate.

Hearing process

24. RM15.364 has been publicly notified and submissions (3) were received in opposition from Aukaha, Te Rūnanga o Ngai Tahu, and the Sinclair Wetlands Trust. These submitters have requested the opportunity to be heard in support of their submissions. Unless these submitters agree to withdraw their submissions, a hearing will be required in accordance with section 100(b) of the RMA.
25. CDC have undertaken further discussions with Aukaha and Te Rūnanga o Ngai Tahu to try to resolve their concerns. A key outcome sought by the submitters was a reduced duration on the consent, the application is amended to in this manner and conditional approval is discussed below.

Conditions

26. Draft conditions have been proposed to provide more effective management and monitoring of the discharge. These conditions will be needed to ensure the effects on the environment are no more than minor.
27. Obtaining a short-term consent to continue to operate will provide time for a review of alternative treatment and discharge options that may address the concerns of the submitters and have a lower environmental impact.
28. CDC has agreed to the following proposed amendments to the application RM15.364 to mitigate concerns of submitter and adverse effects:
 - (a) the term of consent,
 - (b) the volume of discharge to reflect current usage, and
 - (c) any other changes proposed.

29. This evidence includes draft conditions to address the environmental effects and to bring the monitoring and management programs for the consent in line with current best practice for agreement.

Nature of Discharge

30. The Waihola sewage treatment system consists of a single stage oxidation pond and small wetland connected in series that services the nearby township of Waihola (Figures 3 and 4). It is situated on Titri Road and discharges treated effluent via a 1.6km long pipe to a multiport diffuser located on the bed of the Lake Waihola outflow channel (situated approximately 400m and 2.4km from the lower Waipori River and Lake Waihola respectively) (Figure 5). The discharge is operated to some extent by gravity, but is habitually pumped and controlled so as to discharge 2.5hours either side of high tide with the intention to prevent the flow of effluent into Lake Waihola. The diffuser is 24 m long with seven 40m diameter ports drilled 1m apart, plus an additional port at the end of the pipe. The diffuser acts to disperse effluent to the outflow channel so that dense and highly concentrated effluent plumes are avoided.

Activity

31. This consent application is for the discharge from the Wastewater Treatment Plant at Waihola. The discharge is domestic effluent has described in the application.

Proposed upgrades

32. CDC have investigated upgrades to the Sewer Treatment and the discharge regime.
33. It is noted that the water model for Lake Waihola and the Sinclair wetlands may no longer be current. The action of tides and sea level rise which will help decision making on how discharges would interact with environment would benefit from an up-to-date model being available. Attached in Appendix 2 is an investigation into changes to the discharge regime. The conclusion is that:

A pump upgrade would require more investigation to ensure the hydraulic capacity of the pipeline and suitable pump capacity for the discharge is selected. This will be completed after the new consent condition has been issued.

34. The Clutha District Council is expecting an increase in required treatment capability and is proposing the works outlined in Table 1, in the next Annual Plan and in the 21/25 Long Term Plan.
35. On completion of these works we should have full control and measurement of the plants and improved DO and nitrogen.

Item	Waihola (Cost \$)
Outflow Meter	\$20,000.00
Pond Level Sensors	\$20,000.00
Aerators	\$75,000.00
UV Reactor	\$60,000.00
SCADA	\$30,000.00
Tracks/Fences/Gates	\$30,000.00
Bio Shells	\$50,000.00
Inlet Screen	\$100,000.00
New Outlet Pump	\$40,000.00
DO Metering	\$30,000.00
Total	\$475,000.00
Contingency 30%	\$142,500.00
Total	\$617,500.00
Proposed 20/21	\$227,500.00

Consideration of Application

36. Otago Regional Plan: Water for Otago (2014)

12.A.2 Discretionary activities:

Resource consent required 12.A.2.1

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.

12.B Discharge of hazardous substances, hazardous wastes, specified contaminants, and stormwater; and discharges from industrial or trade premises and consented dams

12.B.A General Rules for section 12.B

12.B.A.1 The discharge rules in section 12.B apply where a discharge:

(a) Contains a contaminant provided for in section 12.B; or

(b) Is from an industrial or trade premises or consented dam.

12.B.A.2 The discharge rules in section 12.A apply in addition to 12.B where a discharge contains human sewage.

12.B.4 Discretionary activities: Resource consent required 12.B.4.1 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.

12.B.4.3 The discharge of water or any contaminant covered in section 12.B.1 or 12.B.2, to water or onto or into land in circumstances which may result in that water or contaminant entering water, is a discretionary activity, unless it is: (a) Permitted by a rule in 12.B.1; or (b) Provided for by a rule in 12.B.2, 12.B.3, 12.B.4.1 or 12.B.4.2.

Activity is a discretionary activity

Schedule 1, Schedule of natural and human use values of Otago's surface water bodies

37. This schedule identifies some of the natural and human use values of Otago's lakes and rivers. These are the characteristics of a water body which are important to, or are an essential part of, ecological communities, or are enjoyed or utilised by people and communities.

Table 4: Code for Kai Tahu beliefs, values and uses ascribed to water bodies

Code	Mana Interests:
MA1	Kaitiakitanga – the exercise of guardianship by Kai Tahu in accordance with tikanga Maori* in relation to Otago’s natural and physical resources; and includes the ethic of stewardship.
MA2	Mauri – life force; for example the mauri of a river is most recognisable when there is abundance of water flow and the associated ecosystems are healthy and plentiful; a most important element in the relationship that Kai Tahu have with the water bodies of Otago.
MA3	Waahi tapu and/or Waiwhakaheke – sacred places; sites, areas and values associated with water bodies that hold spiritual values of importance to Kai Tahu. (Note: Kai Tahu should be consulted regarding the location of these places, sites areas and values for a river identified as MA3).
MA4	Waahi taoka – treasured resource; values, sites and resources that are valued and reinforce the special relationship Kai Tahu have with Otago’s water resources.

Code	Access/Customary Use Interests:
MB1	Mahika kai – places where food is procured or produced. Examples in the case of waterborne mahika kai include eels, whitebait, kanakana (lamprey), kokopu (galaxiid species), koura (fresh water crayfish), fresh water mussels, indigenous waterfowl, watercress and raupo.
MB2	Kohanga – important nursery/spawning areas for native fisheries and/or breeding grounds for birds.
MB3	Trails – sites and water bodies which formed part of traditional routes, including tauraka waka (landing place for canoes).
MB4	Cultural materials – water bodies that are sources of traditional weaving materials (such as raupo and paru) and rongoa (medicines).
MB5	Waipuna – sources of water highly regarded for their purity, healing and health-giving powers.

Schedule 15, Table 15.2.4 Discharge quality standards:

38. Schedule 15 of the RPW identifies the outcomes for achieving good water quality in Otago’s lakes and rivers. The schedule sets out targets and timeframes for various water quality parameters depending on the sensitivity of the catchment.

Table 15.2 Receiving water numerical limits and targets for achieving good quality water

39. The limits for Groups 4 and 5 are achieved when 80% of samples collected at a site, over a rolling 5-year period, meet or are better than the limits in Schedule 15. A target date of 31 March 2025 is set when the contaminant concentration does not meet the limit as at 31 March 2012.

Table 15.2.4: Receiving Water Group 4

	Total nitrogen	Total phosphorus	Ammoniacal nitrogen	<i>Escherichia coli</i>	Turbidity
	0.55 mg/l	0.033 mg/l	0.1 mg/l	126 cfu/100 ml	5 NTU
Lake Hayes	31 March 2012	31 March 2025	31 March 2012	31 March 2012	31 March 2012
Lake Johnson	31 March 2025	31 March 2025	31 March 2012	31 March 2012	31 March 2012
Lake Onslow	31 March 2012	31 March 2025	31 March 2012	31 March 2012	31 March 2025
Lake Tuakitoto	31 March 2025	31 March 2025	31 March 2012	31 March 2025	31 March 2025
Lake Waipori & Waihola	31 March 2025	31 March 2025	31 March 2012	31 March 2012	31 March 2025

40. The target date or limits to be achieved varies

- 31 March 2012 for non-ammonical nitrogen and E.coli
- 31 March 2025 for ammonical nitrogen, Total phosphorus and Turbidity

Scope of Application

41. Section 88A(1A) of the Act states that the application continues to be processed, considered, and decided as an application for the type of activity that it was for, or was treated as being for, at the time the application was first lodged. However, Section 88A (2) allows that any plan or proposed plan which exists when the application is considered, must give regard to in accordance with section 104(1)(b).

Affected parties

42. This document will be circulated to affected parties. Conditional approval has been obtained from Aukaha. Aukaha writes this reply on behalf of Te Rūnanga o Ōtākou, the kaitiaki Rūnanga whose takiwā (area):

Te Rūnanga o Ōtākou support the proposed suite of conditions as provided by the Clutha District Council in the letter dated 6 October 2020, for the continued operation of the Waihola Wastewater Treatment Plant on the understanding that :-

- Te Rūnanga o Ōtākou view the final draft suite of conditions before withdrawing their submission in opposition.
- The term of consent will be 7 years
- That the final suite of conditions as agreed, will be adhered to
- That further upgrades of the Waihola Wastewater Treatment Plant over the next 3 years will be made which include but not limited to:-
 - Screen installed at the entry of the Wastewater Treatment Plant.
 - Aerators installed in the 'settling ponds'
 - More detailed monitoring records kept
 - Monitoring/level sensors/auto control valves installed to read oxygen levels with more time dependent/controlled discharge to be on the outgoing tide.
- Te Rūnanga o Ōtākou do not think benthic algal sampling would be required due to the muddy bottomed receiving channel.

Te Rūnanga o Ōtākou would be interested in further discussions on enhancement works in and around Lake Waihola, please contact Aukaha to organise a hui.

Notification and Hearing

43. This shorter duration and additional conditions are agreed by the Clutha District Council and outlined in the attached conditions. There may be additional amendment following discussions with Sinclair Wetland group as an affected party.

Section 104

44. Section 104(1) of the RMA outlines matters for which the consent authority must have regard when considering an application. These include any actual and potential effects on the environment of allowing the activity; and 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 on the environment that will or may result from allowing the activity.
45. Section 104(b) outlines the any relevant provisions of documents in which consent authority must have regard, these are outlined below. For the avoidance of doubt, it is considered that Section 88A(2) (as at 30 September 2020) includes the consideration of the NPS Freshwater and

the NES Freshwater Regs. The assessment is included for completeness despite that the application was lodged on 1 November 2017.

National Policy Statement Freshwater Management 2020.

46. 2.1 Objective (1) seeks to prioritise the health and wellbeing of the water bodies and freshwater ecosystems, and secondly the health needs of people and thirdly the ability of people and communities to provide for their wellbeing.
47. It can be shown through peer review of the application that the discharge has a minor effect on water quality in the tributaries to Lake Waihola and is unlikely to affect whether the river meets the Regional Plan Schedule 15 targets. From Ryder environmental AEE:

The discharge of effluent from the Waihola oxidation pond to the outflow channel of Lake Waihola has a minor effect on water quality that is restricted to a localised area immediately downstream of the discharge point. This effect is temporary and shifts with the changing tide. The discharge does not appear to adversely affect aquatic plant, benthic macroinvertebrate, fish or bird communities. The minor and localised effect of the discharge on water quality in the outflow channel is expected to have minimal, if any, effects on water quality and aquatic communities in Lake Waihola, the surrounding wetland, or the lower Waipori and Taieri Rivers.

48. It is also noted there are significant background levels of phosphates and nitrates in the outlet of Lake Waihola, which indicates background levels from other sources. This may improve with the introduction of new freshwater environmental standards.
49. The application is therefore consistent with the objective due to the discharge has no more than minor effect on the health of the water body and secondly, the function of the Wastewater Treatment Plant in serving the health and wellbeing of the Waihola Community.
50. Section 4 of the Civil Defence Emergency Management Act 2002, Lifeline Utility includes (for the purposes of the RPS has the meaning set out in Section 4 of the Civil Defence Emergency Management Act 2002):

3 An entity that supplies or distributes water to the inhabitants of a city, district, or other place.

4 An entity that provides a wastewater or sewerage network or that disposes of sewage or storm water.

(Clause 4 of [Part B](#) of Schedule 1)

51. Notwithstanding the value of the discharge to the Community, it is acknowledged the discharge of human effluent is contrary to values associated with the Lake Waihola and tributaries. On this basis, CDC is committed to upgrades of the current treatment system and investigating alternative means of discharge through the life of this consent.

2.2 Policies

Policy 1: It is considered the application gives effect to Te Mana o te Wai.

52. The Clutha District Council has planned upgrades to the Waihola WTP system and has committed to significantly improving the discharge while providing for the Community. Through the life of this consent, alternatives to surface water discharges will be considered by the CDC.

Policy 2: Consistent - Tangata whenua and Tangata Moana have been involved in consideration of the consent application.

Policy 3: Consistent - The AEE considered the effect on the discharge on the catchment.

Policy 4: Consistent – The proposal is contributing to the resilience of the Waihola Community.

Policy 5: Consistent – The Community through CDC is committed to improvement of the discharge.

Policy 6: Consistent – Wetlands will not be further degraded.

Policy 7: Consistent - The proposal is seeking improvement in the discharge to the extent practicable.

Policy 8: Consistent – No outstanding water body affected.

Policy 9: Consistent – The AEE showed there no more than minor effect on the freshwater ecosystem from the discharge.

Policy 10: Consistent - as in Policy 9

Policy 11: Consistent – no water take is proposed.

Policy 12: Consistent – working toward meeting standards for the OR Plan Water.

Policy 13: Consistent – monitoring conditions recommended.

Policy 14: Not applicable

Policy 15: Consistent – The application is consistent with the policy due to the function of the WTP in serving the health and sanitary needs of the Waihola Community. The current discharge is

demonstrated to have a less than minor effect on the ecosystem health in the Lake Waihola and tributaries.

53. The discharge of human effluent to surface water is contrary to the values of Tangata whenua and Te Mana o Te Wai. However, in terms of that there are two things to consider:
- Tangata whenua and Tangata Moana recognise the importance of the wastewater treatment system to their whanau and the health and safety of the Community. The burden of cost to the Community is borne by all households, including Ngai Tahu whanui. This is recognised by Tangata Whenua and they understand that upgrades to wastewater treatment systems must be done in a manner that is economically sustainable to the Community, as well as meeting best practise and environmental constraints at the site.
 - The application has shown there is no adverse effect on the water quality of this discharge as it is currently. In addition, CDC are committed to improvements to the treatment plant and the discharge quality. Upgrades will occur over the life of the consent, while alternatives will be explored for the discharge. The alternatives will consider Te Mana o Te Wai and environmental constraints at the site.

Resource Management (National Environmental Standards for Freshwater) Regulations 2020 –

54. No specific regulation for the activity as there are no registered drinking water supplies located downstream of the discharge Taieri Catchment.

Otago Regional Policy Statement 2015

Infrastructure includes f) A drainage or sewerage system;

Objective 1.1 Partly consistent – the application is for the management of physical resources

Policy 1.1.1 - Partly consistent – the discharge is seeking to be managed to ensure downstream effects are minimised.

Policy 1.1.2 Consistent – a functioning WTP meets Community needs

Policy 1.1.3 Consistent

Objective 2.1

Policy 2.1.1 Consistent – the Treaty values have been considered

Policy 2.1.2 Partly consistent

Objective 2.2

Policy 2.2.1 Partly consistent

Objective 3.1 Partly consistent – the values of Otago’s natural and physical resources are recognised, however, the discharge may not maintain or enhance.

Policy 3.1.1 Partly consistent – the discharge is seeking to be managed to ensure downstream effects are minimised.

Policy 3.1.2 Partly consistent

Policy 4.1.12 Consistent – lifeline utilities provided for

Objective 4.3 Consistent – WTP provides for Community

Policy 4.3.1 Consistent - application provides for management of WTP

Objective 4.5 & Policy 4.5.1 - Consistent – growth provided for

RPS 2019

Objective 1.1 Partly consistent

Policy 1.1.1 Consistent

Policy 1.1.2 Partly consistent – cultural wellbeing not fully provided for

Objective 1.2 & Policy 1.2.1 Partly consistent – the WTP is to be upgraded to better manage for downstream values

Objective 2.1, Policy 2.1.1 & 2.1.2 Partly consistent

Objective 2.2 & Policy 2.2.1 Partly consistent

Objective 3.1 & Policy 3.1.1 Fresh water Partly consistent – see above

Policy 3.1.2 Partly consistent – some upgrade to the system is required

Policy 3.1.9 Consistent – there are minimal effects on ecosystem values

Policy 3.1.13 Consistent – discharge improvement is planned

Policy 4.1.12 Consistent – The WTP is a lifeline utility

Objective 4.5 & Policy 4.5.1, 4.5.2 Consistent – this application provides for growth in the Waiholā and surrounding Community

55. Both the Otago Regional Policy Statements for 2015 & 2019 show there is a need to provide physical resources for Communities as well as manage the effects on the natural environments, including the values of freshwater. The CDC is committed to improving the discharge quality to

manage the effects on Lake Waihola and its tributaries. The application is considered not contrary to either of the OR Policy Statements.

Otago Regional Plan: Water

56. The Regional Plan Water: for Otago, which became operative on 1 January 2004, is the primary document that manages water within the Otago region's boundaries.

Objectives and Policies

7.A Objectives 7.A.1 Partly consistent – the CDC is seeking to improve the discharge quality.

7.A.2 Partly consistent – The application has no more than minor effect on water quality, but meets the needs of the Community.

7.A.3 Consistent – no more than minor effects on water quality are acknowledged and CDC is seeking improvement in the discharge.

7.B Policies general

7.B.1 Partly consistent – the CDC recognise the discharge quality may meet Schedule 15 limits but improvements in the WTP will result in ongoing water quality improvements.

7.B.2 Partly consistent – the discharge is not objectionable but may have less than minor effects water quality standards

7.B.3 Partly consistent – while the discharge may result in meeting water quality standards, the consent is short term to recognise that upgrades to the discharge quality are required

7.B.4 Partly consistent – matters have been assessed in the application

7.B.5 Consistent - Kai Tahu values have been considered

7.B.6 Partly consistent – the values, character and amenity of the water body, physical processes, the discharge and the provision of community infrastructure are all described in the application. The water quality in regards to schedule 15 is assessed.

7.B.8 Partly consistent – discharge is being improved.

7.C

7.C.1 Consistent – CDC have committed to upgrades to the treatment system for the Waihola Treatment Plant. Future opportunities are being explored for the discharge, it is shown that there is no discernible degradation of the water quality from this discharge.

7.C.2 Consistent – a. the application considers the nature of the discharge and the sensitivity of the receiving environment to adverse effects. The technical assessment notes there are no discernible adverse effect from the activity.

b. the application outlines the economic importance of this system to the wellbeing of the Waihola Community. The application has outlined the commitment of the CDC to future plant upgrades and the level of investment required to meet alternative means of discharge are being considered by the ORC.

c. the current environmental constraints to an alternative land discharge are being considered by CDC. Technology to overcome these constraints will be considered in this consent term.

7.C.3 Consistent – standards were considered and applied to the consent.

7.C.4 Consistent – the term proposed will be no more than 15 years as the discharge is not considered to meet the water quality standard required to support values but shows not discernible degradation to the water quality and CDC are committed to work progressively to meet that standard within the duration of the resource consent.

Plan Change 8

7.C.12 Partly consistent – CDC recognise there is no adverse effects of the discharges, however, there are adverse effects on the values associated with discharge of human effluent and this has been given with consideration of the matters outlined in the application and this Evidence.

57. The ORP Water policies outline the importance of maintaining water quality in the receiving environment. The WTP discharge is partly consistent with these objectives and policies and a shorter-term duration of consent is consistent with policies 7.C.3 & 4. A shorter timeframe will allow for Otago Regional Council Water Plan to be prepared as required by the National Policy Statement for Freshwater management 2020. It is anticipated this will provide further guidance and standards regarding best practice management of a wastewater discharge consistent with the hierarchy of the NPS.

Section 104

58. In considering the application, the consent authority must have regard to the actual and potential effects on the environment. The discharge is considered to have a no more than minor

effect on water quality parameters, downstream of the discharge site. Given that the monitored discharge includes physical effects on the tributaries, it is particularly relevant that consideration is given to the monitoring results.

59. This means that the discharge has been shown to have no more than minor adverse effects on the downstream water quality.
60. The positive effect of this application is the provision of essential infrastructure to the Waihola Community and surrounds. The provision of centralised wastewater treatment is the recommended approach in the joint Australian/New Zealand Standard (2000) for on-site domestic wastewater management. Effluent treatment systems are also recognised as lifeline services in the Civil Defense Emergency Management Act 2002. The Regional Policy Statement also considers the provision of infrastructure services for Communities. The provision of centralised wastewater treatment provides not only for central management but for the wellbeing of people and communities.
61. In considering the documents outlined in Section 104(1)(a) of the Act, the application is in keeping with many policies and partly consistent with others. The NPS Freshwater sets out the principles of Te Mana o Te Wai and the hierarchy for consideration of freshwater. This hierarchy seeks to list the health needs of people second, then meeting the needs of community, thirdly after the maintenance of waterway health. Therefore, under the NPS, the application must prioritise the health of the receiving environment.
62. The policies of the OR Plan Water, clearly anticipate there will be some discharge and sets threshold limits for discharges through Schedule 15, water quality standards. The AEE outlines the application in terms of Schedule 15, and peer review of the AEE support the fact that the effect will have no more than minor effect on meeting the Regional Plan Schedule 15 targets. Further, policy 7.C.4 of the water plan, sets a timeframe threshold for consents that do not meet the water quality standards.
63. Section 104(2) of the Act, states that the consent authority, when forming an opinion for the purposes of subsection (1)(a), may disregard an adverse effect of the activity on the environment if a national environmental standard or the plan permits an activity with that effect. There is not considered to be a permitted baseline for water discharges.
64. Section 104(3) sets out provisions for when a consent authority may not grant resource consent. Relevant to this application is Section 107 and 104(3)(d), when a consent should have been

notified. Section 107 is discussed below, and Section 104(3)(d) in the notification provisions above.

Section 104B

65. Section 104B outlines the process for considering an application for a discretionary activity, a consent authority, the consent authority

(a) may grant or refuse the application; and

(b) if it grants the application, may impose conditions under section 108.

66. The activity is discretionary; therefore the application is not required to be wholly consistent with the objectives and policies of the national and regional planning documents. That said, the plans anticipate there are instances where consents of this kind may be granted. Specifically, 7.C.2 and 7.C.12. It is considered that the application may be granted under 104B and conditions are suggested consistent in Appendix 1 consistent with 104B(b).

Section 105

67. Section 105(1) sets out matters for an application for a discharge permit, for which the consent authority must, in addition to the matters in section 104(1), have regard to. In response to these matters:

(a) the application describes the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and

(b) this Evidence outlines the reasons this consent is necessary,

(c) The alternative is to cease to reticulate. This would result in many individual on-site wastewater treatment and effluent disposal systems. The outcome of such an eventuality is not favored by CDC.

Section 107

68. Section 107 outlines the Restriction on grant of certain discharge permits. Section 107(1) outlines the matters for which a consent authority shall not grant a discharge permit. These matters are addressed below:
69. 107(1)(a) the discharge of a contaminant or water into water; if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters:
- (c) the AEE outlines that the discharge does not result in the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:
 - (d) the AEE outlines that the discharge does not result in any conspicuous change in the colour or visual clarity:
 - (e) the AEE outlines that the discharge does not result in any emission of objectionable odour:
 - (f) the AEE outlines that the discharge does not result in the rendering of fresh water unsuitable for consumption by farm animals:
 - (g) the AEE outlines that the discharge does not result in any significant adverse effects on aquatic life.
70. There is nothing in Section 107(1) that would prevent granting of this consent.

Adverse Environment Effects

Mitigation

71. Three forms of mitigation are proposed for this consent. One is the short duration and the second is the upgrade conditions that have been prepared in consultation with ORC staff. Further monitoring conditions are included and attached in Appendix 1. The third mitigation is the extensive monitoring to investigate changes to the physical discharge regime proposed by CDC.
72. The existing sampling on the discharge transport has been undertaken to assess the behavior of the discharge plume and the effect on Lake Waihola. It is evident that further investigation is required particularly around the physical implications of the pump capacity and automaton around tide cycles.
73. Wastewater ponds are significantly influenced by weather, concentration of influent and the antecedent conditions. Being a biological ecosystem with these internal and external variables oxidation ponds are difficult to manage without long-term accurate data.
74. CDC wish to assist with progressing such as long term monitoring and improvement for Lake Waihola, including:
 - Investigations and research
 - Additional monitoring
 - Assist ORC with any modelling venture. CDC understand that there is an ORC water model for the lakes and rivers in the basin that is no longer current and on outdated platforms.
 - To contribute to any amelioration or enhancement projects to recognise Te Mana o te Wai.

Recommended conditions

75. CDC agree with the conditions outlined in Mr Henderson's report, except for conditions 1, 2, . Discussion on these specific changes requested in Table 1 below:

Condition 1:
This consent authorises the discharge of treated human wastewater at a volume of up to 192 cubic metres per day into the outflow channel of Lake Waihola at the point shown in Map [X] attached as Appendix 1 to this consent.
Proposed Condition

<p>This consent authorises the discharge of treated human wastewater at a volume of up to 680 cubic metres per day into the outflow channel of Lake Waihola at the point shown in Map [X] attached as Appendix 1 to this consent.</p>
<p>Condition 2</p>
<p>A discharge greater than the volume authorised by Condition 1 may occur only where:</p> <p>(a) the discharge was as a result of a 1 in 10-year rainfall event or greater; and</p> <p>(b) the discharge volume does not exceed 609 cubic metres per day.</p> <p>For the purposes of verifying compliance with Condition 2 (a), the Consent Holder must identify rainfall recorded at the NIWA Dunedin Aero AWS (7339) weather monitoring station.</p>
<p>Proposed Condition</p>
<p>The consent holder will review the volume of wastewater discharged annually. The consent holder will commit to inflow and infiltration detection work with the network catchment to work toward reduces the inflow volume to the Waihola wastewater treatment plant.</p>
<p>Condition 3 (a)</p>
<p>Effluent discharged from the treatment system must only be pumped into the Lake Waihola outflow channel during the latter half of the incoming tide and/or the initial half of the outgoing tide.</p>
<p>Proposed Condition</p>
<p>a. The period effluent is discharged from the Waihola WWTP shall be reduced to minimise or eliminate the backflow into Lake Waihola.</p> <p>The consent holder may further investigate the alteration of the discharge regime to achieve backflow into Lake Waihola, as per the 2021 O&M Manual as follows:</p> <ul style="list-style-type: none"> • the time subtracted from the high tide time and the time added to the high tide time shall be modified to control the keystone valve open and close time. • To allow frequent adjustment of the discharge timeframe as necessary to meet the wet weather flow requirements. • to allow investigation into the hydraulic capacity of the pipeline and suitable pump capacity for the discharge is selected.
<p>Condition 5,</p>
<p>Samples must be collected monthly and must be undertaken at the following locations on the same day:</p> <p>(a) The treated wastewater from the outfall prior to its discharge into the outflow</p>

<p>channel of Lake Waihola;</p> <p>(b) If more than one discharge point exists monitoring must be undertaken from both discharge points and each point identified;</p> <p>(c) the outflow channel of Lake Waihola, no more than 50 metres upstream of the discharge point; and</p> <p>(d) the outflow channel of Lake Waihola, no more than 50 metres downstream of the discharge.</p>
<p>Proposed Condition</p>
<p>Samples must be collected monthly and must be undertaken at the following locations on the same day:</p> <ul style="list-style-type: none"> (a) The treated wastewater from the outfall prior to its discharge into the outflow (b) If more than one discharge point exists monitoring must be undertaken from both discharge points and each point identified; (c) (c) the outflow channel of Lake Waihola, no more than 50 metres upstream of the discharge point; and (d) (d) the outflow channel of Lake Waihola, no more than 50 metres downstream of the discharge. <p>Sampling shall be undertaken to ensure there is no physical risk to safety, but where practical give a representative sample of the discharge point, upstream and downstream of the discharge.</p>
<p>Condition 5</p>
<p>At the time of sampling the flow rate and water depth, field measurements of pH, temperature, turbidity, electric conductivity, dissolved oxygen (DO) and in-stream visual clarity (measured through black disk) must be recorded.</p>
<p>Proposed Condition</p>
<p>Measuring the flow rate of the Waihola stream will not be practical and need some depth measuring gauge needs to be installed to measure depth.</p>
<p>Condition 8</p>
<p>From the 31st of March 2025 samples of receiving water taken from the outflow channel of Lake Waihola in accordance with Condition 5 must be monitored against exceedances of the following standards when calculated over a rolling five-year period:</p> <ul style="list-style-type: none"> (a) The 80th percentile for Total nitrogen (TN) concentrations should not exceed 0.55 g/m³; and (b) The 80th percentile for dissolved reactive phosphorous concentrations should not exceed 0.033 mg/L; and (c) The 80th percentile for ammoniacal nitrogen concentrations should not exceed 0.1 mg/L; and (d) The 80th percentile for Escherichia coli (E.coli) should not exceed 126 cfu/100 ml; and (e) The 80th percentile for turbidity should not exceed 5 NTU

Proposed Condition

From the 31st of March 2025 samples taken upstream and downstream of the discharge point, shall be compared to ensure there is **no net increase** in the following parameters from the discharge, when compared to the following standards when calculated over a rolling five-year period:

(a) The 80th percentile for Total nitrogen (TN) concentrations should not exceed 0.55 g/m³; and

(b) The 80th percentile for dissolved reactive phosphorous concentrations should not exceed 0.033 mg/L; and

(c) The 80th percentile for ammoniacal nitrogen concentrations should not exceed 0.1 mg/L; and

(d) The 80th percentile for Escherichia coli (E.coli) should not exceed 126 cfu/100 ml; and

(e) The 80th percentile for turbidity should not exceed 5 NTU

Note: for the avoidance of doubt, the concentration of the downstream discharge to be subtracted from the concentration in the upstream discharge to give a net change in the parameter.

76. The existing sampling regime was based on quarterly samples. By recording samples at close intervals there will be a wider range of results however the information will provide a better understanding of the discharge. It is recommended that the sampling be undertaken monthly apart from DO which will be automated.
77. Wastewater ponds are significantly influenced by weather, concentration of influent and the antecedent conditions. Being a biological ecosystem with these internal and external variables oxidation ponds are difficult to manage without long-term accurate data.

Conclusion

78. The Waihola Wastewater Treatment Plant is necessary infrastructure for Waihola and surrounds. The impact of the discharge, while it can be seen to have a minor effect on the water quality parameters, the AEE concludes that there is little effect on the health of the ecosystem in the Lake Waihola and Tributaries.
79. The application can be seen to partly consistent to the objectives of the relevant national and regional policy statements and plans. The hierarchy of the planning documents shows the importance of infrastructure to the health and safety of Communities. Further, wastewater infrastructure can be shown to be a lifeline utility under the Civil Defence Emergency Management Legislation.
80. The discharge of human effluent to surface water is contrary to the values of Tangata whenua and Te Mana o Te Wai. However, in terms of that there are two things to consider:

- Tangata whenua and Tangata Moana recognise the importance of the wastewater treatment system to their whanau and the health and safety of the Community. The burden of cost to the Community is borne by all households, including Ngai Tahu whanui. This is recognised by Tangata Whenua and they understand that upgrades to wastewater treatment systems must be done in a manner that is economically sustainable to the Community, as well as meeting best practice and environmental constraints at the site.
- The application has shown there is no adverse effect on the water quality of this discharge as it is currently. In addition, CDC are committed to improvements to the treatment plant and the discharge quality. Upgrades will occur over the life of the consent, while alternatives will be explored for the discharge. The alternatives will consider Te Mana o Te Wai and environmental constraints at the site.

There are no matters under Section 104, 105 or 107 that would prevent the consent from being granted.

Appendix 1

Relevant Experience Rachel Vaughan

Qualifications and experience

1. I hold a Bachelor of Science in Environmental Science from Lincoln University. I have 23 years' experience in strategic management and planning within the local government environment. My experience includes time with 5 local authorities completing a range of consent auditing, plan policy, regulatory and infrastructure planning work. Large infrastructure projects include the Woolston Burwood expressway, Belfast Wastewater Treatment Plant, Addington Stormwater Planning. I have completed various infrastructure strategies and large scale designation applications.
2. For the last 4 years I have been a sole practitioner, working for a range of private developers, local government organisations and NGOs on consenting and policy matters in Canterbury. .
3. I am currently working on several environmental, infrastructure and planning projects. I am also preparing and reporting on several community and private resource consent applications. Most recently I have had input into the Clutha District Council drinking water and wastewater resource consents, Hector Dolphin Threat Management Strategy, the Kaikoura Shellfish and Seaweed reopening, the Kaikoura Paua Hatchery Management Plan and private resource consent applications.
4. Before entering private practice, I was Natural Environment Recovery Lead for the Hurunui Kaikoura Earthquake Recovery Team, I was instrumental in forming the first Recovery Team under the amended Civil Defence Emergency Management Act 2002. Prior to the Hurunui Kaikoura Earthquake series, I was Regulatory Manager and Policy Planner at the Kaikoura District Council. In these roles, I had input into the Hurunui Kaikoura Earthquake Recovery Legislation.
 - Hurunui/Kaikōura Earthquakes Emergency Relief Act - This Act is deemed to have come into force on 14 November 2016.
 - The Hurunui/Kaikoura Earthquake Recovery Act – enacted 13 December 2016, and
 - Hurunui/Kaikōura Earthquakes Recovery (Restoration of Coastal Route) Order 2016.
5. During this time, I co-designed the policy response from National Government to the Earthquake Recovery including the designing and implementing the Hurunui Kaikoura Earthquake Recovery Waste Project. I jointly prepared Reimagine Kaikoura – the Community aspirations for Earthquake Recovery. While Regulatory Manager, I was part of the Territorial Authority drafting team on the Canterbury Regional Policy Statement 2013 (CRPS) from 2008 to 2013.
6. I was a joint contributor to the Kaikoura Marine Strategy, which was enacted into legislation, the Kaikōura (Te Tai o Marokura) Marine Management Act 2014. I have had policy input into various

other national documents including the Department of Conservation Visitor Strategy, NZ Biodiversity Strategy Review. I have been responsible for the Kaikoura District Plan and Waimakariri District Plan. I have appeared in the Environment Court as an expert planning witness.

7. I am currently Acting Planning, Science and Innovation Manager for West Coast Regional Council and within this role overseeing the Freshwater Implementation program for West Coast Region.

Appendix 2

Waihola Wastewater Treatment Plant Consent No: 2002.046 Condition 2 (C)

Backflow Minimisation Report



Clutha District Council

WAIHOLA WASTEWATER TREATMENT PLANT
CONSENT NO: 2002.046 CONDITION 2 (C)
BACKFLOW MINIMISATION REPORT

Version: 2
October 2021



DOCUMENT CONTROL

Document Title: Waihola Wastewater Treatment Plant – Consent No: 2002.046 Condition 2(c) Backflow minimisation report

Revision Number: Version 2

	Name	Date
Author:	Keiran Medel	07/10/2021
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1. INTRODUCTION

Clutha District Council (CDC) currently holds Consent No. 2002.046 which authorises the discharge of treated wastewater effluent to the Waipori River. The grid reference of the discharge point is NZTM 1376557E 4902692N (Figure 1.1). The consent expired on 1 September 2017, reapplication RM15.364 is currently underway.

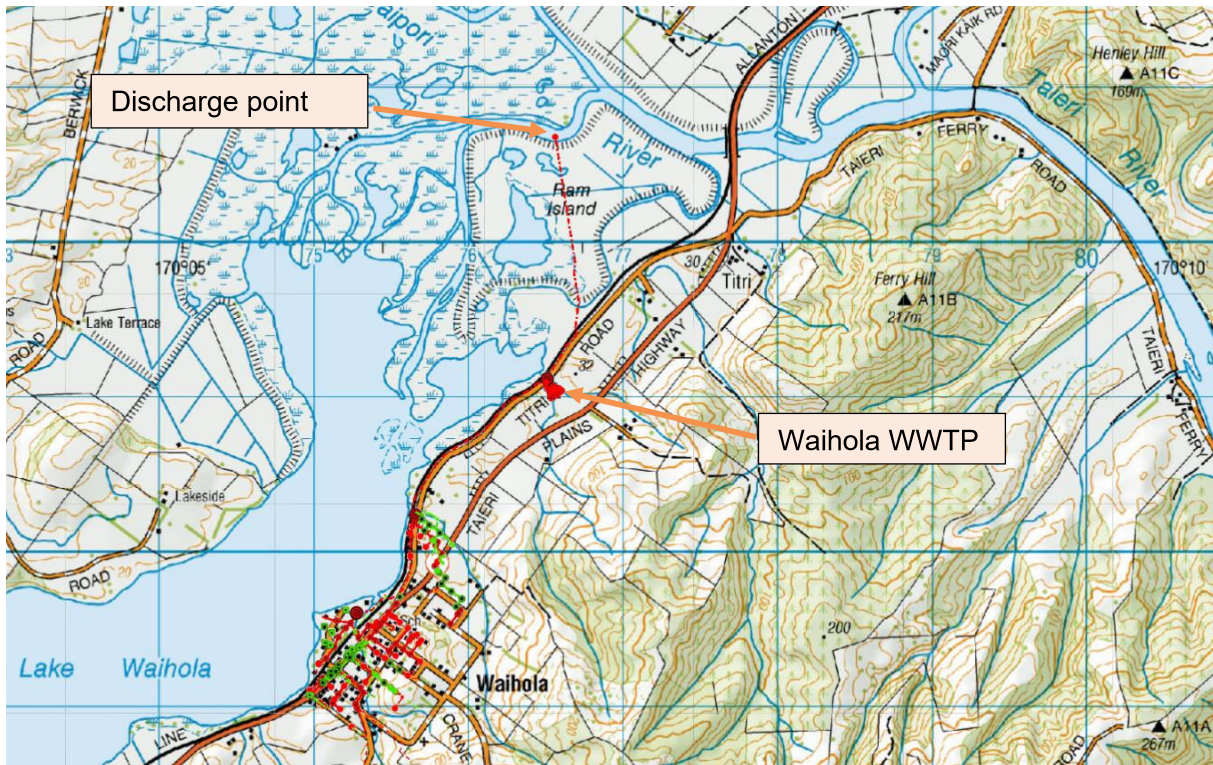


Figure 1.1 Location of Waihola Wastewater Treatment Plant (WWTP) and Discharge location.

Consent 2002.046 Condition 2(c) of 2002.046 request that the following investigations take place:

1. Investigate the options for minimising the backflow of effluent into Lake Waihola
2. Specifically assess the possibility of reducing the period effluent is discharged.
3. Detail the time frame for implementing any proposed changes to the disposal regime.

Ryder report (Waihola Discharge Assessment RJG 20.11.16) identified that the “...plume is diluted quickly and carried upstream relatively rapidly, once the tide turns diluted effluent that was discharged early in the cycle will begin to move downstream and may become more concentrated as it meets with effluent that has been discharged later in the cycle at slack water.”



The same report also recognised *“that the discharge could be delayed until the beginning of the ebb tide flow but doing this may lead to the tail end of the discharge being carried upstream into the Lake on the flood tide. It would, therefore, appear that the current regime is the most appropriate.”*

However, Otago Regional Council confirmed on 27 August 2021 that the Ryder 2021 report does not comply with condition 2(c) for the following reasons.

1. It does not adequately investigate the options for minimising the backflow of effluent into lake Waihola.
2. The report does not specifically assess the possibility of reducing the period effluent is discharged.
3. The report also does not detail the time frame for implementing any proposed changes to the disposal regime.

Clutha District Council has developed the methodology detailed in Section 2 which was reviewed and approved by the ORC compliance team and ORC consultant. The investigation was completed during September and October 2021. This report outlines the details and outcomes of the investigation to comply with the requirements of consent condition 2(c).

2. INVESTIGATION METHODOLOGY

To investigate the options for minimising the backflow of effluent into Lake Waihola and assess the possibility of reducing the period effluent is discharged CDC implemented a 3-step methodology as outlined below:

Test A – Dye Test with Current Discharge Regime (Duration: 6 hours per tide cycle)

Ryder’s investigation was replicated to survey the movement of wastewater plume during the current discharge regime:

- a. Dye was added to the discharge pump within the pumping station at the Waihola WWTP during a typical discharge event, the pump was manually activated.
- b. Once the dye reached the Waipori river, the plume was tracked by drone.
- c. The movement of the plume was mapped to identify how far the effluent back flowed into Lake Waihola.



Test B – Dye Test with Shortened Discharge Regime (Duration: 4 hours per tide cycle)

Ryder's investigation was replicated to survey the movement of wastewater plume during a shortened discharge regime:

- a. The commencement of the discharge event was delayed by 1 hour. The discharge event was then ceased 1 hour earlier than normal at the end of the initial half of the outgoing tide. This reduced the period of discharge to around 4 hours.
- b. Dye was added to the wetland outlet chambers at the Waihola WWTP during the delayed discharge event, the keystone valve and pump were automatically activated.
- c. Once the dye reached the river, the plume was tracked by drone.
- d. The movement of the plume was mapped to identify how far, if at all, the effluent back flowed into Lake Waihola.

Test C – Dye Test with Modified Discharge Regime (Duration ~ 5 hours per tide cycle)

Ryder's investigation was replicated to survey the movement of wastewater plume during a modified discharge regime:

- a. The commencement of the discharge event was delayed until the start of the outgoing tide. The discharge event was then ceased at the end of the outgoing tide. The period of discharge was around 5 hours.
- b. Dye was added to the wetland outlet chambers at the Waihola WWTP during the modified discharge event, the keystone valve and pump were automatically activated.
- c. Once the dye reached the river, the plume was tracked by drone.
- d. The movement of the plume was mapped to identify how far, if at all, the effluent back flowed into Lake Waihola.

Any modifications to the disposal regime, based on the outcomes of test A to C, can be implemented quickly by modifying the offset times (currently 150 minutes before the high tide and 217 minutes after the high tide).



3. DYE TESTS - OBSERVATION OF BACKFLOW

3.1. TEST A – DYE TEST WITH CURRENT REGIME

Red Back drain dye (green) was introduced to the discharge pump within the pumping station at the Waihola WWTP at 8:40 AM on 29 September 2021 (Figure 3.1.1). Unfortunately, the dye plume was not detected however, debris on the surface of the river could be seen flowing upstream towards the lake with the incoming tide. The investigation ceased at 9:50 AM (Figure 3.1.2).



Figure 3.1.1 Location for introducing dye into the discharge.

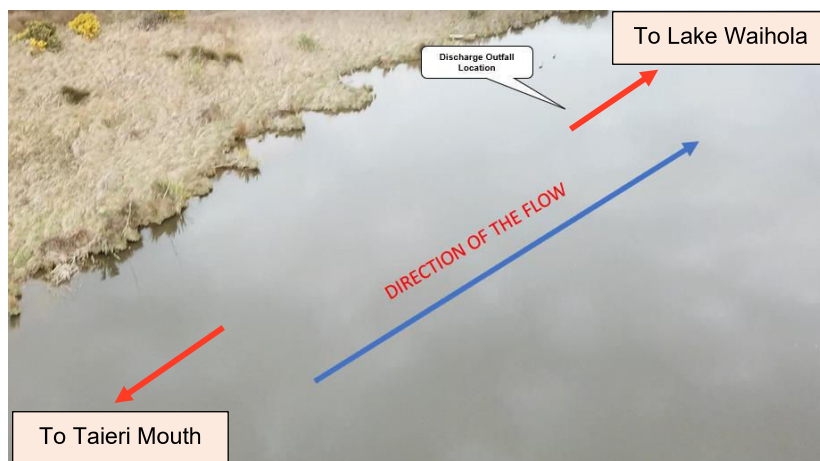


Figure 3.1.2 Waihola WWTP Outfall Location on 29 September 2021 9:50 AM.



Due to the time constraint, Step 1 test was not repeated as a similar test was completed on 14 September 2019. The results of the 14 September 2019 test are identical with the Ryder investigation in 2016. The observations from the 14 September 2019 dye test are documented below:

- Rhodamine dye was introduced to the outlet of the WWTP wetland at 11:40 AM on 14 September 2019 (Figure 3.1.3).
- The plume was detected approximately 25 m upstream of the outfall at 12:40 PM. (Figure 3.1.4). The plume was initially readily distinguishable from the boat and moved rapidly upstream with the incoming tide.
- Drogue and oranges were deployed within the dye patch (approximately 50m from the outfall) as soon as possible once the dye was visible (Figure 3.1.5).



Figure 3.1.3 Dye being released at the intake to the outfall pipe



Figure 3.1.4 Dye patch appears and is readily visible on 14 September 2019 12:40 PM.



Figure 3.1.5 Drogue and oranges deployed within dye patch (12:43 PM).



- After 15 minutes the drogue and 3 oranges veered into the northern branch of the river, while 2 oranges took the southern branch. The dye plume remained discernible and split between the two channels, the major portion following the northern path (Figure 3.1.6).
- On the incoming tide the dye patch moved quickly, covering 100m in around 10mins. The major portion of the plume moved into the northern channel and on into the lake indicated by point 1 (Figure 3.1.6). The portion of the plume that moved into the southern channel did not appear to enter the lake as indicated by point 2 (Figure 3.1.6). There is estimated to be a 30-minute delay from the pump starting until the wastewater exits the outfall, with the discharge occurring over a 6-hour period.

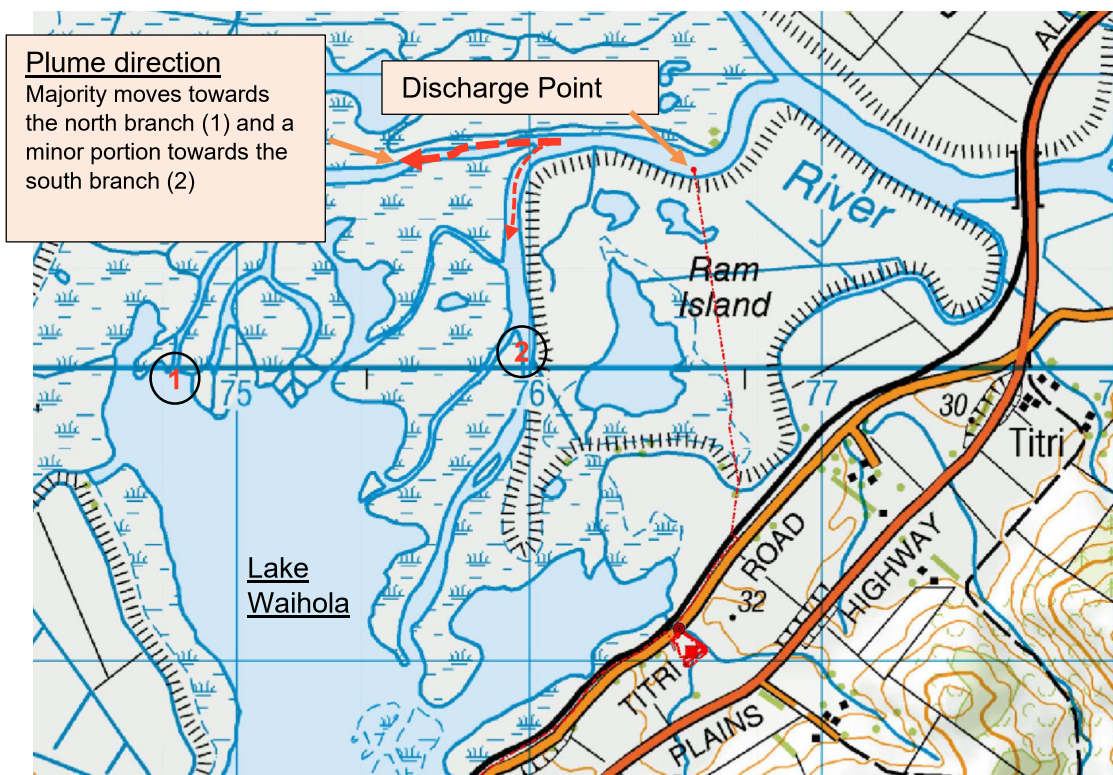


Figure 3.1.6 Test A Survey Results

Conclusion:

The investigation concludes that under the current regime, it is expected that the effluent will back flow towards the lake through the northern and southern channel with the incoming tide. The plume was only observed to be entering Lake Waihola through northern channel. During the outgoing tide, the effluent is expected to be diluted and then discharged towards the Taieri River.

The 2016 Ryder report noted that although the plume dilutes quickly, once the tide turns the diluted effluent may become more concentrated as it meets the effluent discharged later in the cycle.



3.2. TEST B - DYE TEST WITH SHORTENED DISCHARGE REGIME

A combination of Red Back dye (green) and Indrain green fluorescence liquid drain dye was introduced to the outlet of the Waihola WWTP wetlands at 9:57 AM on 30 September 2021 (Figure 3.2.1). Drogues were not used as there was no practical way of deploying them within the dye patch.



Figure 3.2.1 Dye released at the intake to the outfall pipe

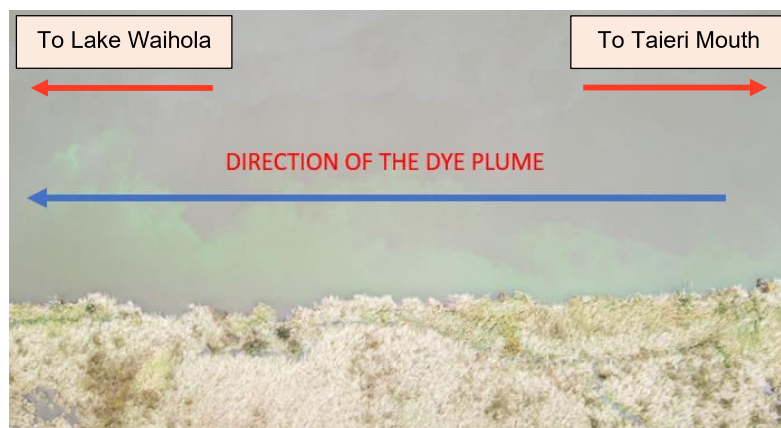


Figure 3.2.2 Dye patch appears and is readily visible at 11:15 AM.

The observations from the 30 September 2021 dye test are documented below:

- There is estimated to be a 30-minute delay from the pump starting until the wastewater exits the outfall, with the discharge occurring over a modified 4-hour period.
- The plume was detected approximately 100 m upstream of the outfall at 11:15 AM hugging the southern shoreline (Figure 3.2.2).
- The dye patch moved slowly upstream, with much of the plume moving to the southern shoreline 100 m upstream of the discharge point.
- The drone was launched from the west shoreline of Lake Waihola at 11:45 AM (high tide at 11:57 AM). The drone survey completed indicated that there was no distinguishable plume which had back flowed into Lake Waihola from either channel (Figure 3.2.3, 3.2.4 and 3.2.5).



Figure 3.2.3 Drone survey location Point 1 (indicated in Figure 3.2.6) – No trace of dye



Figure 3.2.4 Drone survey location Point 2 (indicated in Figure 3.2.6) – No trace of dye



Figure 3.2.5 Drone survey location Point 3 (indicated in Figure 3.2.6) – No trace of dye



Figure 3.2.6 Test B Survey Results

Conclusion:

The dye plume was observed to be moving towards the upstream of the discharge point.. However, the dye plume was not observed to be backflowing into Lake Waihola.



3.3. TEST C – DYE TEST WITH MODIFIED DISCHARGE REGIME

A 500 ml container of Indrain green fluorescence liquid drain dye was introduced to the outlet of the Waihola WWTP wetlands at 13:15 PM on 15 October 2021 (Figure 3.3.1).



Figure 3.3.1 Dye released at the intake to the outfall pipe at 13:15 PM.

The observations from the 15 October 2021 dye test are documented below:

- The plume was detected discharging from the discharge outfall and flowing downstream away from Lake Waihola at 14:15 PM (Figure 3.3.2). There is estimated to be a 30-minute delay from the pump starting until the wastewater exists the outfall, with the discharge occurring over a modified 3hr 38mins period.
- The plume was readily distinguishable from the drone and was moving downstream as was expected at the start of the outgoing tide (high tide at 13:01 PM). Drogues were not used as there was no practical way of deploying them within the dye patch.
- The dye patch moved downstream, with the major portion of the plume moving close to the southern shoreline after leaving the discharge outfall. The drone survey indicated that there was no distinguishable plume moving upstream towards Lake Waihola.
- The drone was not launched from the western shoreline of Lake Waihola as it was clear that the dye was flowing downstream away from Lake Waihola on the outgoing tide (Figure 3.3.3).

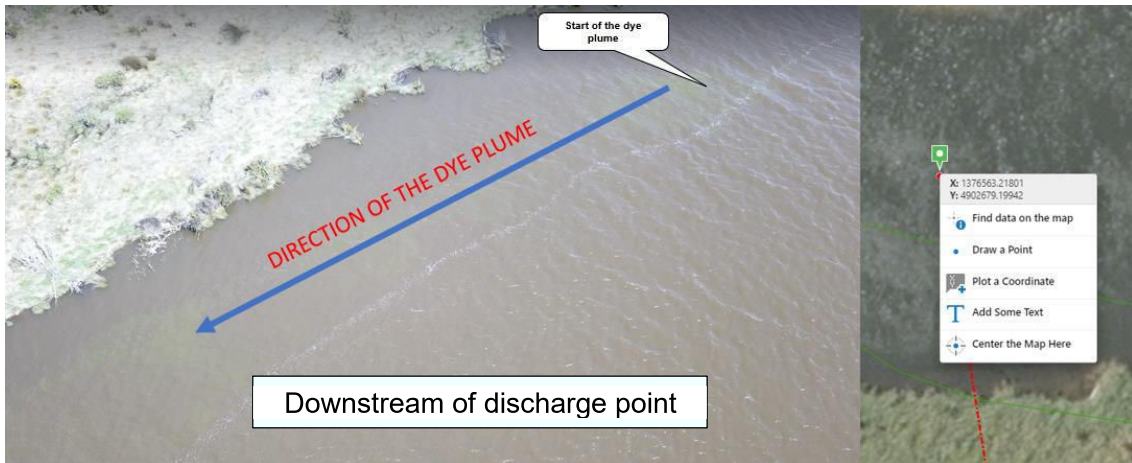


Figure 3.3.2 Dye patch appears and is readily visible at 14:15 PM.

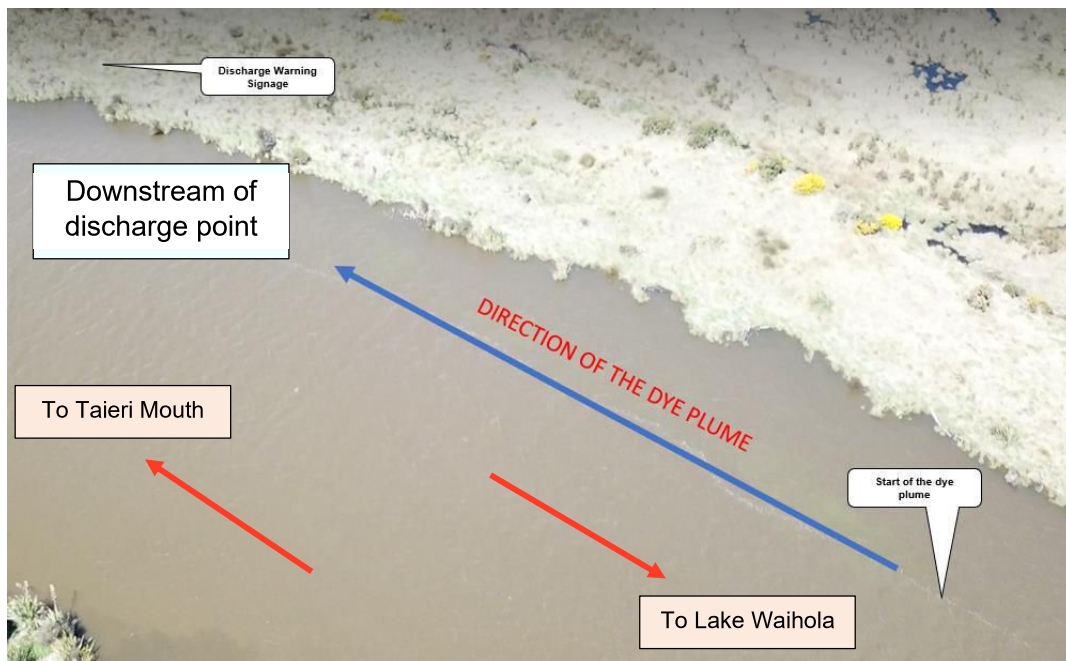


Figure 3.3.3 Dye patch appears and steadily moves away from the Lake Waihola on the outgoing tide.



Figure 3.3.4 Test C Survey Results

Conclusion:

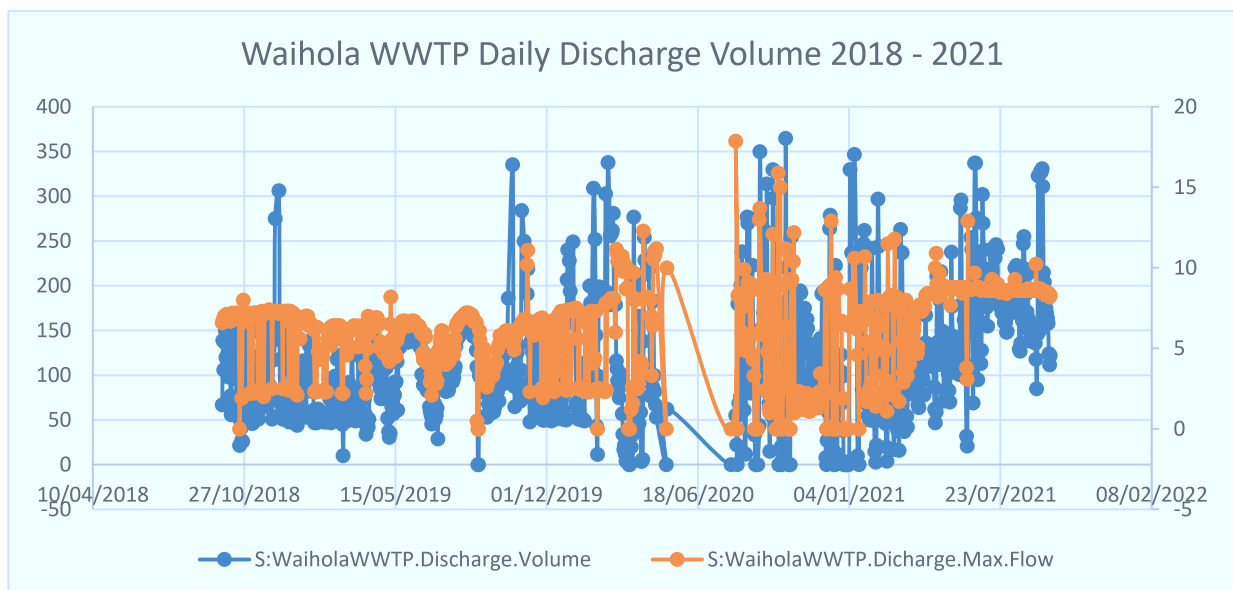
The dye plume was observed to be moving towards the downstream (away from the Lake Waihola) of the discharge point during the modified discharge regime.



4. IMPACT ON DISCHARGE VOLUMES

During standard operations the discharge from the Waihola WWTP occurs over a 6hr 5mins period from the latter half of the incoming tide until the end of the initial half of the outgoing tide. With the current site setup, the maximum flow rate that can be produced by the pump is 8.4 l/s, with the pump running for the full discharge period across 2 tidal events the current maximum discharge volume per day is 368 m³ under normal dry weather operations.

- From 28 of September 2018 to 28 of September 2021 there have been 32 occasions where the value of 368 m³/day was exceeded. These are likely to have been influenced by heavy rainfall events.
- The highest volume discharged was 609 m³/day which is still compliant with the maximum daily consented discharge limit (680 m³/day).
- With the removal of the outlier events, the calculated average discharge volume from the Waihola WWTP is 116 m³/day.
- From the last 3 years of data, average discharge volume is 116 m³/day with a peak discharge volume of 609 m³/day for the Waihola WWTP.



The volumes discharged during the completion of Steps 1 – 3 are provided in Table 3.4.1. As expected, each discharge regime was able to cope with volume of treated effluent produced under normal dry weather conditions. Please note that discharge was prevented from occurring on the evening of the 29th and 30th of September to ensure that there was sufficient height in the wetlands to allow the pump to reach the max rate of 8.4 l/s.

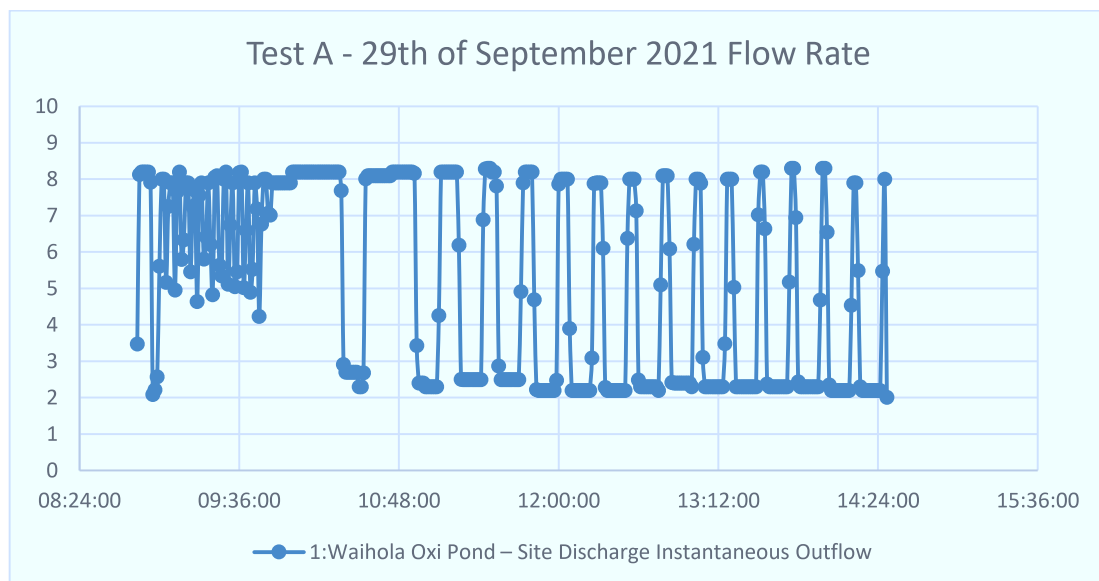


Date	Dye Test Method	Discharge Commence	Discharge Cease	Discharge Time	Discharge Volume (m3)	Discharge Flow Rate (l/s)
29/09/21	Test A – Current Regime	8:23 AM	14:28 PM	6 Hrs 5 Mins	122	2.2 – 8.3
30/09/21	Test B – Shortened Regime	10:26 AM	14:33 PM	4 Hrs 7 Mins	104	2.3 – 8.3
15/10/21	Test C.2 – Modified Regime	13:01 PM	16:39 PM	3 Hrs 38 Mins	100	7.5 – 7.6

Table 4.1 Discharge Volumes produced during Steps 1 – 3.

Test A – Current Regime - Discharge Volume Analysis (29 September 2021)

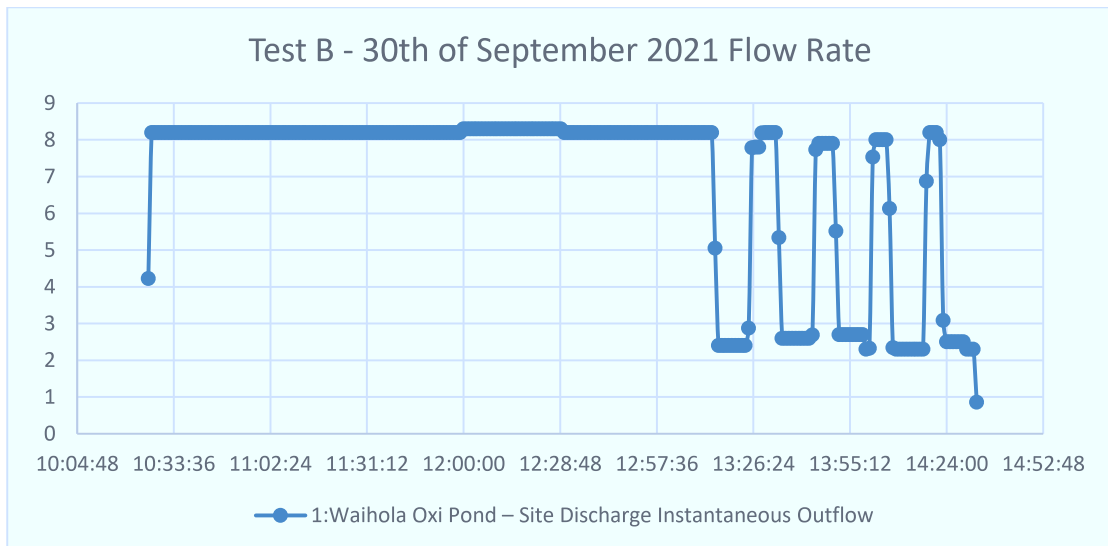
- Total of 122 m3 was discharged during the 6 hour and 5-minute period. With two tide cycles per day, this equates to 244 m3/day. During this discharge event the pump operated at a rate greater than 8 l/s for 1 hour and 40 minutes and at a rate less than 3 l/s for 2 hours and 31 minutes.
- The operation of the pump is dependent on the pond level. As a worst-case scenario, if the pump operates for the duration of discharge period (6hrs 5mins) under current regime, the maximum volume of discharge is estimated to be 368 m3 per day.
- Under the current regime there is a capacity to discharge a further 312 m3 of effluent per day (current consent limit: 680 m3 per day).
- It should be noted that during pump operation the treated effluent would not reach the Waipori River until around 8:53 AM, if discharge occurred under gravity this would be delayed even further.





Test B – Shortened Regime - Discharge Volume Analysis (30 September 2021)

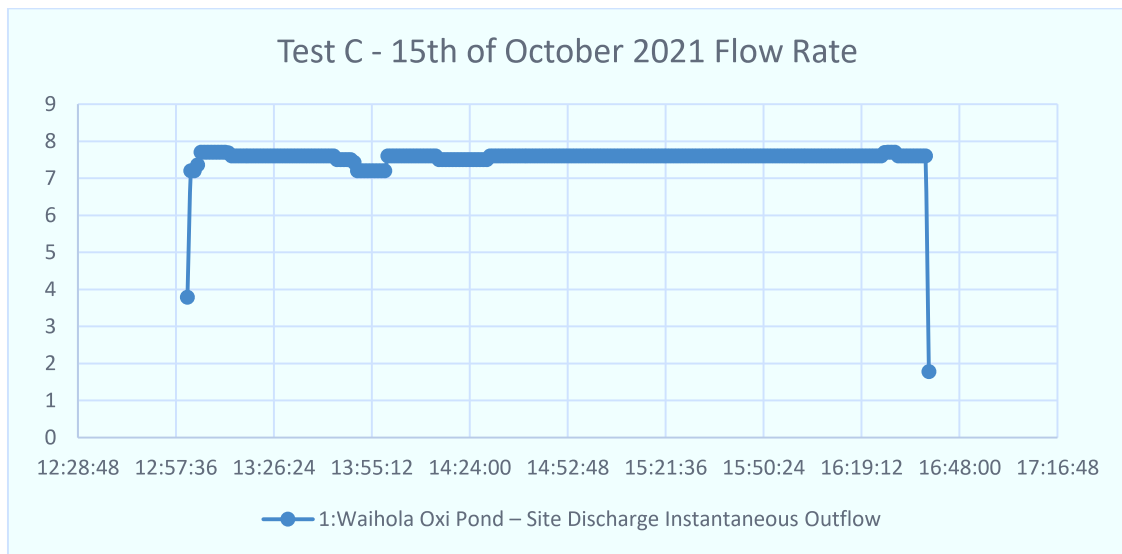
- Total of 104 m³ was discharge during the 4 hours and 7-minute period. With two tide cycles per day, this equates to 208 m³/day. During this discharge event the pump operated at a rate greater than 8 l/s for 3 hours and 1 minute and at a rate less than 3 l/s for 50 minutes.
- The operation of the pump is dependent on the pond level. As a worst-case scenario, if the pump operates for the duration of discharge period (4hrs 7mins) under a shortened regime, the maximum volume of discharge is estimated to be 246 m³.
- It should be noted that during pump operation the treated effluent would not reach the Waipori River until around 10:56 AM, if discharge occurred under gravity this would be delayed even further.





Test C – Modified Regime - Discharge Volume Analysis (15 October 2021)

- Total of 100 m³ was discharged during the 3 hours and 38-minute period. With two tide cycles per day, this equates to 200 m³/day. During this discharge event the pump operated at a consistent rate of 7.5 – 7.6 L/s.
- It should be noted that during pump operation the treated effluent would not reach the Waipori River until around 13:31 PM, if discharge occurred under gravity this would be delayed even further.



Summary:

The current pump is not able to discharge the current consent limit of 680 m³/day. Table 3.5.1 summarises the maximum volume that can be discharged with current pump capacity under different discharge regimes.

Discharging Regime	Duration of discharge per tide cycle	Max discharge volume (m ³) per day – worst case scenario
Current Regime	6hrs 5mins	368
Shortened Regime	4hrs 7mins	246
Modified Regime	3hrs 38mins	200

Table 4.2 Max Discharge volume under current pump capacity



Table 3.5.2 summarises the required pump capacity to operate at consent limits for both dry and wet weather.

Discharging Regime	Duration of discharge per tide cycle	Pump capacity (l/s) for dry weather consent limit of 680m ³ /day	Pump capacity (l/s) for dry weather consent limit of 1020 m ³ /day
Test A - Current Regime	6hrs 5mins	15.5	23
Test B - Shortened Regime	4hrs 7mins	23	34.4
Test C - Modified Regime	3hrs 38mins	26	39

Table 4.3 Pump capacity requirement to operate at consent limit.



5. SUMMARY OF INVESTIGATION TO MEET CONDITION 2(C)

The following conclusions can be made from this investigation that meet the requirements of condition 2(c) of consent 2002.046.

Investigate the options for minimising the backflow of effluent into Lake Waihola

Based on the investigation in Section 3, backflow can be prevented by altering the commencement of the discharge from the Waihola WWTP to the start of the outgoing tide, however the effluent discharged at the end of the outgoing tide may backflow into the lake on the incoming tide (this was noted during the original consenting application). The backflow of effluent into Lake Waihola can be minimised by delaying the commencement of the discharge from the Waihola WWTP to the start of the outgoing tide and then ceasing the discharge on the latter half of the outgoing tide (Test C).

Specifically assess the possibility of reducing the period effluent is discharged.

The period effluent is discharged from the Waihola WWTP can be reduced to minimise or eliminate the backflow into Lake Waihola. The current pump can handle the average discharge volume (116 m³/day, based on the last 3 years of data) with a modified regime. However, it will struggle to meet the peak wet weather volume (609 m³/day, based on the last 3 years of data). A pump capacity upgrade is necessary to meet the current discharge limit for both dry and wet weather. Upgrading the pump and increasing its capacity will have the most significant impact on reducing the discharge time required to operate the plant.

Detail the time frame for implementing any proposed changes to the disposal regime.

The alteration of the discharge regime can be completed relatively quickly, as per the 2021 O&M Manual the time subtracted from the high tide time and the time added to the high tide time can be modified to control the keystone valve open and close time. This was used to temporarily modify the discharge times during this investigation. However, frequent adjustment of the discharge timeframe is necessary to meet the wet weather flow requirements.

A pump upgrade would require more investigation to ensure the hydraulic capacity of the pipeline and suitable pump capacity for the discharge is selected. This will be completed after the new consent condition has been issued.



6. DRONE SURVEY TEAM

Keiran Medel, Compliance Engineer, Clutha District Council

George Rutter, Project Engineer, Clutha District Council

Appendix 3

Engineering Assessment of Conditions

Conditions

Specific

1. This consent authorises the discharge of treated human wastewater at a volume of up to 192 cubic metres per day into the outflow channel of Lake Waihola at the point shown below.



Fig 1 Waihola Wastewater Discharge Location

Discussion

The Clutha District Council cannot agree to this condition.

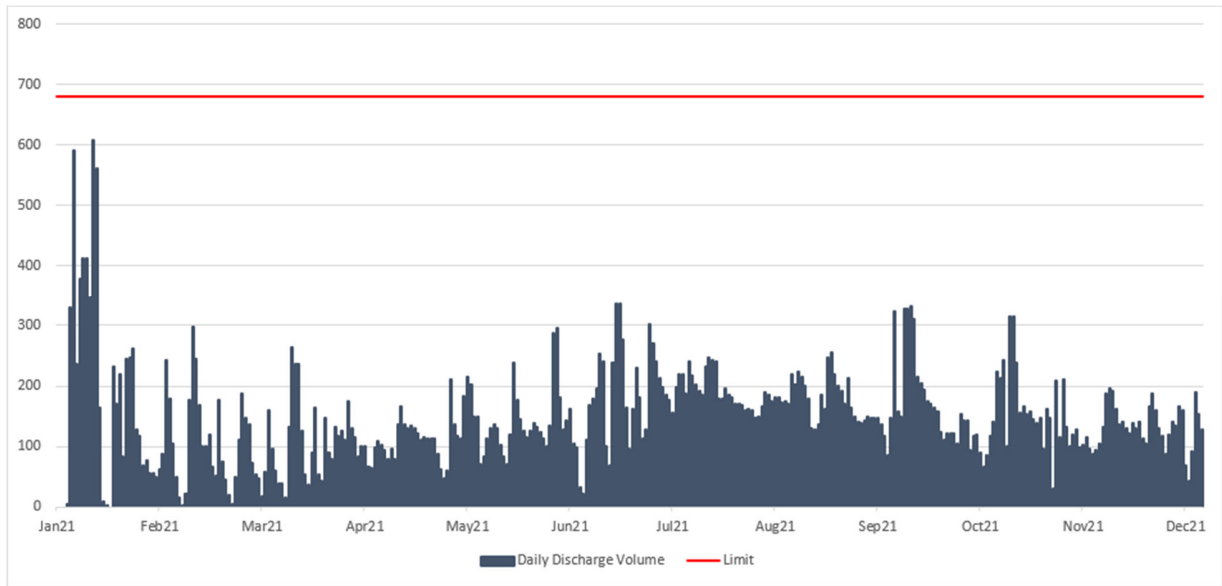


Fig 2 Daily Flow Record Lake Waihola Treatment Plant

The discharge shows effects of infiltration and inflow.

There is some correlation with groundwater levels.

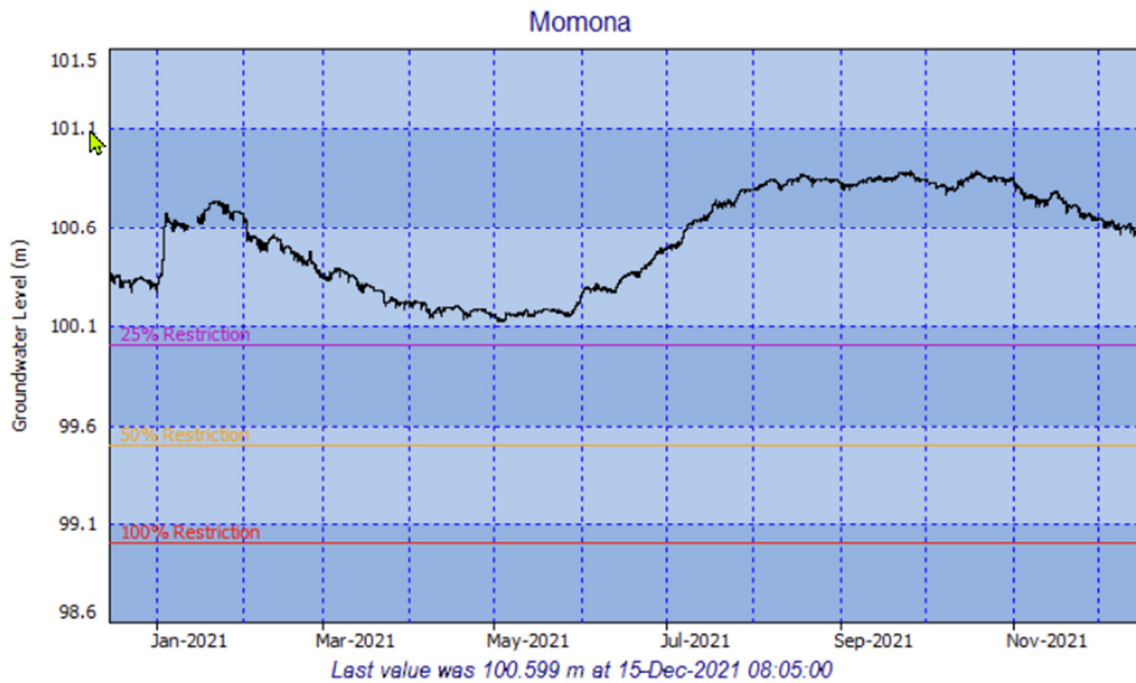


Fig 3 Otago Regional Council Ground Water Levels Momona

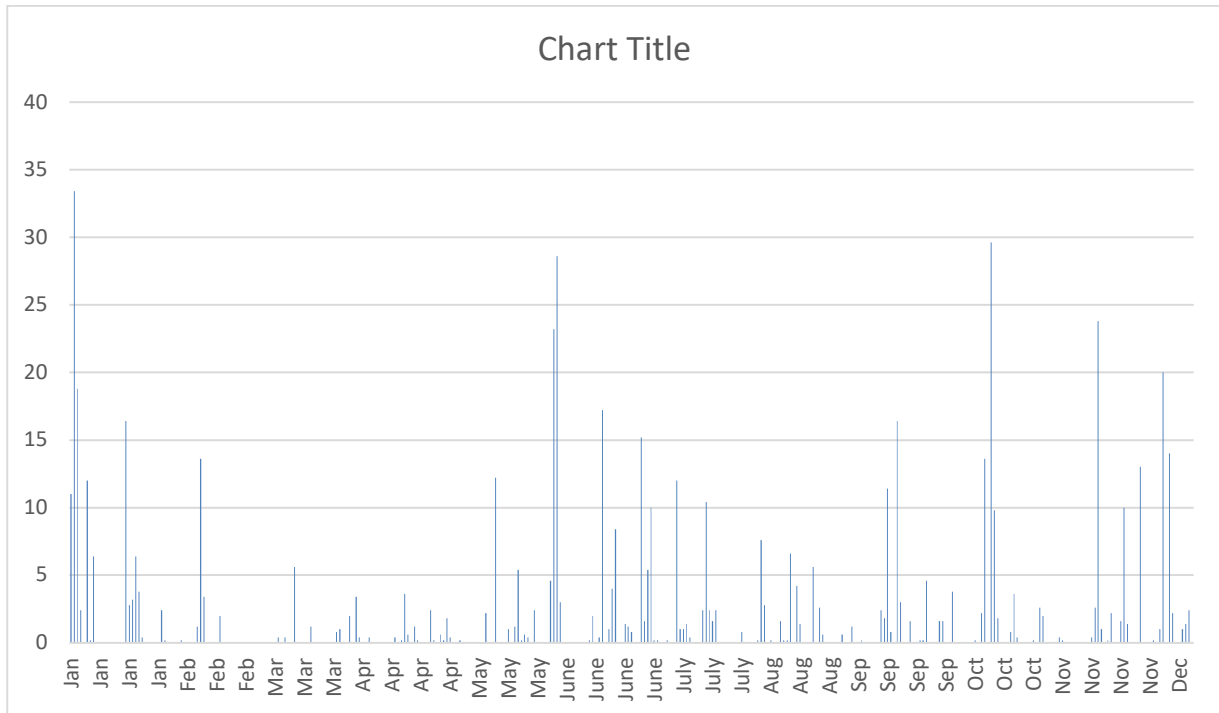


Fig 4 NIWA Rainfall Data Momona

The Clutha District Council is giving priority to identifying inflow and infiltration in Waihola.

Unfortunately, Waihola has reticulation that is submerged when the level of Lake Waihola floods the campground area.

The Clutha District Council has recently inspected 196 properties connected to the sewer network in Waihola, 46 have been requested to raise gully traps and 7 to remove cross connections. This will assist with lowering the flow of rainwater into the system.

This removal of inflow and infiltration will have no visible effect on Lake Waihola as it carries no additional contaminants. It will have some effect on the Waihola Treatment Plant as it reduces the treatment duration.

As the Waihola is presently a restricted water supply there is minimal possibility of reducing flow from households as they will have already adjusted to low intensity water use.

Waihola is a growth area. Under the District Plan it is possible for the number of dwellings to increase from 217 to 368 dwellings. Not all of these will connect to the sewer. At this point 196

of 217 properties are connected to the sewer. The remaining properties will still have on-site disposal, the effluent from which is not monitored and will end up in Lake Waihola via the groundwater. Clutha District Council has been actively expanding the reticulated area to remove on-site discharges.

Should the Clutha District Council be able to reduce flows through the treatment plant the amount of phosphorus and nitrogen entering the treatment plant will not decrease.

Should the Clutha District Council reduce the ability of properties to connect then the phosphorus and nitrogen from the additional properties will bypass the treatment process and end up in Lake Waihola.

Any treatment process will reduce phosphorus and nitrogen and discharge it at the outlet of Lake Waihola and largely bypass the lake.

In summary:

- a) the Clutha District Council would like to reduce flow from properties, but any reduction will be detrimental to the lake.
- b) The Clutha District Council is prioritising the reduction of inflow and infiltration in Waihola.

Recommended Condition:

The Clutha District Council will provide as part of its annual report the results of its I & I programme and the I& I programme and the proposed remedial works for the following year.

The Consenting Authority will respond and request any variations that it believes are appropriate.

2. A discharge greater than the volume authorised by Condition 1 may occur only where:

- a) the discharge was a result of a 1 in 10-year rainfall event or greater; and
- b) the discharge volume does not exceed 609 cubic metres per day.

At present until the I & I is reduced the 1 in 10-year event condition is not possible to be met. The I & I recommendation in Condition 1 is a preferable and workable condition.

It is noted that even under a 1 in 1-year flood the discharge point is under high flood and all water will be away from the lake. The discharge point will also have very high sediment and faecal loadings at this time due to the runoff from farmland. Also as noted in Condition 1 there will be no additional phosphorus or nitrogen discharged.

3. a) Effluent discharged from the treatment system must only be pumped into the Lake Waihola outflow channel during the latter half of the incoming tide and/or the initial half of the outgoing tide.

While the Clutha District Council can meet this requirement it has undertaken observations that show that under some conditions the discharge on the latter half of the incoming tide has a higher probability of entering the lake than that discharged on the outgoing tide. Under some conditions with significantly higher than dry weather flows we may want to discharge under a wider tidal range.

The Council is aware that the Otago Regional Council has in the past had a river model that modelled the flows of the Taieri and Waihola Rivers and Lakes. It would be of value if this model was updated and recalibrated into real time. The discharge from the wastewater treatment plant could then be tied into the real time model.

This could only occur if there was a willingness on the Consenting Authority to lead this project as much of the data will be sourced from their existing site information and would be verified by their modellers.

The Council would like to be in a position to confirm these observations to enable the volume and time of discharge to be optimised to confirm that discharge does not enter the lake.

The council has no issues with conditions b) to d).

4. The Council has no issue with this.

5. The Council has no issue with this.

Comment: The council to meet these, and its Health and Safety requirements, is investigating the purchase of a drone for water sampling. It anticipates being able to undertake this work from 1 April 2022.

6. The Council has reviewed the parameters that it is required to meet.

The quality of treated wastewater immediately before it is discharged to outflow channel of Lake Waihola must:

a) Not exceed any standard specified below:

Parameter	Units	Samples must not exceed Median limits in more than 8 out of 12 consecutive samples	Samples must not exceed 95th percentile limits in more than 2 out of 12 consecutive samples
5-day iv) Carbonaceous Biochemical Oxygen Demand (BOD5)	g/m ³	75	140
Total Suspended Solids (TSS)	g/m ³	100	175
Escherichia coli (E.coli)	cfu/100mL	80,000	315,000
Total ammoniacal nitrogen (NH ₄ -N)	g/m ³	23	31
Total phosphorus (TP)	g/m ³	5.7	7.7

b) Be within the pH range of 6.5 – 9.0.

c) Be no less 2 g/m³ of Dissolved Oxygen as an average of any five consecutive weekly measurements taken at approximately 9.00 am.

The Council, in order to meet these requirements, must undertake a substantial capital upgrade programme as the existing infrastructure is unable to meet these requirements.

The Council has requested a peer review of options that would address these issues.

The Consultant tasked with this work on the basis that he is familiar with the council's wastewater treatment plants and processes and also reviewing other council upgrades to its wastewater has confirmed that he can complete this work in April 2022. It is anticipated that detailed design will follow and then the procurement of the infrastructure will occur.

The procurement of site specific plant, installation and commissioning will take at least 12 months.

As the effects of the changes to the discharge will occur after this point it is recommended that the first sample subject to the measuring criteria be from July 2023.

Note: This is a significant project in terms of the Clutha District Council and the Council has budgeted \$1.5M to undertake this upgrade or approximately \$7,500 per property. This is a significant investment for a scheme that may only have a design life of 6 years before the design of the next upgrade that may supersede these works.

Some of the parameters that we are designing to meet are likely to be higher than the receiving environment.

7. The Council has no issue with this.

8. The Council has no issue with this.

9. The Council has no issue with this.

10. The Council has no issue with this.

11. The Council has no issue with this.

Comment: the Balclutha Consent may have this written in a better format

12. No condition 12.

13. The Council has no issue with this.

14. The Council has no issue with this.

Comment: There is a preference to align the reporting date with the reporting year to the end of June each year with the Annual Report due on 31 August.

15. The Council has some issue with this as the next Activity Management Plan is due as part of the Long-Term Planning Cycle approximately Jan 2024 and then every 3 years after that. This is a statutory requirement, interim plans can be developed and if required for this work cycle a Capital Project only plan would be produced after the Consultant review in April 2022 say by 30th June 2022.

The previous upgrade plan, which this consent will largely supersede with the new \$1.5M budget, had the following:

The following physical upgrades shall be undertaken at the wastewater treatment plant:

- Screen installed at the entry of the Wastewater Treatment Plant.
- Aerators installed in the 'settling ponds'
- More detailed monitoring records kept
- Monitoring/level sensors/auto control valves installed to read oxygen levels with more time dependent/controlled discharge to be on the outgoing tide.

The Clutha District Council is expecting an increase in required treatment capability and is proposing the following indicative works in the next Annual Plan and in the 21/25 Long Term Plan.

Item	Waihola (Cost \$)
Outflow Meter	\$20,000.00
Pond Level Sensors	\$20,000.00
Aerators	\$75,000.00
UV Reactor	\$60,000.00
SCADA	\$30,000.00
Tracks/Fences/Gates	\$30,000.00
Bio Shells	\$50,000.00
Inlet Screen	\$100,000.00

New Outlet Pump	\$40,000.00
DO Metering	\$30,000.00
Total	\$475,000.00
Contingency 30%	\$142,500.00
Total	\$617,500.00
Proposed 20/21	\$227,500.00

16. The Council has no issue with this.

17. The Council has no issue with this.

