Long List Report

Shotover WWTP Treated Effluent Disposal Solution

Queenstown Lakes District Council

10 July 2025

→ **The Power of Commitment**

Project name		Shotover WWTP Disposal Field Alternative Discharge					
Document title		Long List Report | Shotover WWTP Treated Effluent Disposal Solution					
Project number		12645246					
File name		Shotover long list options report					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S3	RevA-Draft for client comment	Sarah Browne Helen Barclay Anthony Kirk	Ian Ho Tim Elridge		Ryan Orr		21/05/25
S4	Rev0	Sarah Browne	Tim Eldridge	On file	Ryan Orr	On file	10/07/25

GHD Limited
138 Victoria Street, Level 3
Christchurch Central, Canterbury 8013, New Zealand
T +64 3 378 0900 | **F** +64 3 377 8575 | **E** chcmail@ghd.com | **ghd.com**

Executive summary

Introduction

Queenstown Lakes District Council (QLDC) has commissioned GHD to develop a business case, which seeks to identify a long-term solution for the disposal of treated effluent from the Kimiākau (Shotover) Wastewater Treatment Plant (WWTP). LandPro are engaged by QLDC as the specialist planner of this project, and they assisted in the options assessment.

This report outlines the long list of options that were considered to address the identified problems and realise the benefits from investment. The report also summarises the process and methodology that was applied to assess the options using an Multi Criteria Analysis (MCA) framework, to identify short list options to be further developed and refined.

Background and context

The Kimiākau (Shotover) WWTP serves the Queenstown urban area, treating the wastewater through a Modified Ludzac-Ettinger (MLE) reactor, clarifier, sludge treatment, UV treatment, and a Dose and Drain (DAD) disposal field. Queenstown Lakes District Council (QLDC) is currently upgrading the plant with a second MLE reactor tank and clarifier, expected to be operational by the end of 2025, to improve effluent quality.

The DAD disposal field, commissioned for disposal of the treated effluent in 2019, has deteriorated since its causing surface water overflow and non-compliance with resource consent conditions. Emergency works commenced on 31 March 2025 to discharge treated effluent through the historic discharge channel under section 330 of the Resource Management Act 1991 (RMA).

Due to the DAD disposal field's failures, QLDC is developing a new long-term disposal solution. This report aims to identify the long list and shortlisted options to replace the existing DAD disposal field and emergency river discharge, by catering to long-term treated effluent disposal requirements in a culturally appropriate, environmentally friendly, and operationally effective manner. The design horizon for the treated effluent disposal is 2060, with $77.5M allocated in the long term plan budget for the solution.

Long list options

A comprehensive list of potential options was developed at the beginning of the project, covering various disposal methods and discharge locations. The identification process included desktop analyses of the site and surrounding areas, previous work at the WWTP, similar past projects, site visits, and meetings with QLDC, Veolia, and iwi representatives. This list was refined by excluding options with obvious constraints or fatal flaws. Constraints such as proximity to the WWTP, residential zones, geology, slope, water supply wells, surface water, funding availability, legislative standards, and other considerations were factored into the assessment. QLDC also provided guidance that viable options aren’t to be discarded based solely on fatally flawed scoring of cultural impacts alone. It should be noted that these options were presented at the long list stage, which was early in the definition process and without mitigations to address specific cultural concerns or deficiencies. Therefore, if options were technically viable, within budget and otherwise achievable, but not deemed culturally appropriate by iwi representatives, there was consideration to carry them forward to the next phase for further development to address deficiencies. The exception to this was options which were considered by the project’s technical leads to be a direct discharge to the river with no prior land contact, these options were not carried forward.

This resulted in a remaining long list options as follow:

- Option 1 a – High-rate land disposal a) Delta infiltration basins
- Option 1 b – High-rate land disposal b) Delta trenches
- Option 2 a – Moderate rate land disposal a) Airport & vicinity area
- Option 2 b – Moderate rate land disposal b) Southern corridor
- Option 2 c – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River
- Option 3 a – Low-rate disposal a) Doc land / Coronet peak
- Option 4 a – Land flow path to river a) Shotover

- Option 4 b – Land flow path to river b) Kawarau
- Option 5 a – Deep well injections a) Frankton
- Option 5 b – Deep well injections b) Bridesdale
- Option 6 a – Shallow well injections a) Delta
- Option 7 a – Subsurface Wetland on a) Delta
- Option 8 a – Well Point or Soak holes a) Frankton

The long list options were assessed by technical specialists using a Multi Criteria Assessment (MCA). The MCA enables a wide range of different aspects to be taken into consideration in evaluating options and provides a systematic framework for working through and assessing each option.

The MCA workshop was held in person at QLDC on Thursday, March 13th, 2025, with key representatives from QLDC, Te Ao Mārama (TAMI), Aukaha, LandPro, and the GHD project team.

Each investment objective or factor was assigned a scorer (or multiple scorers) to take ownership of the scores:

- For environmental or technical objectives and factors, a GHD technical expert scored
- For planning based factors, Landpro specialist planner scored
- For the cultural objectives and factors, iwi partners Aukaha and TAMI scored

This workshop provided an opportunity for the initial scores to be presented and for the workshop group to discuss, provide input and decide on what options should be shortlisted. Where required further information was provided on options after the workshop to enable final scoring of the long list of options. The MCA scores were subsequently updated, and the final scores by the specialists and representatives are stated in this report and Appendix A.

Short list options

Following the long list MCA assessment and workshop discussions, the long list options were refined to five options (plus Base Case) to carry forward to the short list stage, as follows:

- **Base Case: Retained as a comparator.**
- **Option 2a: Moderate rate land disposal to Airport and surrounding area.**

This option is carried forward based on the following reasons:

- Strong support from TAMI and Aukaha
- Better visual and amenity effect as the disposal field will be removed from the Delta.

However, this option could be constrained by land availability (potential conflict with planned development/land use) and very high capital cost. As a result, it was agreed during the MCA workshop to carry forward this option, for further investigation and discussion with landowners in the Frankton Flat area.

- **Option 4b: Land flow path to river b) Kawarau**

This option has benefits which include:

- Broad mixing zone at the receiving environment
- Modest capital expenditure
- Implementation timeline is relatively clear and short.

This option was originally removed due to being fatally flawed from a cultural perspective as evaluated by TAMI and Aukaha. It was re-introduced into the short list at the request of QLDC and following discussions with the project team. The intention of this is to include an option that complies with the proposed national wastewater environmental performance standards from Taumata Arowai. It is expected that Option 4b will be able to meet these upcoming standards and will provide a comparator as a 'Do Minimum' that complies with the latest environmental standards.

- **Option 5a: Deep well injections a) Frankton**

This option is carried forward based on the following reasons:

- Discharge of treated effluent is out of the Delta

- Bore injections have been used in other sectors and overseas for treated effluent disposal
- It is expected this option could be delivered within the LTP budget allowance but requires further technical investigations and noting the budget would be impacted if land acquisition was required.

Whilst it was agreed during the MCA workshop to carry forward this option, Aukaha and TAMI indicated that more information is needed for the shortlisted option evaluation stage, to support this option.

Moreover, field investigation needs to take place to understand site specific parameters to develop the concept design and better cost estimates to confirm the viability of this option.

❖ Option 7a: Subsurface Wetland on a) Delta

This option was formed during the MCA workshop, with a constructed subsurface wetland included prior to land flow path to the Kawarau River. Constructed wetlands provide additional treatment and potential amenity and ecological benefits.

This option is fatally flawed from a cultural perspective as evaluated by Aukaha and TAMI. The option has been carried forward to the short list reflecting that it retains the most land contact of the remaining disposal options on the Delta and has scope to have improvements to address some of the cultural aspects. This option is expected to have additional land contact included as it is developed at the short list stage as well as seeking to address concerns relating to flood risk.

❖ Option 8a: Well Point or Soak holes a) Frankton

This option was formed during the MCA workshop, and agreed to be carried forward to the short list for the following reasons:

- This option scored the highest by Aukaha, with their view (based on the information presented to them for the long list assessment) that it would have the least impact on the groundwater aquifer and adjacent surface water bodies of the options considered, and that it had strong alignment with mana whenua cultural practices
- Discharge of treated effluent is out of the Delta
- Injection wells/soak holes have been used in other sectors and overseas for treated effluent disposal
- It is expected this option could be delivered within the LTP budget allowance but requires further technical investigations and noting the budget would be impacted if land acquisition was required.

Similar to Option 5a, further field investigations are necessary to refine the feasibility and concept of this option. Moreover, this option will involve a higher number of disposal wells, thus land availability may become a constraint.

Next steps

Following the long list MCA assessment and the identification of the five short list options, the project team will continue developing the short list options through additional investigations and concept design refinements. A further workshop with QLDC, LandPro, and iwi representatives will be arranged to further assess the options against the full MCA framework to determine the recommended option to progress.

Contents

Table index

Figure index

Appendices

1. Introduction

Queenstown Lakes District Council (QLDC) has commissioned GHD to develop a business case, which seeks to identify a long-term solution for the disposal of treated effluent from the Kimiākau (Shotover) Wastewater Treatment Plant (WWTP). LandPro are engaged by QLDC as the specialist planner of this project, and they assisted in the options assessment.

1.1 Purpose of this report

The business case has been prepared in accordance with the Treasury Better Business Case approach.

This report outlines the long list of options that were considered to address the identified problems and realise the benefits from investment. The report also summarises the process and methodology that was applied to assess the options using an Multi Criteria Analysis (MCA) framework, to identify short list options to be further developed and refined.

The remainder of this report is structured as follows:

- **Section 1** provides an introduction and context for the project and the purpose of this report.
- **Section 2** outlines the process for developing the options and how these were assessed to refine them into a practicable long list.
- **Section 3** details each of the long list options.
- **Section 4** summarises the MCA assessment, including how the framework was developed, the objectives and criteria established, the scoring rationale for each option against the framework, and the decisions made by the MCA working group on which options should be carried forward and why.
- **Section 5** identifies the recommended short list options to be carried forward and outlines the next steps.

1.2 Context

The Kimiākau (Shotover) Wastewater Treatment Plant treats wastewater from the wider Queenstown urban area. The treatment plant process includes inlet screens, a Modified Ludzac-Ettinger (MLE) reactor, clarifier, sludge treatment system, UV treatment and a disposal field. Approximately 20% of the wastewater is currently treated via an oxidation pond system instead of the MLE and clarifier system, the effluent is combined before the UV treatment and disposal. Queenstown Lakes District Council (QLDC) is currently upgrading the treatment plant with a second MLE reactor tank and clarifier that is expected to come online in late 2025 after which the ponds (Pond 2 and 3) will be decommissioned. This is expected to significantly improve the treated effluent quality.

The Dose and Drain (DAD) disposal field, which was commissioned in 2019, has experienced performance deterioration. It was initially designed with 11 soakage sectors to replace the previous discharge channel which directly discharged into the Shotover River. By May 2024, its performance worsened, causing surface water to overflow into the environment. This led to abatement notices and an enforcement order as it was not compliant with the conditions of the resource consent (RM13.215.03.V2), which includes no ponding, no surface run-off of treated wastewater or no mounding of groundwater to above the ground surface. Investigations revealed that suspended solids and biological growth blocked the gravel pores, reducing permeability. Efforts to manage this, including hydrogen peroxide dosing and reconstructing as Rapid Infiltration Basins (RIBs), were largely ineffective.

Because the DAD disposal field was no longer operating as designed, and was struggling to cope with existing flows, in October 2024 QLDC commenced developing a new long-term disposal solution for treated effluent produced at the WWTP (this project). The solution will replace the existing DAD disposal field and the emergency river discharge and has objectives to cater for the long-term effluent disposal requirements in a culturally appropriate, environmentally friendly, and operationally effective manner. For this project, the design horizon for effluent disposal is 2060, based on a 35-year consent duration.

QLDC's Long Term Plan (LTP) has allocated $77.5M of funding for the replacement Disposal Field solution.

1.3 Assumptions

This report is based on several assumptions, which are detailed throughout this report. Additionally, the following assumptions apply:

- The MCA assessment contained in this report was undertaken before the emergency action to divert treated effluent into the discharge channel (this commenced on 31st March 2025) and the short-term consent application (lodged on 1st May 2025).
- The design team have relied on a desktop review of publicly available information to inform the long list assessment. The high-level estimates of area/infrastructure required are subject to change following further assessment and investigation of the site-specific conditions.
- Identification of options, and in particular locations, for wastewater disposal takes a typology approach rather than being exhaustive. This approach is assumed to provide a list of representative options suitable for decision making.
- Any figures provided to show the location for the options proposed are only indicative areas selected and made at the time of investigation. For some of the options, the land selected in the figure shown may no longer be feasible to use and/or more or less land may be required.
- The estimated implementation timeframe for various long list options is based on no consent hearing, relatively short consent approval, detailed design and construction periods. These timelines will be reviewed again as part of the shortlisted options assessment.
- Indicative cost ranges prepared as part of this process are for the purpose of initial options comparison only and are not suitable for budgetary purposes. More defined cost estimates will be developed as part of the short list development process, after field investigations and further concept design has been completed through the short list options evaluation.
    - Viability of bore injection (deep or well point) options will be determined from field investigation and subsequent technical analysis which will result in a revision of cost estimates.
    - Subsurface wetland arrangement confirmation will result in cost update during the short list options evaluation and further design input.
- The Stage 3 expansion of Shotover WWTP has been designed to the 2048 demand, treating an average flow of 19,100 m^3/day.
- The long-term effluent disposal is designed for 35 years, approximately 2060. The future demand has been extrapolated using the Stage 3 WWTP expansion growth forecast, and the average flow in 2060 would reach 25,800 m^3/day.
- The scores will be reviewed and updated in the shortlisted options evaluation once further field investigations and technical assessments have been conducted in the short list options evaluation stage, refer to Figure 1.

1.4 Scope and limitations

This report: has been prepared by GHD for Queenstown Lakes District Council and may only be used and relied on by Queenstown Lakes District Council for the purpose agreed between GHD and Queenstown Lakes District Council as set out in this report.

GHD otherwise disclaims responsibility to any person other than Queenstown Lakes District Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Queenstown Lakes District Council and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

GHD has prepared the indicative cost ranges set out in Section 3.2 of this report using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD.

The Cost ranges provided in this report has been prepared for the purpose of high level options comparison, and must not be used for any other purpose. The project methodology has prescribed a more refined approach be taken for Cost Estimations when the shortlisted options are evaluated.

The Cost Estimate is an indicative estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the work can or will be undertaken at a cost which is the same or less than the Cost Estimate.

2. Options development and assessment process

This section outlines the long list development process and details the assessment framework used to quantitatively and qualitatively assess the options.

2.1 Methodology

GHD has developed a robust and well-established business case methodology which aligns with the Treasury Better Business Case approach. For this project, a bespoke MCA framework was developed to reflect the specific investment scope and to help differentiate between the options. The summary notes from the MCA set up workshop are located in Appendix B.

Figure 1 outlines the overall project process for the development of options and selection of the preferred option. The project started with a review of previous studies, an initial site visit (6th November 2024), project success workshop (7th November 2024) and technical confirmation workshop (3rd December 2024). Input into the various workshops allowed the GHD and QLDC team to collaboratively develop a long list of options and supplementary options. Supplementary options are treatments that can be added to a disposal method but do not handle the disposal themselves.

These identified options and supplementary options were then subject to an initial screening. Where options were considered to be unfeasible or have a number of significant barriers to implementation these were not progressed further for the long list development and assessment process.

Additionally, if options were technically viable, within budget and otherwise achievable, there was consideration to carry them forward to the next phase of assessments for further development to address deficiencies even if they were deemed fatally flawed by Iwi representatives. The exception to this was options which were considered by the project's technical leads to be a direct discharge to the river with no prior land contact, these options were not carried forward.

The criteria for the development of these options and initial screening is outlined below in section 2.2.1.1 and section 2.2.1.3.

The developed long list was then discussed and agreed upon by QLDC, GHD, LandPro and the Iwi partners (Aukaha and Te Ao Marama Incorporated (TAMI)), along with the MCA criteria, during the MCA Setup workshop (12th December 2024). The options long list was then formed based on the remaining options and agreed upon during the MCA Setup Workshop.

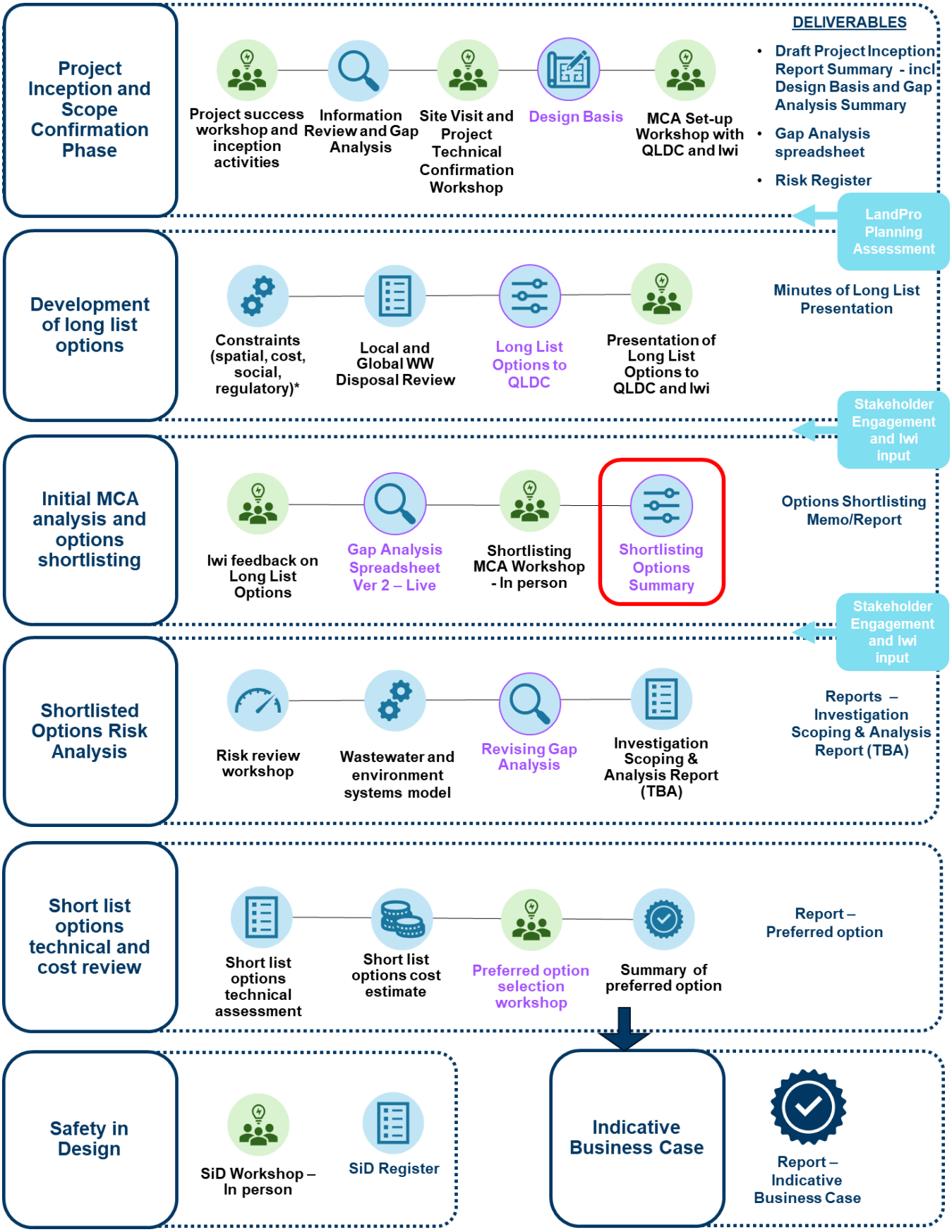

Figure 1 *Shotover WWTP alternative disposal solutions methodology with this reporting stage outlined in red*

2.2 Options and supplementary options

This section details the process undertaken to identify and develop the long list options and supplementary options for consideration and assessment. This process was undertaken to:

- Provide a robust and defensible outcome
- Consider a wide range of alternatives and options
- Identify the emerging preferred investment that considers a wide range of factors and outcomes.

2.2.1 Development of options

At the beginning of the project, a comprehensive list of possible options was developed. This initial long list options development covered a typology of possible disposal methods and discharge locations. Included in the identification of options was consideration of a number of opportunistic factors, such as existing large scale revegetation programmes and existing linear infrastructure development requirements.

The options were reviewed and refined, with options having a number of significant barriers, not considered further. The reasoning for option exclusion criteria for this are outlined in section 2.2.1.2.

Supplementary options have also been developed. These support the discharge but are not a disposal method. For example, the realignment of the floodwall on the Delta is not a discharge option itself but supports certain disposal options.

2.2.1.1 Identification process

The potential typology of options and supplementary options for consideration were identified through consideration of potential constraints, with the identification of options comprising the following steps:

1) Desktop analysis and constraints analysis (from publicly available information and reports) of the site and surrounding areas.
2) Desktop analysis of previous work undertaken at the WWTP
3) Desktop analysis of similar past projects, potential discharge solutions and feasibility of these
4) Site visits
5) Input from workshop and meetings with QLDC, LandPro and Iwi partners
    a. Project success workshop with GHD, LandPro and QLDC (7th November 2024)
    b. Initial meeting with iwi partners Aukaha and TAMI (25th November 2024)
    c. Technical confirmation workshop (3rd December 2024)
    d. MCA setup workshop with QLDC, LandPro, Veolia, Aukaha and TAMI (12th December 2024)
    e. Weekly meeting with QLDC and LandPro to discuss progress and updates (ongoing since October 2024)
6) Consideration of any planned activities at the site

2.2.1.2 Constraints and exclusion considerations

The following section describes how each constraint was considered as part of the desktop assessment for land disposal.

Relocation of WWTP

Relocation of Shotover WWTP has been excluded as an option. This is on the basis that QLDC and the community has invested a significant sum in the existing treatment plant (the Stage 1 and Stage 2 upgrades). QLDC is currently completing the Stage 3 upgrade with the doubling of the secondary treatment capacity, due for completion by end of 2025. Hence, the WWTP relocation is not considered to be a viable option.

Proximity to WWTP

Distance constraints: Locations outside the Whakatipu basin were excluded to maintain operational efficiency and manage costs effectively. Due to the high capital and operational costs associated with long distance wastewater

conveyance, only select options beyond the existing wastewater network extent were considered, with these options having other notably beneficial factors.

Land zoned residential

Land zoned for rural, recreational and industrial activities was considered. Land zoned residential was excluded due to expected high cost of land, increased stakeholder requirements, potential for conflict with local community and amenity value.

Geology and soils

Locations with low permeability soils and/or rock were excluded due to the potential risks of ponding, run-off and stability issues. These include areas with schist at or near the surface, and glacial tills.

Slope of land

Land with a high surface gradient has a greater risk of surficial runoff and can add complexity and cost of construction and operation. Land with a slope greater than 15% was excluded for certain disposal methods.

Proximity to water supply wells

There are no mapped groundwater protection zones within the basin, however, we have excluded areas that are likely within a source protection zone for community drinking wells. This includes area hydraulically upgradient (groundwater and/or connected surface water) of a groundwater supply wells based on conceptual understanding of the groundwater environment.

Proximity to surface water

Locations within the catchments of lakes, such as Lake Hayes and Lake Whakatipu, were considered unsuitable due the potential to affect water quality and recreational use of these water bodies, and to reduce community concern regarding effects.

Funding availability

A wide range of options were considered, but some options were deemed to be beyond the limits of funding available for this disposal project. The QLDC long term plan has set aside a budget of $77.5M based on previous indicative assessment undertaken by others. To enable a wide range of options for consideration, those options with estimated costs of up to approximately $150M were prioritised for further assessment.

Options such as treating wastewater to drinking water standards/direct potable reuse is considered to be unaffordable. For instance, the Upper South Creek Advanced Water Recycling Centre in West Sydney is understood to cost over AUD$1.6 billion[1], inclusive of a 35 ML/d treatment plant, 17km of treated effluent pipeline and 24km of brine disposal pipeline. For comparison, constructing a similar facility for Shotover (25 ML/d) with a brine disposal pipeline over 200km in length (to the coast) would be significantly higher than what's considered reasonable, in addition, selection of a suitable location for brine disposal is a highly complex and expensive investigation.

Select options with costs greater than $150M were considered where there was specific interest in understanding the cost of beneficial wastewater use and where these were required to consider low rate land application of wastewater over a large area; a common wastewater disposal approach.

Beneficial use of wastewater

Opportunities for wastewater disposal to provide support for other initiatives, such as restoration initiatives, watering of fields, development of areas that support biodiversity or improve recreational use/access, were also considered. Select options where such opportunities were notable were favoured in option identification, to provide comparative understanding of the overall benefit of such beneficial wastewater use. Use of wastewater irrigation to support Project Tohu, on the flanks of Coronet Peak, was considered for this reason.

Development Opportunities

Urban development in the fringes of Queenstown is resulting in opportunities and the need for additional linear infrastructure to provide services to Queenstown residents. The cost of conveying wastewater can be significantly

[1] Australia New Zealand Infrastructure Pipeline **website**

reduced where it is aligned with other infrastructure works, such as bridge building, allowing areas more distant from the WWTP to be considered. Areas in the Southern Corridor were considered in identifying options for this reason.

Legislative and water quality standards

Options considered were selected to meet current and proposed standards for treated wastewater disposal. QLDC is currently undertaking the WWTP Stage 3 upgrade works, which are expected to be completed by the end of 2025. Addition of the second bioreactor and clarifier will significantly increase the plant capacity and improve the quality of the discharge effluent, as the ponds will no longer form part of the treatment process.

In February 2025, Taumata Arowai released the proposed wastewater discharge standards for consultation, which included limits for treated effluent discharging into freshwater, lakes and ocean, as well as land-based discharges. The proposed standards for land-based discharges is limited to low-rate land discharge e.g. irrigation, while options such as disposal trenches, rapid infiltration basins and bore injection are not considered in the proposed standard.

The anticipated treated effluent quality after the Stage 3 upgrades are complete would meet the proposed discharge standards for river environments under “moderate and high” dilution categories.

- Other considerations
- Proximity to areas of Cultural and Heritage Significance
- Seismic Risk
- Existing land use and opportunities for future land use.

2.2.1.3 All options summary

The initial list of possible options is outlined in Table 1 below with reasoning provided if options were not considered further.

Table 1 Initial screening of potential disposal options

Type of discharge	Location of discharge	Carried forward to the long list	Comment or reasoning for why an option was or was not carried forward to the Long List Assessment
High rate land disposal	Delta infiltration basins	Yes	Reliable disposal and ease of operations.
	Delta trenches	Yes	Reliable disposal and ease of operations.
Moderate rate land disposal	Airport and surrounding area	Yes	Access to open areas where not near groundwater supply.
	Southern corridor	Yes	Infrastructure development provides conveyance opportunity.
	Alternate locations across the Shotover or Kawarau River	Yes	Access to open areas outside of water supply catchment.
Low-rate land disposal	DoC land / Coronet peak	Yes	Geology and site-specific issues are known to be difficult. Significant distance from WWTP.
Land flow path to river	Shotover & Kawarau	Yes	Improved recreational use of delta and use of natural flow paths.
Direct pipe discharge	Shotover River	No	Culturally and socially not acceptable.
Rockfilter (nominal contact with rocks)	Shotover Delta/River	No	Culturally and socially not acceptable as identified in the initial workshop.
Deep well injections	Frankton & Bridesdale	Yes	High aquifer transmissivity and capacity, outside potable water supply catchment.
Shallow well injections	Shotover Delta, near the river	Yes	Reduced footprint on delta, outside water supply catchment and known receptor for wastewater disposal.

Type of discharge	Location of discharge	Carried forward to the long list	Comment or reasoning for why an option was or was not carried forward to the Long List Assessment
Surface wetland	Shotover Delta	No	Large open water surface, risk to aviation from waterfowl.
Subsurface Wetlands	Kawarau	Yes	NB: considered as a supplementary option only.
Well point injection	Airport and vicinity area	Yes	Significant thickness of permeable gravels/sands above groundwater allows discharge with lower cost than bores and improved cultural consideration.
Spray irrigation in open space	Any location	No	Although this is a culturally acceptable solution, the option is not suitable for winter application due to low evapotranspiration and freezing conditions in winter. Also, difficult due to land constraints (highly developed).
Any disposal method	Within the catchment of Lake Hayes or Lake Whakatipu	No	Potential ecological impact and recreational water body contamination.
	Anywhere outside of the Whakatipu basin	No	Distance leads to escalation in capital cost and operating expenditure.
	Anywhere beyond approximately 3.5 km, except where considered for: – Beneficial use – Aligned with other significant infrastructure initiative – Offers common disposal typology not available elsewhere	No	Escalation in capital cost and operating expenditure due to distance.
	Areas with unsuitable geology	No	Not feasible.
	Residential property	No	Socially unacceptable.
Other options			
Direct Potable water reuse		No	Excessive cost, beyond project scope Cost and public perception.
Relocation of WWTP		No	Excessive cost, beyond project scope Cost and QLDC investment loss.
Supplementary option – Disposal of a portion of the treated effluent via non-potable reuse.		Yes	Feasible and can be applied to support the considered options.
Supplementary option – realignment of the floodwater training wall may utilise existing ‘island’ landforms, to increase area of Delta available for wastewater management and / or recreation uses		Yes	Feasible and can be applied to support some of the considered options.

2.2.1.4 Long list options summary

Following removal of unsuitable options, six long list options were identified along with three supplementary options which may provide additional benefits. During the MCA assessment workshop (13th March 2025), two additional options were added, resulting in a total of eight long-list options. For several options, multiple locations were identified, leading to sub-options.

Detailed guidance from TAMI and Aukaha, at the MCA workshop on 13 March 2025, indicated that any disposal options on the Shotover Delta are considered as being culturally a direct disposal to water due to the proximity of the receiving environment to the disposal method. Consequently, they regard any disposal option on the Shotover Delta as fatally flawed from a cultural perspective. QLDC has provided guidance that viable options aren't to be discarded based solely on fatally flawed scoring of cultural impacts alone. It should also be noted that these options were presented at the long list stage, which was early in the definition process and without mitigations to address specific cultural concerns or deficiencies. Therefore, if options were technically viable, within budget and otherwise achievable, but not deemed culturally appropriate by iwi representatives, there was consideration to carry them forward to the next phase for further development to address deficiencies. The exception to this was options which were considered by the project's technical leads to be a direct discharge to the river with no prior land contact, these options were not carried forward.

Table 2 below outlines the disposal options considered during the longlist optioneering process. The supplementary options, which are not disposal methods, can be used to complement a disposal option and were not scored as part of the MCA assessment.

Table 2 Long list options and supplementary options considered for the Shotover WWTP alternative disposal solutions.

Option				**Supplementary options**		
Disposal method		**Disposal Location**		**Subsurface wetlands on Delta**	**Re-use**	**Realignment of the floodwall**
Option 1	**High rate land disposal**	a)	Delta infiltration basins (requires smaller area)	Possible	Yes	Yes
		b)	Delta trenches (requires smaller area)	Possible	Yes	Yes
Option 2	**Moderate rate land disposal**	a)	Airport and vicinity area	No	Yes	No
		b)	Southern corridor	No	Yes	No
		c)	Alternate locations across the Shotover or Kawarau Rivers	No	Yes	No
Option 3	**Low rate land disposal**	a)	DOC land in vicinity of Coronet peak	No	Yes	No
Option 4	**Land flow path to river**	a)	Shotover	No	Yes	Yes
		b)	Kawarau	Yes	Yes	Yes
Option 5	**Deep well injections**	a)	Frankton	No	Yes	No
		b)	Bridesdale	No	Yes	No
Option 6	**Shallow well injections**	a)	Delta	No	Yes	Yes
Option 7	**Wetlands & land flow path to river**	a)	Kawarau	Included in option	Yes	Yes
Option 8	**Well points or soakage wells**	a)	Airport and surrounding area	No	Yes	No

3. Long list options

This section provides the initial development of the options, including a description and high-level review of the options developed to provide initial information to support the MCA scoring.

3.1 Long list options description

This section describes each of the options considered as part of the long list. Each disposal option in this report is presented using a consistent structure to support comparison and evaluation. The options are grouped by disposal method, with sub-options detailing specific design approaches or site configurations.

For each option and sub-option, the following information is typically provided:

- A high-level overview of the disposal method, including its purpose and operational concept.
- Key physical and environmental factors influencing feasibility, such as land area, soil type, groundwater levels, and aquifer capacity.
- Any major infrastructure or earthworks required to implement the option, including bridges, ground raising, trenching, or embankment realignment.
- The relationship of the option to existing infrastructure, land ownership, and current land use or disturbance.
- Potential effects on surrounding areas, including waterways, recreational use, and landscape changes.
- A summary of the option's complexity, operational demands, and indicative capital cost, based on a high-level assessment.

One common improvement across all options is the requirement to add tertiary filtration at the Shotover WWTP. This filtration step, upstream of the UV, would improve the clarity and reduce the solids concentration in the final treated effluent discharging from the plant to the disposal method. It is important to note that any option not on the Shotover Delta will require pumping of the treated wastewater due to the location of the WWTP. The location of the WWTP (Shotover Delta) offers proximity to existing infrastructure and the rivers and is within an existing designation for Wastewater Treatment activities.

3.1.1 Base case

For comparison purposes, the 'Base Case' or 'business as usual' option is described as the discharge infrastructure and operation at the time of the assessment. It also assumes any ongoing maintenance of that operation or planned and funded works. At the time of assessment (13th March 2025), this involved continued operation and maintenance of the converted DAD system as a series of infiltration basins for treated effluent disposal, with overland flow paths for excess treated effluent to the area around the DAD field.

This option is not considered a viable or acceptable long-term solution due to several issues, including non-compliance with the conditions of the resource consent (RM13.215.03.V2), not meeting current discharge rates with infiltration capacity loss or performance deterioration, ponding, and overland flows of treated wastewater across the delta.

3.1.2 Option 1 - High-rate land disposal

Disposal to shallow groundwater on the Shotover River Delta (such as via the DAD) is limited by the aquifer capacity which is estimated at approximately 5,000 m^3/day high groundwater level conditions. When the Shotover River is flowing at high levels, a significant proportion of the aquifer capacity is taken up with (river connected) groundwater, thereby limiting the amount available to accept wastewater discharges. Discharge in excess to this amount during such times has the potential to generate overland flow of treated wastewater. Capacity can be improved by building up the ground surface with open gravel or excavating existing ground and replacing with more open gravel.

Option 1 involves promoting increased sub-surface capacity by increasing the surface elevation adjacent to the Kawarau River by building a raised platform of open gravel. High-rate application of treated wastewater to this platform may be through either open basins (Option 1a) or closed trenches (Option 1b).

This method is designed to allow rapid soakage of treated wastewater, with multiple disposal areas used to allow 'resting' periods between applications. The required land area depends on factors such as infiltration capacity, ground water levels and the aquifers ability to disperse treated effluent.

This option would result in significant changes to the Delta, Kawarau riverbank, and recreational use along the riverbank. The realignment of the flood protection embankment may be necessary to provide sufficient land area adjacent to the river. Renewal of gravel is likely needed due to progressive siltation and flood damage.

Figure 2 ***An example of the infiltration basin similar to Option 1a***

3.1.2.1 Option 1a – Infiltration basins at Shotover delta

Option 1a involves high-rate infiltration open basins be constructed on the Shotover River Delta for disposal of the treated effluent. Due to the shallow groundwater table and aquifer capacity to disperse applied wastewater, this will require the proposed 10 ha disposal area as shown yellow in Figure 3 to be raised by approximately 3m to avoid ponding.

This option is located close to the existing WWTP and infrastructure, utilises QLDC-owned land, and the area has already seen significant disturbance. Infiltration to the ground is limited by the shallow groundwater table and aquifer capacity. Raising the ground surface with open gravel (2-3 meters) is required to increase capacity, which would involve more than 300,000 m^3 of cobbles. Seepages to the Kawarau River from the gravel bank may be visible.

The option has a high technical complexity, low operational complexity and average capital cost in comparison to other options considered. Refer to Section 3.2 for a summary of this assessment.

Figure 3 Option 1a Infiltration Basin in the Shotover Delta - indicative site area (yellow highlight)

3.1.2.2 Option 1b – Closed Trenches

Option 1b involves high-rate infiltration disposal of treated wastewater on the Shotover River Delta via trenches. The disposal trenches will require a 25 ha area and the existing flood protection training line will likely need to be relocated. Due to the shallow groundwater table and aquifer capacity to disperse, this will require the proposed disposal area to be raised by 2-3 m to avoid ponding.

This option is close to the WWTP and existing infrastructure, utilises QLDC-owned land, and the area has already seen significant disturbance. Raising the ground surface by approximately 2-3 m with gravel is required to provide a surface for trenches and aquifer capacity. Figure 4 shows the site area and the approximate flood wall relocation related to Option 1b (any flood wall relocation requires appropriate assessment and approvals).

This option has a moderate technical complexity, low operational complexity and high capital cost in comparison to other options considered. Refer to Section 3.2 for a summary of this assessment.

Figure 4 Option 1b Trenches in Shotover Delta, indicative site area (blue highlight) and flood wall relocation (red lines)

3.1.3 Option 2 - Moderate rate land disposal

Option 2 involves disposal to land methods with a moderate application rate of treated wastewater, such as some trench systems which requires a total area of approximately 70 to 90 hectares.

Discharge is assumed to occur to the sub-surface, such as by evenly spaced, shallow trenches, which avoids potential contact and spray drift compared to surface methods. Moderate rate application rates also avoid prolonged saturation of soils and so typically need shorter resting periods than high-rate schemes.

For this option, transpiration and nutrient uptake by vegetation is often relied upon to reduce soil saturation and avoid excessive nutrient leaching. Therefore, the land area required is significantly greater than high-rate disposal schemes and determined by soil infiltration capacity, depth to low permeability layers, groundwater levels, topography and buffer distances from wetlands and streams.

3.1.3.1 Option 2a – Disposal to Airport and vicinity area

Option 2a involves disposal trenches or similar moderate disposal scheme be constructed in the area surrounding the Queenstown airport at Frankton Flats. The UV treated and filtered effluent would be pumped to the Frankton area for disposal.

This option benefits from the significant depth to the groundwater table (over 40 meters) over a large area at Frankton Flats, and the potential to expand the trench network as future population increases. However, it requires pumping from the WWTP and some areas might be earmarked for future development by the landowners or remain vacant for safety reasons, resulting in potential land use conflicts. If land purchase is required, this could significantly increase the project costs. Moreover, construction activities and maintenance access needs to be

carefully planned around the airport operations and other activities in the area. Figure 5 shows indicative land area that could to considered, acknowledging that not all this land may be available.

This option has a high technical complexity, average operational complexity and very high capital cost in comparison to other options considered, especially after an indicative land purchase price has been included. Refer to Section 3.2 for a summary of this assessment.

Figure 5 ***Option 2a Trenches in the airport and support indicative site area (blue highlight), note that not all area will be available***

3.1.3.2 Option 2b - Disposal at Southern Corridor

Similar to Option 2a, however the moderate rate disposal scheme is located within the Southern Corridor.

The treated effluent would be pumped to the Southern Corridor area for dispersal into trenches. A new bridge and a long pipeline would be necessary for this option. This area is shown indicatively in Figure 6.

This option allows for the potential expansion of the trench network with future population increases, is readily accessible for maintenance, and addresses southern development wastewater conveyance needs as a secondary outcome. However, it should be noted that this land is owned by the QEII Trust, gifted by the Jardine family, and is not intended for housing development. The viability of disposing of treated effluent in this area would need to be confirmed if this is taken forward into the short list.

This option has a high technical complexity, high operational complexity and high capital cost in comparison to other options considered. Refer to Section 3.2 for a summary of this assessment.

Figure 6 Option 2b Southern Corridor disposal indicative site area (yellow highlight)

3.1.3.3 Option 2c - Disposal at Bridesdale and across the Kawarau Rivers

Option 2c involves the construction of a moderate rate disposal scheme at Bridesdale Flats and an additional area across the Kawarau River. Several dispersed locations would likely be required to provide a complete solution resulting in more complex operation and maintenance.

For the treated effluent pipeline to reach the land parcels on the opposite side of the Kawarau River, it will require the construction of a bridge(s) on top of land purchase of currently privately owned land. In addition to more complex operation and maintenance of the scheme, land parcels at the Ladies Mile, north of the Shotover Country, are subject to recent rezoning for 2,400 houses, leading to potential land use conflicts. Note: this option was originally developed prior to the rezoning being confirmed.

This option has a very high technical complexity owing to land access and acquisition and additional infrastructure required to service the disperse land parcels. The challenges are also compounded by high operational complexity and high capital cost. Refer to Section 3.2 for a summary of this assessment.

Figure 7 ***Option 2c Disposal at Bridesdale and across the Kawarau Rivers indicates site area (yellow highlight). The WWTP is approximately 5km from the Bridesdale Flats site.***

3.1.4 Option 3 - Low-rate land disposal

Low rate land disposal often involves irrigation at a low rate, typically up to 5 mm/day over large areas. This method is often aligned with ongoing use of the land for plantation forestry, pasture or beneficial revegetation. The option provides in-ground treatment for nutrients and contaminants.

In appropriate areas, all year round irrigation is feasible when there is reliable soakage to ground. However, in areas where soakage to ground is limited due to weather conditions and topography, irrigation is typically undertaken seasonally and dictated by soil moisture (deficit irrigation).

3.1.4.1 Option 3a - Irrigation to Department of Conservation land and/or Coronet Peak

Option 3a involves irrigation to the Project Tohu site and an additional 300 ha of ridge slope adjacent to Coronet Peak Road. This option was included following the initial workshop and discussion between iwi representatives, QLDC and GHD on potential options.

The Project Tohu site covers 200 ha on the south facing slopes of Coronet Peak close to Arrowtown and rises to its highest point of 930m. Project Tohu will plant over 500,000 indigenous species of grasses, scrubs and trees. The site has planned future recreational uses ranging from biking, hiking and horse riding. In addition to this area, another 300 ha of ridge slope adjacent to Coronet Peak Rd, would be needed as shown in Figure 8 below.

The major limitation of this option is that effluent disposal is suitable for seasonal use only. During winter months, south-facing areas will have extended frost conditions, significantly restricting the ability for land application. Due to the steep topography and limited soil depth over bedrock, the application rate has to be kept very low to minimize surface run-off. This implies an alternate/additional disposal solution will be needed when land application is not operational. Moreover, this option also entails significant infrastructure and operational costs in

relation to the construction of the steep and long rising main from the WWTP site and operation and maintenance of the 7km pipeline and irrigation equipment. A potential risk exists for preferential flow paths and run-off of applied effluent to surface water (streams) and resulting land stability issues. The effect, and risk, on recreational users also needs to be considered.

This option is assessed to be very difficult owing to seasonal use, steep topography, and high capital and operating cost. Refer to Section 3.2 for a summary of this assessment.

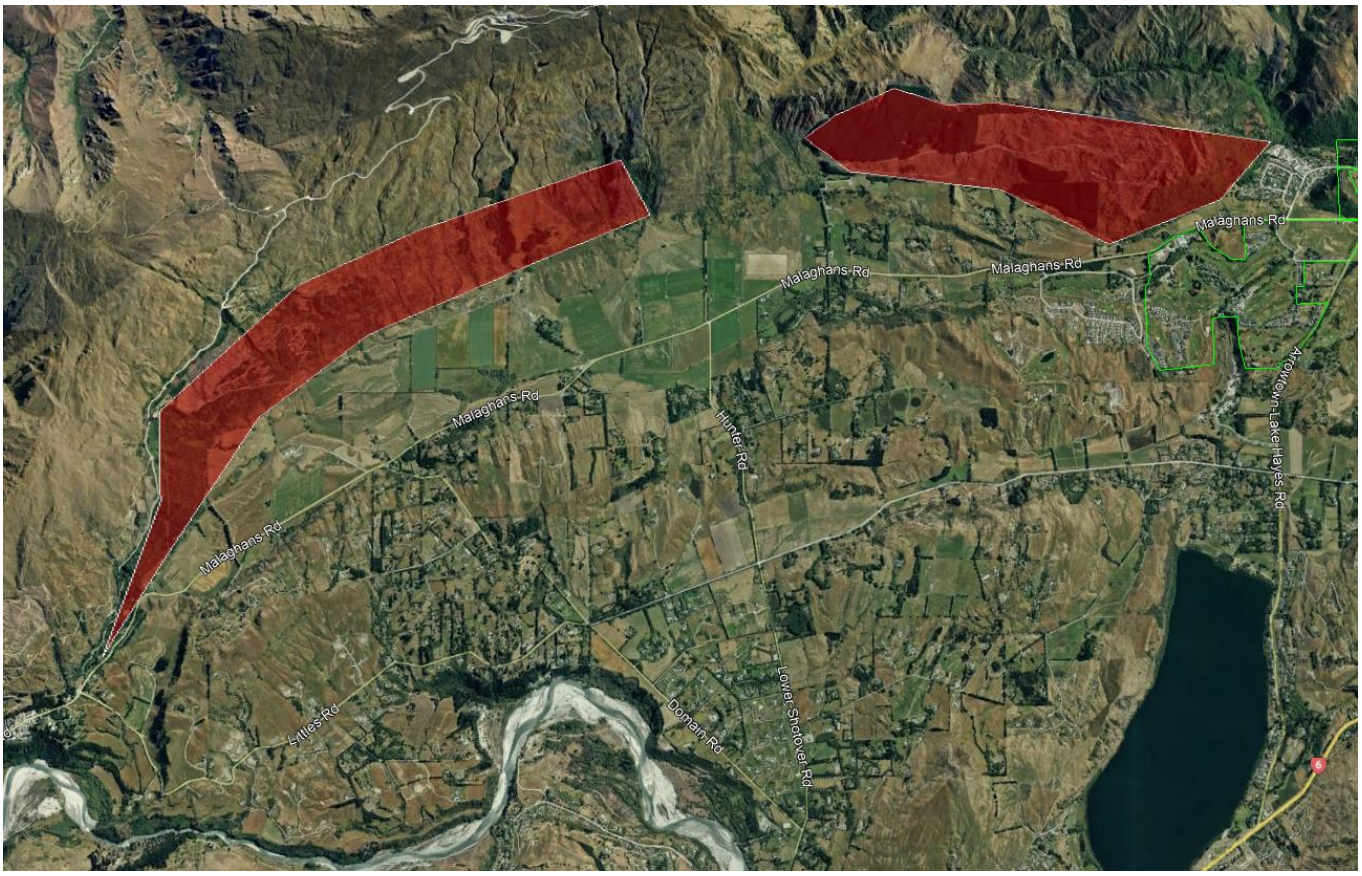

Figure 8 ***Option 3a Indicative area for Irrigation to Department of Conservation land and/or Coronet Peak***

3.1.5 Option 4 - Land flow path to river

Option 4 is a land flow path to a river and can be at various scales and designs from discrete rock channels to engineered amenity features. For this scenario, it would require a large scale subsurface flow path, engineered with local rock to provide a naturalised means of directing treated wastewater and any intercepted stormwater to the environment.

Land flow paths provide connection of treated wastewater with the ground and use of topography and land features of the surroundings. This option is often used beneficially to provide river-bank erosion protection and can be designed to accommodate all flow conditions. In the example case of Cambridge WWTP, the land flow path was designed for amenity and cultural value with input from community and Iwi contribution, refer to Figure 9 below.

With the Shotover WWTP located near the vicinity of the Shotover River and the Kawarau River, this option would take advantage of constructing less infrastructure and on QLDC owned land. However, it is susceptible to sedimentation and clogging from floods and offers minimal in-ground treatment.

Figure 9 Example land flow path to river at Cambridge WWTP to Waikato River

3.1.5.1 Option 4a – Discharge into Shotover River

Option 4a involves long land flow paths (> 250 m) to the Shotover River. This option repurposes the previous channels used for wastewater disposal and their connection to the river. The option would be modified to provide a subsurface flow path, including infilling with rock. The development of a rock discharge area at the riverbank, would minimise public contact, protect against erosion, and disperse flow into the river. Discharge channel locations are shown in Figure 10 below.

River mixing locations are not readily publicly accessible, and repurposing the previous engineered channels will minimise disruption to the area and recreational land use.

This option incurs lower capital cost and less maintenance than other options, though it requires management and exclusion of public access to parts of the Shotover River. There is also potential for the treated wastewater to migrate with groundwater away from the channels, contributing to ponding on the Delta.

Compared to other options, this option has a lower technical and operational complexity, with a lower capital cost. Refer to Section 3.2 for a summary of this assessment.

Figure 10 Option 4a, Previous discharge channel indicated in the diagram (blue highlight)

3.1.5.2 Option 4b – Discharge to Kawarau River

Option 4b involves broad and long (>100 m) land flow paths constructed in natural depressions and former river channels on the Shotover Delta. These engineered flow paths across the Delta would merge with the Kawarau River providing the means for flow to disperse into the river. Figure 11 shows possible engineering flow paths (blue highlight) and flood wall extension (red line), where this is warranted for flood protection.

The option includes developing a sufficient thickness of rock to accommodate flood flows and public access over and around rock features. River mixing locations are not commonly used, but this option uses the natural Delta environment and historical river channels for flow. It is cost-effective, though it requires management and exclusion of public access to parts of the Delta. Renewal of rock is likely needed in places following future flood events.

Similar to Option 4a, this option is also assessed to have lower technical and operational complexity, with a lower capital expenditure compared to other options.

Refer to Section 3.2 for a summary of this assessment.

Figure 11 ***Option 4 b, figure indicates potential areas which could be used for engineered flow paths (blue highlight) and flood wall modification (red line)***

3.1.6 Option 5 - Deep well injection

Option 5 is the disposal of treated wastewater via injection into the groundwater aquifer, for in ground treatment and dispersion. This has been used overseas as a means of returning stormwater and treated wastewater to the environment, or to increase recharge of heavily used aquifers. Aquifers at depth that are not used for water supply and within known flow paths are typically targeted. Bores are large diameter (typically >0.3 m) and may be pressurised to promote discharge. Routine maintenance and resting of the bores are necessary, and this maintenance must be performed by specialist contractors. High levels of filtration prior to disposal is essential to prevent clogging.

3.1.6.1 Option 5a – Frankton (Airport)

Option 5a is the discharge of the treated wastewater via deep injection wells on Frankton Flats. Based on limited information about the site geology and groundwater, it has been estimated that at least 4 bores (2 in use and 2 resting) will be required to meet the 2060 population projections, pending further field investigations. This option offers potential as a sole or mixed solution option with year-round disposal capacity if suitable geology of permeable gravels and a deep groundwater table (>40 m) is confirmed. The additional filtration through the gravel aquifer would result in the treated water flowing to the Kawarau catchment. Groundwater on this side of the Shotover River is not utilised for public water supply, which is advantageous. However, a land access agreement (lease) will be required for the bores, and the system is sensitive to the quality of injection water, with potential for clogging. Flow rate management is crucial to reduce the risk of groundwater mounding and the generation of

riverbank springs, and there is a potential risk of land instability. Additionally, pumping of the effluent from the WWTP to each injection point is required.

This option requires further investigation to obtain a better understanding of the geology before a basic sizing and concept can be developed. Based on the initial high-level assessment, the technical and operational complexity is average compared to other more challenging options. The initial assessment indicated a low cost in comparison to other options, however, this assumes no land purchase. Refer to Section 3.2 for a summary of this assessment.

Figure 12 shows an indicative area where injection wells could be located, subject to land access confirmation. Note that not all the highlighted land area would be required, rather discreet points within the area.

Figure 12 ***Option 5 a, possible injection wells at the Frankton flat area (blue highlight), not all highlighted land areas would be required, rather discreet points within the area***

3.1.6.2 Option 5b – Bridesdale

In Option 5b, the injection bores would instead be located at the Bridesdale site as shown in Figure 13 below. Compared to Option 5a, very limited information is known or available for making an initial assessment for this location. The desktop assessment for the long list options comparison assumed similar geology at this site to Option 5a. However, this is likely to be different and can only be confirmed by undertaking site investigations. The site is also low-lying and potentially subject to other hazards and risks.

Moreover, this option would require land purchase or land access agreements with the private landowners, as well as construction of new a bridge(s) for the effluent rising main reaching the prospective site location. This increases the technical and operational complexity of this option.

Figure 13 below shows that area for possible wastewater injections wells, subject to land access confirmation. Note that not all highlighted land area would be required but rather discreet points within the area.

Figure 13 *Option 5 b, possible injection wells at the Bridesdale area (blue highlight), not all highlighted land areas would be required, rather discreet points within the area*

3.1.7 Option 6 - Shallow well injection

Option 6 is the disposal of treated wastewater via injection into the ground and shallow aquifer, for in ground treatment and dispersion. The option bypasses shallow soil limitations on infiltration by putting disposal water into a permeable aquifer for dispersion. Located adjacent to the Kawarau River this option also provides a direct path for discharge to the river, providing a known extent of impact and potentially more reliable means of disposal than where aquifer capacity limits capacity for disposal. The option may use a combination of well designs (vertical or angled) or gallery (horizontal well screen). It should be noted: limited length and potential for groundwater mounding effects limits the individual well disposal rates, typically requiring a network of wells to dissipate large volumes.

3.1.7.1 Option 6a – Shotover Delta

Option 6a is shallow injection wells at the southern end of the Delta. This includes wide diameter horizontal or angled boreholes into the river gravels under the Kawarau River. An estimate of 7 to 10 discharge wells was assumed for discharging tertiary treated effluent. Figure 14 shows the indicative site area for this option.

Similar to Option 5a and 5b, there is limited site-specific knowledge currently available to determine if this option is favourable at the proposed site location.

Figure 14 Option 6 a, figure indicates site area which could be used for the shallow injection wells (red highlight)

3.1.8 Option 7 - Subsurface Wetland

This option was introduced following the MCA workshop; however, it is important to note that the subsurface wetland was initially presented as a supplementary option. The approach of including the wetland in a delta option was discussed during the workshop as part of efforts to identify a culturally acceptable solution for wastewater disposal on the Delta.

Constructed subsurface flow (SSF) wetlands could be in the form of a bed, a basin or channel filled with media of gravel or sand. The wastewater flows could flow horizontally and/or vertically through the media, supporting the growth of wetland plants.

These wetlands utilise physical, chemical, and biological processes to further polish the treated wastewater quality. Microorganisms attached to the media and plant roots play a crucial role in breaking down contaminants. SSF wetlands can add biodiversity and aesthetic values, without the issues associated with free surface water wetlands, such as waterfowl and mosquitos.

Figure 15 Example subsurface wetlands for WWTP tertiary treatment overseas.

3.1.8.1 Option 7 a – Shotover Delta

Option 7a is based on the installation of subsurface wetlands and plantings, which connects to rock filled flow paths to the Kawarau River. As shown indicatively in Figure 16, the wetlands could be as much as 1 km in total length, occupying a moderately large area in the delta.

It offers year-round disposal capacity close to the WWTP, and is located on QLDC-owned land. The polishing by wetland media and plant uptake, along with prolonged transport time through the subsurface wetlands (expected to be greater than one week to the Kawarau River), provides additional biodiversity and aesthetic benefits. There is cost associated with maintaining the subsurface wetlands and the potential need for periodic rejuvenation, and management of stormwater in the vicinity of the wetland. The proposed tertiary filtration at the WWTP would extend the period between rejuvenations.

The technical complexity of this option is primarily associated with working with the landform and the hydraulic design associated with the length between the UV channel and the Kawarau River. Refer to Section 3.2 for a summary of the assessment.

Figure 16 *Option 7 a, figure indicates site area for the wetlands (green highlight) and engineering land treatment paths (blue highlight)*

3.1.9 Option 8 - Shallow well point injection or soak holes

This option was discussed during the workshop and introduced as an option for scoring following. There are some similarities to Option 5, and further technical investigation is needed to confirm the viability. This option may address some concerns raised by Aukaha and TAMI at the MCA workshop regarding disposal of treated wastewater directly into groundwater, such as by Option 5.

Option 8 includes the disposal of treated wastewater into the vadose zone (ground above groundwater aquifer) via injection wells or soakholes for in ground treatment and dispersion. This method is used internationally to dispose of wastewater while reducing the impacts on groundwater, e.g. Vermont sites in the USA.

The solution may use a combination of soak holes, boreholes or well designs, depending on hydrogeology. This provides the opportunity for dissipation of treated wastewater where the geology has horizontal layers of low permeability soil that may otherwise limit vertical infiltration from the surface. However, limited length of bores/soak holes can limit individual well disposal rates, typically requiring a broad network of wells to dissipate large volumes.

3.1.9.1 Option 8a – Airport or surrounding area

Option 8a uses soak holes, boreholes or well points, at the Queenstown Airport or surrounding area to provide dispersion of wastewater to soils **above** the groundwater table. An extensive network of such soakage instalments would be required to provide for effective disposal of wastewater to ground.

This option offers potential as a sole or mixed solution with year-round disposal capacity, benefiting from suitable geology with permeable gravels and a deep groundwater table (>40 m). The in-ground treatment and filtration through gravels, along with the potential to intersect more permeable lenses of gravels, enhance infiltration capacity. However, this option requires pumping from the WWTP to various disposal zones, with the number of

bores to be determined from further investigations. The number of injection wells could be as many as 60 to 90 within the area shown in Figure 17. Similar to other options in the area, some land parcels might already be earmarked for future development, making them less available for the use of disposing treated effluent.

As identified in Option 5, further technical investigations are necessarily to confirm the viability of this option, particularly the number of injection wells or soakholes. From these investigations, a concept can then be refined to determine the land access and acquisition requirements.

Figure 17 Option 8 a, indicative area (blue highlight) where well point injections could be located.

3.1.10 Supplementary options

Several supplementary options have been considered as part of this long list options assessment which are described in the section below.

3.1.10.1 Non potable reuse

Non-potable reuse has the potential to alleviate the peak potable water demand, through providing a high-quality recycled water for uses ranging from truck wash, dust suppression and irrigation of green space and reserves in the Frankton area and Shotover Country. The total volume of reuse is yet to be estimated, but it will only make up a small percentage of the treated effluent volume from the Shotover WWTP.

Infrastructure requirements depend on the uses of recycled water. As a minimum, it would require tertiary filtration (already part of the long list options), a storage tank and a stand pipe at the northern end of the treatment plant, for trucks to collect recycled water. If the recycled water is to be distributed to reserves and sports grounds in the

Frankton Flats area, additional treatment such as chlorination for virus removal and additional conveyance infrastructure would be needed.

This option will be further assessed in the subsequent short list options phase, to identify the infrastructure requirements and the demand for recycled water in the near to medium future in the Frankton Flat area.

3.1.10.2 Realignment of the floodwall

The existing floodwall was originally constructed so that the Shotover River enters the Kawarau River at an oblique angle during flood flows. The floodwall bridges 'islands' within the Delta that have persisted through flood events and dams historical flow channels. The presence of the flood wall has permanent implications for the Delta, with rock deposition no longer occurring in those areas disconnected from the Shotover River. While erosion of the Kawarau River bank is likely over time, parts of the Delta inside the flood wall have been permanently reclaimed as land. Flood protection can likely be achieved with smaller structures and make more Delta area available for use.

Realignment of the floodwater training wall, as shown in Figure 18 below, would utilise existing 'island' landforms, to promote Shotover River flow at an oblique angle to the Kawarau River. This creates an extensive environment, sufficient for multi-use and improved recreational use, while also allowing for more natural erosion of the Kawarau Riverbank than will currently occur. It is noted that flood wall realignment requires detailed assessment to determine viability and extent, and consideration of required approvals.

This option increases land area, assisting in achieving a range of recreational and wastewater management objectives, and helps remove conflicts of space. However, it involves further permanent modification of the historical Delta landform and discretionary realignment of infrastructure.

Figure 18 Supplementary option - Proposed realignment of the floodwall indicated location (red lines)

3.2 Summary

Table 3 provides a description of the option including technical attributes including construction complexity, quantity of materials required, increase of operation and maintenance input, and approximate land area

requirements. As stated in Section 3.1, the land area requirements were estimated based on a desktop assessment with information publicly available. Options that are carried forward into the shortlist options phase will likely require field investigations to confirm the site-specific factors ranging from geology, groundwater table and others to refine the area needed for treated effluent disposal.

The indicative cost range was derived from various cost assumptions including rates from commercial entities and past projects. Some of the options have factored in an estimate of potential land purchase cost. The purpose of developing indicative cost ranges is for comparative purposes at the long list stage. Estimates are based on high level inputs, scope definition and assumptions and are therefore not suitable for budgetary purposes at this stage. Further cost estimates, including whole of life costs, will be prepared for the short list options following the completion of field investigations, concept design and input from quantity surveyors using relevant and recent project data.

Table 3 ***Summary of high level options preliminary assessment , both technical and operational complexity are scored out of 5 with higher scores indicating the option is more complex. For the cost, purple reflects construction cost, red reflects potential land costs.***

Option	Technical Complexity to build	Complexity of Operation	Land Area Required	Comparative Cost Range Purple – Capital Red - Land	Comparative Cost Range
Do nothing, continue using the existing disposal field	Not considered a viable or acceptable longer term option				
Option 1 – High-rate land disposal a) Delta infiltration basins			10 ha		$70M to $120M
Option 1 – High-rate land disposal b) Delta trenches			25 ha		$120M to $200M
Option 2 – Moderate rate land disposal a) Airport and vicinity area			70 – 90 ha		$120M to $200M (land purchase provision incl.)
Option 2 – Moderate rate land disposal b) Southern corridor			70 – 90 ha		$100M to $150M
Option 2 – Moderate rate land disposal c) Alternate locations across the Kawarau River			70 – 90 ha		$120M to $200M
Option 3 – Low-rate disposal a) Doc land / Coronet peak			400 – 500 ha		$150M to $250M
Option 4 – Land flow path to river a) Shotover			N/A		$20M to $35M
Option 4 – Land flow path to river b) Kawarau			Discreet points across the area		$20M to $35M
Option 5 – Deep well injections a) Frankton			Discreet points across the area	 No land purchase cost assumed	$40M to $75M** (assume no land purchase, in QLDC land)
Option 5 – Deep well injections b) Bridesdale			Discreet points across the area		$80M to $100M**
Option 6 – Shallow well injections a) Delta			Discreet points across the area		$30M to $60M**
Option 7 – Subsurface Wetland on a) Delta			Up to 10 ha (could be less)		$30M to 60M***

Option	Technical Complexity to build	Complexity of Operation	Land Area Required	Comparative Cost Range Purple – Capital Red - Land	Comparative Cost Range
Option 8 – Well Point or Soak holes a) Frankton			Discreet points across the area	 No land purchase cost assumed	$40M to 75M** (assume no land purchase, mostly in QLDC land)

** Indicative cost range are only for the purpose of initial options comparison. More defined cost estimates will be provided after field investigations and concept sizing work as part of short list options evaluation*
*** Viability and cost of bore injection (deep or well point) options will be determined from field investigation, subsequent technical analysis and revision of cost estimates.*
**** Subsurface wetland arrangement will require a cost update during the short list options evaluation and further design input.*

4. Options MCA assessment

The approach and results of the long list MCA assessment are outlined in the following sections.

4.1 MCA scoring system

Multi criteria assessment (MCA) enables a wide range of different aspects to be taken into consideration in evaluating options and provides a systematic framework for working through the merits and disadvantages of each option. It is a tool that can help decision making, but it does not make the decision. Done well, it provides an open, traceable, and repeatable process. It enables consideration of a range of criteria which are both qualitative and quantitative.

Project options were scored against the MCA criteria using a 11-point scoring system. Table 4 outlines the MCA scoring system with the scores and scoring descriptions.

Table 4 MCA scoring system

Score	Scoring Description
+ 5	Substantial benefits and a high degree of confidence of benefits being realised and/or long term / permanent benefits
+ 4	High extent of benefits and confidence of benefit being realised and/or medium – long term benefits
+ 3	Good benefits and/or medium term
+ 2	Low or localised benefits and/or short term
+ 1	Very low benefits and/or very short term
0	Base case – the current solution if it were working as designed and meeting the consent requirements.
- 1	Few difficulties, very low cost or low impact on some resources/values and/or very short term
- 2	Minor difficulties, low cost or minor impacts on resources/values and/or short term
- 3	Some difficulties, moderate cost or some impact on resources/values and/or medium term
- 4	Clear difficulties, high cost or high impact on resources/values and/or medium – long term
- 5	Substantial difficulties, very high cost or substantial impact on resources/values and/or long term / permanent
FF	Fatally Flawed. Extreme difficulties, extremely high cost or substantial impact on resources/values and/or long term / permanent which cannot be mitigated by reasonable measures and may not be able to be mitigated by extraordinary mitigation

The scoring of options was completed relative to the base case, which is considered to have a zero score against all MCA criteria unless otherwise defined, with rationale provided for why zero was not used. A future year of 2060 was proposed for the MCA assessments in line with a planned 35-year consent. It is assumed that all elements of each option would be in place by 2060 for scoring purposes.

4.2 MCA framework

The MCA assessment criteria categories are outlined in the following Figure 19.

Figure 19 MCA framework groups

Note – Cultural considerations are often within the social and environmental effects, however for this project some of the cultural considerations are captured as part of the investment objectives as well as the social and environmental effects. This will not dilute or take away from the cultural considerations.

The individual MCA assessment criteria used to assess options for this project (under each category) are described in the following Section 4.3. The proposed key performance indicators, measures and considerations used to inform the option scoring for each criterion are also shown in the following Section 4.3.

Additionally, consentability is not a separate criteria, it is captured in specific criteria (i.e. visual impact) and their impact on the ability of an option to be consented.

4.3 MCA investment objectives and criteria

This section outlines the MCA investment objectives and criteria as agreed by QLDC, Aukaha, TAMI, LandPro and GHD and documented in the MCA Framework located in Appendix B. Each investment objective and criteria include key performance indicators or measures that are to be used in the assessment process.

Investment Objectives	Key Performance Indicators	Scoring lead
IO1 - The health and well-being of the surrounding waterways are maintained, protected and improved where practicable to support water quality.	– Ecosystem / Aquatic health effects – Human health effects – Nuisance growth – Recreation impacts	– Anthony Kirk
IO2 - The disposal of treated wastewater aligns with tikanga as guided by mana whenua.	– Mana whenua values and knowledge – Alignment with mana whenua cultural practices, protocols and values.	– Alex Gorrie and Riria Hakiwai
IO3 - Ability to service the community's and visitor wastewater needs now and into the future up to the equivalent flows projected for 2060.	– Can accommodate forecast population or economic growth over time – Can accommodate peak day inflows – Can be resilient to extreme climate events, climate change and natural disasters	– Ian Ho and Anthony Kirk

Social and Environmental Factors	Considerations	Scoring lead
S&E1 - Mō tātou, ā, mō kā uri ā muri ake nei For us and our children after us.	– Integration of whakapapa Intergenerational equity, innovation, and knowledge. – Te mana o te wai Mauri of the water is upheld or enhanced – Ki uta ki tai Whole of catchment impact and holistic consideration.	– Alex Gorrie and Riria Hakiwai
S&E2 - Cultural impacts to sites of significance and access to sites for cultural activities.	– Sites of cultural significance impacts – Physical access to site for cultural and recreational activities.	– Alex Gorrie and Riria Hakiwai
S&E3 - Impacts to the surrounding environment.	– Natural waterway impacts – Biodiversity	– Anthony Kirk
S&E4 - Environmental impacts to surrounding catchment land, soil and groundwater.	– Surface water effects – Soil health effects – Groundwater effects	– Anthony Kirk
S&E5 - Visual effects	– The extent to which there is a visual impact from options that differ from existing land use or impact the surrounding natural environment	– Claire Perkins and Anthony Kirk
S&E6 - Amenity effects	– Noise impacts – Risk to potential receptors – Recreational access – Air quality / odour risk	– Claire Perkins and Anthony Kirk

Critical Success Factors	Considerations	Scoring lead
CSF1 - Constructability and technical feasibility	– Technical feasibility – Technical / constructability risks – Compatibility – Technical robustness and operational resilience	– Ian Ho
CSF2 - Sustainability - Carbon emissions and sustainable use of resources supporting organisational goals	– Carbon emissions (operation carbon included) – Beneficial reuse	– Ian Ho
CSF3 - Operational reliability and maintainability	– Ease of operations / maintenance – Operational complexity and risks – Functionality	– Ian Ho
CSF4 - Property difficulties and impacts	– Property requirements, impacts and difficulties.	– Claire Perkins and Ian Ho
CSF5 - Implementation timeframe	– Timeline – Addressing current performance issues	– Ian Ho

	**CSF6 -** Costs and affordability	– Capital costs – Operation costs (annual) – Whole of life costs (NPV) – Stage ability	– Ian Ho

4.4 Long list options MCA results

The MCA workshop was held in person at QLDC on Thursday, March 13th, 2025, with key representatives from QLDC, TAMI, Aukaha, LandPro, and the GHD project team.

Each investment objective or factor was assigned a scorer (or multiple scorers) to take ownership of the scores:

- For environmental or technical objectives and factors, a GHD technical expert scored
- For planning based factors, Landpro specialist planner scored
- For the cultural objectives and factors, iwi partners Aukaha and TAMI scored

This workshop provided an opportunity for the initial scores to be presented and for the workshop group to discuss, provide input and decide on what options should be shortlisted. Where required further information was provided on options after the workshop to enable final scoring of the long list of options. The MCA scores were subsequently updated, and the final scores by the specialists and representatives are stated in this report and Appendix A.

4.4.1 Long list scores summary

The investment objectives and criteria are summarised in Table 5 below. Note – 1. Where 'No score' is given, this was due to additional technical information or clarity being requested which will be available for the short list assessments. 2. For culturally based criteria the score provided in the table below is for Aukaha; TAMI had similar scores for some options and did not provide some scores for other options, see specific scores in the following pages.

Table 5 MCA assessment score summary

Option	Investment Objectives			Social and Environmental Factors						Critical Success Factors					
	IO1 Health and well-being of waterways	IO2 treated wastewater aligns with tikanga	IO3 Ability to service the future flows	S&E1 Mō tātou, ā, mō kā uri ā muri ake nei	S&E2 Cultural impacts and access to sites	S&E3 Impacts to enviro	S&E4 Impacts to land, soil and GW	S&E5 Visual effects	S&E6 Amenity effects	CSF1 Technical feasibility	CSF2 Sustainable	CSF3 Operation	CSF4 Property	CSF5 Timeframe	CSF6 Costs
Base case (as intended under consent conditions)	0	FF	-1	FF	FF	0	0	0	0	0	0	-1	0	0	0
Base case (as disposal field is currently performing)	-4	FF	FF	FF	FF	-3	-3	-3	-3	-3	-2	-3	0	-5	-3
Option 1 – High-rate land disposal a) Delta infiltration basins	+2	FF	+1	FF	FF	-2	+2	-2	-2	-3	-3	0	-2	-2	-4
Option 1 – High-rate land disposal b) Delta trenches	+3	FF	+1	FF	FF	-2	+2	-2	-3	-3	-3	0	-2	-2	-5
Option 2 – Moderate rate land disposal a) Airport and vicinity area	+4	+4	+1	+4	+4	+4	+4	+2	+3	-4	-2	-2	-4	-2	-5
Option 2 – Moderate rate land disposal b) Southern corridor	0	-4	+1	-4	-3	+2	0	-1	-1	-4	-4	-1	-3	-4	-3
Option 2 – Moderate rate land disposal alternate locations	+3	-3	0	-4	-3	+2	+3	-1	-1	-5	-5	-3	-3	-5	-5
Option 3 – Low-rate disposal a) Doc land / Coronet peak	+4	-4	-3	-4	-1	0	+4	-3	-3	-5	-4	-4	-3	-2	-5
Option 4 – Land flow path to river a) Shotover	-1	FF	+1	FF	FF	0	+1	+2	+2	+1	+2	+2	0	+1	+2
Option 4 – Land flow path to river b) Kawarau	+2	FF	+2	FF	FF	+2	+2	+1	+1	+2	+1	+1	0	+1	+2
Option 5 – Deep well injections a) Frankton	+3	-4	+2	-4	-3	+3	+3	+2	+3	No score	-1	-2	-1	-2	0
Option 5 – Deep well injections b) Bridesdale	+2	-3	+2	-3	-2	+3	+2	+2	+3	No score	-3	-2	-1	-5	-2
Option 6 – Shallow well injections a) Delta	+2	FF	+2	FF	FF	+2	+2	+1	+2	No score	-1	-2	0	-2	+1
Option 7 – Subsurface Wetland on a) Delta	+3	FF	+2	FF	FF	+2	+3	+2	+1	+2	-1	+1	0	0	0
Option 8 – Well Point or Soak holes a) Frankton	+3	+5	+1	+5	+5	+3	+3	+2	+3	No score	-1	-2	-1	-2	0

4.4.2 Investment objectives

4.4.2.1 Objective 1

Investment Objective 1 is **the health and well-being of the surrounding waterways are maintained, protected and improved where practicable to support water quality**. The scores and rationale for each option are outlined in the following Table 6.

Table 6 ***Long list assessment – the health and wellbeing of surrounding waterways are maintained, protected and improved where practicable to support water quality.***

Option	Score	Rationale for scoring
Base case (as intended under consent conditions)	0	– Baseline.
Base Case (as disposal field is currently performing)	-4	– Overflow and ponding of treated wastewater in downgradient areas – Daylighting of impacted groundwater and overland flow when GW levels are high – Discolouration and algal growth in discrete channels, and downgradient flow paths – Potential human health risks
Option 1 – High-rate land disposal a) Delta infiltration basins	+2	– Improved level of treatment, lower nutrient load – Minimal public contact – Potential for minor daylighting of discharges at rivers edge during high groundwater levels
Option 1 – High-rate land disposal b) Delta trenches	+3	– Improved level of treatment, lower nutrient load – Minimal public contact – Diffuse discharge across extent of Kawarau River bank – Less likely to daylight at rivers edge
Option 2 – Moderate rate land disposal a) Airport and vicinity area	+4	– Improved level of treatment, lower nutrient load – Significant inground treatment due to depth to GW – Broad diffuse discharge to Kawarau
Option 2 – Moderate rate land disposal b) Southern corridor	0	– Improved level of treatment, lower nutrient load – Moderate Inground treatment – Cropping opportunity – Localised influence on stream and inflow to Kawarau River. – Significant disturbance to access in the area
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	+3	– Improved level of treatment, lower nutrient load – Moderate Inground treatment for some areas – Distributed irrigation provides more diffuse impact on GW and water quality
Option 3 – Low-rate disposal a) Doc land / Coronet peak	+4	– Significant removal of wastewater from immediate Kawarau -River Catchment – Seasonal use provides for minor plant nutrient uptake and evapotranspiration
Option 4 – Land flow path to river a) Shotover	-1	– Improved level of treatment, lower nutrient load to Kawarau. – Potentially elevated nutrient concentrations during very low flow periods, resulting in algal growth. – Disturbance of river bed mobilises sediment, but also limits periphyton growth
Option 4 – Land flow path to river b) Kawarau	+2	– Improved level of treatment, lower nutrient load – Uses similar flow paths to the Kawarau as present discharge to ground
Option 5 – Deep well injections a) Frankton	+3	– Improved level of treatment, lower nutrient load – Uses similar flow paths to the Kawarau as present discharge to ground

Option	Score	Rationale for scoring
Option 5 – Deep well injections b) Bridesdale	+2	– Improved level of treatment, lower nutrient load – Limited inground treatment – Potential for localised mixing in Kawarau
Option 6 – Shallow well injections a) Delta	+2	– Improved level of treatment, lower nutrient load – Minimal inground treatment – Likely to form areas of localised mixing in Kawarau
Option 7 – Subsurface Wetland on a) Delta	+3	– Improved level of treatment, lower nutrient load – Uses similar flow paths to the Kawarau as present discharge to ground
Option 8 – Well Point or Soak holes a) Frankton	+3	– Improved level of treatment, lower nutrient load – Potential inground treatment – Potential to distribute broadly to allow more diffuse inflow to Kawarau River

When evaluating the options against this investment objective, options that protect water quality and hydrological conditions were rated more favourably. This included options that provide improved levels of treatment and lower nutrient loads. Additionally, options that offered significant inground treatment and broad, diffuse discharge were preferred. Options that resulted in overflow, ponding, or potential human health risks were rated less favourably.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

- Best score (+4) and rationale:
    - Option 2 a - Moderate rate land disposal to airport: High score due to significant in-ground treatment and broad diffuse discharge, making it effective for nutrient load reduction.
    - Option 3 a - Low-rate disposal to Doc land/Coronet peak: High score for its broad distribution at low rates and seasonal use, which minimises leaching and impacts to water.
- Worst score (-1) and rationale:
    - Option 4 a – Land flow path to Shotover River: Lowest score due to potential for elevated nutrient concentrations, algal growth, and disturbance of the riverbed.

4.4.2.2 Objective 2

Investment Objective 2 is **the disposal of treated wastewater aligns with tikanga as guided by mana whenua**. These scores were provided by Aukaha and TAMI. Please note that TAMI was unable to provide scores for all options. The scores and rationale for each option, as defined by Aukaha and TAMI, are outlined in the following Table 7.

Table 7 Long list assessment disposal of treated wastewater aligns with tikanga as guided by mana whenua.

Option	Score (Aukaha)	Rationale for scoring (Aukaha)	Score (TAMI)	Rationale (TAMI)
Base case (as intended under consent conditions)	FF	– The system is not working as intended and is effectively discharging to the Kimiākau and Kawarau rivers.	No score	– Not scored
Base case (as disposal field is currently performing)	FF	– The system is not working as intended and is effectively discharging to the Kimiākau and Kawarau rivers.	No score	– Not scored
Option 1 – High-rate land disposal a) Delta infiltration basins	FF	– Disposal beds are in the floodplain, and are adjacent to the Kawarau meaning that there is inadequate land based treatment prior to reaching the receiving waterbody to water – Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01 – Through a matauraka Māori lens, this is effectively BAU, the characteristics of the soils and the extra distance from the current disposal fields are not	FF	– Considered as fatally flawed (verbal feedback at workshop).

Option	Score (Aukaha)	Rationale for scoring (Aukaha)	Score (TAMI)	Rationale (TAMI)
		substantially different enough to classify this solution as distinct from the current disposal field.		
Option 1 – High-rate land disposal b) Delta trenches	**FF**	– Disposal beds are in the floodplain, and are adjacent to the Kawarau meaning that there is inadequate land based treatment prior to reaching the receiving waterbody to water – Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01 – Through a matauraka Māori lens, this is effectively BAU, the characteristics of the soils and the extra distance from the current disposal fields are not substantially different enough to classify this solution as distinct from the current disposal field.	**FF**	– Considered as fatally flawed (verbal feedback at workshop).
Option 2 – Moderate rate land disposal a) Airport and vicinity area	**+4**	– Out of all options considered, this one is expected to have one of the lowest impacts on the GW aquifer and on the adjacent surface water bodies, and has the best alignment with mana whenua cultural practices, protocols and values around waste and water.	**No score**	– Further information gathered by the technical team to be completed before score can be assigned.
Option 2 – Moderate rate land disposal b) Southern corridor	**-4**	– Requires river crossing(s) of wastewater pipes to reach the disposal area. – Groundwater is unacceptably shallow (<2m).	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	**-3**	– This option requires at least one river crossing to reach disposal areas. – Two of the three disposal areas are in the floodplain. – Although distributed disposal lowers the contaminant loading in any one area, the riverside disposal fields are of concern to mana whenua because of their lack of resilience to flooding of the Kawarau. – The main concern is that these two fields will be effectively the same as the BAU option.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	**-4**	– Receiving environment is outside of catchment that generates the wastewater. – Receiving environment is not suitable for receiving year round loads. – Shallow depth before reaching bedrock is inappropriate for land disposal.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 4 – Land flow path to river a) Shotover	**FF**	– Disposal beds are in the floodplain, and adjacent to the Kawarau, meaning that there is inadequate land based treatment prior to reaching the receiving waterbody to water – Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01 – Through a matauraka Māori lens, this is effectively BAU, or more damaging than BAU. – The characteristics of the soils and the extra distance from the current disposal fields are not substantially different enough to classify this solution as distinct from the current disposal field.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 4 – Land flow path to river b) Kawarau	**FF**	– Disposal beds are in the floodplain, and adjacent to the Kawarau, meaning that there is inadequate land based	**No score**	– No score, note that this option is eliminated

Option	Score (Aukaha)	Rationale for scoring (Aukaha)	Score (TAMI)	Rationale (TAMI)
		treatment prior to reaching the receiving waterbody to water – Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01 – Through a matauraka Māori lens, this is effectively BAU, or more damaging than BAU. – The characteristics of the soils and the extra distance from the current disposal fields are not substantially different enough to classify this solution as distinct from the current disposal field. – Minimal in-ground treatment.		from shortlisting.
Option 5 – Deep well injections a) Frankton	**-4**	– The risk of system failure and contamination of the groundwater – Lack of knowledge about the groundwater aquifer and how it would interact with surface water if contaminated – Preference not to trial technology in this area – High perceived contamination risk if system is comprised – There is a risk of groundwater mounding and generation of riverbank streams – Mana whenua values are not aligned with discharge directly to groundwater.	**No score**	– Further information gathered by the technical team to be completed before score can be assigned.
Option 5 – Deep well injections b) Bridesdale	**-3**	– The risk of system failure and contamination of the groundwater – Lack of knowledge about the groundwater aquifer and how it would interact with surface water if contaminated – Preference not to trial novel technology in this area – High perceived contamination risk if system is comprised – There is a risk of groundwater mounding and generation of riverbank streams – Closer to river than Frankton deep well injection – The Bridesdale land is consented to divert flood flows and therefore risks the bore being exposed to extra nutrient and sediment loads in a flood hazard event.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 6 – Shallow well injections a) Delta	**FF**	– Disposal beds are in the floodplain, and under the Kawarau, meaning that there is inadequate land based treatment prior to reaching the receiving waterbody to water – Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01 – Through a matauraka Māori lens, this is effectively BAU, or more damaging than BAU. – The characteristics of the soils and the extra distance from the current disposal fields are not substantially different enough to classify this solution as distinct from the current disposal field. – Diffuse discharge with rapid mixing in river.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 7 – Subsurface Wetland on a) Delta	**FF**	– Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01 – Disposal area is still in the Kawarau – Through a matauraka Māori lens, this is effectively BAU, or more damaging than BAU. – The characteristics of the soils and the extra distance from the current disposal fields are not substantially	**No score**	– Further information gathered by the technical team to be completed before score

Option	Score (Aukaha)	Rationale for scoring (Aukaha)	Score (TAMI)	Rationale (TAMI)
		different enough to classify this solution as distinct from the current disposal field. – ~One week timeframe for with rapid mixing in river under storm conditions. Longer under normal conditions.		can be assigned.
Option 8 – Well Point or Soak holes a) Frankton	**+5**	– The groundwater table is substantially deeper than any other considered, minimising the risk of aquifer or surface water contamination. – There is an anticipated 28 - 30 m depth between the injection point and the groundwater table – Out of all options considered, this one is expected to have the least impact on the GW aquifer and on the adjacent surface water bodies, and has the best alignment with mana whenua cultural practices, protocols and values around waste and water.	**No score**	– Further information gathered by the technical team to be completed before score can be assigned.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best score (+5) and rational:

- Option 8a – Well Point or Soak holes on the Frankton. Aukaha rationale for score: The groundwater table is substantially deeper than any other considered, minimising the risk of aquifer or surface water contamination. There is an anticipated 28 - 30 m depth between the injection point and the groundwater table. Out of all options considered, this one is expected to have the least impact on the GW aquifer and on the adjacent surface water bodies and has the best alignment with mana whenua cultural practices, protocols and values around waste and water.
- TAMI did not provide a formal score, and more information is required before their scoring can be completed.

Worse scores (all culturally fatally flawed):

- Option 1a – High-rate land disposal via Delta infiltration basins. Fatally flawed by both Aukaha and TAMI.
- Option 1b – High-rate land disposal via Delta trenches. Fatally flawed by both Aukaha and TAMI.
- Option 4a – Land flow path to Shotover River. This option was deemed fatally flawed by Aukaha. While TAMI did not provide a formal score due to the option being eliminated early, verbal feedback during the workshop indicated that they do not support it.
- Option 4b – Land flow path to Kawarau River. This option was deemed fatally flawed by Aukaha. While TAMI did not provide a formal score due to the option being eliminated early, verbal feedback during the workshop indicated that they do not support it.
- Option 6a – Shallow well injections on the Delta. This option was deemed fatally flawed by Aukaha. TAMI did not provide a formal score due to the option being eliminated early.
- Option 7a – Subsurface Wetland on the Delta. This option was deemed fatally flawed by Aukaha. TAMI did not provide a formal score, and more information is required before their score could be completed.

4.4.2.3 Objective 3

Objective 3 is t**he ability to service the community's and visitor wastewater needs now and into the future up to the equivalent flows projected for 2060**. The scores and rationale for each option are outlined in the following Table 8.

Table 8 ***MCA assessment - the ability to service the community's and visitor wastewater needs now and into the future up to the equivalent flows projected for 2060***

Option	Score	Rationale
Base case (as intended under consent conditions)	**-1**	– Even if the DAD operates as intended, it will still require expansion to accommodate flows in 2060 (average flow ~ 25,000m3/day). Additional or alternative disposal solution will be required.
Base case (as disposal field is currently performing)	**FF**	– Ongoing performance deterioration and not suitable for future use.
Option 1 – High-rate land disposal a) Delta infiltration basins	**+1**	– Compared to status quo (operated as intended), similar outcome and can accommodate 2060 flows.
Option 1 – High-rate land disposal b) Delta trenches	**+1**	– Compared to status quo (operated as intended), similar outcome and can accommodate 2060 flows.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	**+1**	– Can accommodate 2060 flows.
Option 2 – Moderate rate land disposal b) Southern corridor	**+1**	– Can accommodate 2060 flows.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	**0**	– Whilst can accommodate future flows, proximity to nearby land uses could reduce future expandability.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	**-3**	– As it is a part solution and seasonal flow only. – Unable to accommodate flows in 2060.
Option 4 – Land flow path to river a) Shotover	**+1**	– Can accommodate future flow increase.
Option 4 – Land flow path to river b) Kawarau	**+2**	– Able to service growth > 2060.
Option 5 – Deep well injections a) Frankton	**+2**	– Able to service growth > 2060.
Option 5 – Deep well injections b) Bridesdale	**+2**	– Able to service growth > 2060.
Option 6 – Shallow well injections a) Delta	**+2**	– Able to service growth > 2060.
Option 7 – Subsurface Wetland on a) Delta	**+2**	– Able to service growth > 2060.
Option 8 – Well Point or Soak holes a) Frankton	**+1**	– Able to service growth > 2060, but with possible limitations.

When evaluating the various options against this investment objective, options that could accommodate future growth and provide long-term sustainability were rated more favourably. Solutions that offered flexibility and expandability were also preferred. Options that were limited in scope, only able to operate seasonally, or already with known performance deterioration were assigned with lower scores.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

- Best scores (+2) and rationale:
    - Option 4b: 5a, 5b, 6a, 7a: Able to service growth past 2060.
    - Further field investigations need to take place to confirm site specific parameters and refine the loading rates for each option.
- Worst score (-3) and rationale:
    - Option 3a: As it is a part solution suitable for seasonal flow only. Unable to accommodate flows in 2060.

4.4.3 Social and environmental factors

4.4.3.1 Social and environmental factor 1

The social and environmental factor 1 is: **Mō tātou, ā, mō kā uri ā muri ake nei - For us and our children after us**. These scores were done by Aukaha and TAMI. Please note that TAMI was unable to provide scores for all options. The scores and rationale for each option, as defined by Aukaha and TAMI, are outlined in the following Table 9.

Table 9 MCA assessment - Mō tātou, ā, mō kā uri ā muri ake nei - For us and our children after us

Option	Score (Aukaha)	Rationale (Aukaha)	Score (TAMI)	Rationale (TAMI)
Base case (as intended under consent conditions)	FF	– The current system does not consider the whole-of-catchment effects from the discharge on water.	FF	
Base case (as disposal field is currently performing)	FF	– The current system does not consider the whole-of-catchment effects from the discharge on water.	FF	
Option 1 – High-rate land disposal a) Delta infiltration basins	FF	– Disposal beds are in the floodplain, and are adjacent to the Kawarau. – Substantial earthworks (>300,000 m^3 cobbles) required, further modifying the natural environment. – Misaligned with mō tātou, ā, mō kā uri (pepeha) due to lack of flood resilience being situated in the floodplain, expected to need remedial works after floods. – Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01. – Through a matauraka Māori lens, this is effectively BAU, the characteristics of the soils and the extra distance from the current disposal fields are not substantially different enough to classify this solution as distinct from the current disposal field. – The primary issue as per the KTKO NRMP 2005 is that this option is not providing adequate land based treatment prior to reaching the receiving waterbody.	FF	– Understood this option is considered as fatally flawed.
Option 1 – High-rate land disposal b) Delta trenches	FF	– Disposal beds are in the floodplain, and are adjacent to the Kawarau. – Substantial earthworks required, further modifying the natural environment. – Misaligned with mō tātou, ā, mō kā uri (pepeha) due to lack of flood resilience being situated in the floodplain, expected to need remedial works after floods. – Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01. – Through a matauraka Māori lens, this is effectively BAU, the characteristics of the soils and the extra distance from the current disposal fields are not substantially different enough to classify this solution as distinct from the current disposal field. – The primary issue as per the KTKO NRMP 2005 is that this option is not providing adequate land	FF	– Understood this option is considered as fatally flawed.

Option	Score (Aukaha)	Rationale (Aukaha)	Score (TAMI)	Rationale (TAMI)
		based treatment prior to reaching the receiving waterbody.		
Option 2 – Moderate rate land disposal a) Airport and vicinity area	**4**	– There is potential to expand for population growth. This land use limits further urbanisation in an area that is already limited in how it can deal with wastewater, it is a safeguard for the health of the adjacent waterbodies for current and future generations. – The site is not in a flood prone location or expected to be destabilised with the disposal loading rates. – The contaminants are treated and disposed of in catchment. – The necessity for a pump-driven solution means that in the event on an emergency where power is out, the system will not be able to operate and will likely result in discharge to the current floodplain area.	**4**	– Further information gathered by the technical team to be completed before score can be assigned.
Option 2 – Moderate rate land disposal b) Southern corridor	**-4**	– Due to presence of glacial till, it is a partial solution only, therefore it will not necessarily meet the needs of the population it services on its own, if this is the case, then it will not be appropriate for the forecast growth of future populations either. – There are four groundwater bores between 50m and 450m due east of the proposed disposal area.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	**-4**	– The land at Bridesdale is consented to divert Kawarau River flood flows for the purpose of flood hazard mitigation (RM18.238.02), therefore it is also assumed to be located in the floodplain. This is of concern to mana whenua and renders this location very similar to the BAU location in terms of suitability. – The land at Ladies Mile currently has two consents for groundwater takes, within the project area, or within 250m of the project area. – The eastern most parcel is all within the floodplain. – Approx. 2/3 of the disposal area is a similar.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	**-4**	– Not appropriate to receive flows and loads throughout the year, so not considered a stand alone solution. – Extra loading on the catchment to areas that are not sufficiently permeable to handle it. – Potential for preferential flow paths and run-off to surface water. – It will require river crossings which are always unfavourable to mana whenua if they can be avoided (for the contamination risk if the pipe was to fail). – Although the contaminant loading in the shotover floodplain area will be reduced, this option just shifts the problem further away and is misaligned with the ki uta ki tai approach.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 4 – Land flow path to river a) Shotover	**FF**	– Disposal beds are in the floodplain. – Susceptible to sedimentation and clogging from floods, therefore not expected to be resilient to natural hazard events. – Inappropriate receiving environment.	**No score**	– No score, note that this option is eliminated from shortlisting.

Option	Score (Aukaha)	Rationale (Aukaha)	Score (TAMI)	Rationale (TAMI)
Option 4 – Land flow path to river b) Kawarau	FF	– Disposal beds are in the floodplain. – Susceptible to sedimentation and clogging from floods, therefore not expected to be resilient to natural hazard events. – Inappropriate receiving environment.	No score	– No score, note that this option is eliminated from shortlisting.
Option 5 – Deep well injections a) Frankton	-4	– The option may cause land instability. – Southern edge is close to Kawarau. – Highly sensitive to quality of injected water, so not as robust. – Potential to expand for population growth.	No score	– Further information gathered by the technical team to be completed before score can be assigned. – Highlighted in the workshop that insufficient information at this stage to assess this option.
Option 5 – Deep well injections b) Bridesdale	-3	– The option may cause land instability – Southern edge is close to Kawarau – Requires a river crossing – Highly sensitive to quality of injected water, so not as robust – Potential to expand for population growth – The land at Bridesdale is consented to divert Kawarau River flood flows for the purpose of flood hazard mitigation (RM18.238.02), therefore it is also assumed to be located in the floodplain. This is of concern to mana whenua and renders this location very similar to the BAU location in terms of suitability under a flood hazard event.	No score	– No score, note that this option is eliminated from shortlisting.
Option 6 – Shallow well injections a) Delta	FF	– Disposal beds are in the floodplain, misaligned with TMoTW – discharge to gravels under Kawarau River, – expected to interfere with GW, – the discharge ultimately flows into the Kawarau catchment without prior treatment by the ground, – diffuse discharge with rapid mixing in river, – knowledge gap.	No score	– No score, note that this option is eliminated from shortlisting.
Option 7 – Subsurface Wetland on a) Delta	FF	– Disposal beds are partially in the floodplain and are adjacent to the Kawarau. – Misaligned with mō tātou, ā, mō kā uri (pepeha) due to lack of flood resilience being situated in the floodplain, expected to need remedial works after flood. – Does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01. – Through a matauraka Māori lens, this is effectively BAU, the characteristics of the soils and the extra distance from the current disposal fields are not substantially different enough to classify this solution as distinct from the current disposal field. – The primary issue as per the KTKO NRMP 2005 is that this option is not providing adequate land-based treatment prior to reaching the receiving waterbody.	FF	– Further information gathered by the technical team to be completed before score can be assigned.

Option	Score (Aukaha)	Rationale (Aukaha)	Score (TAMI)	Rationale (TAMI)
Option 8 – Well Point or Soak holes a) Frankton	5	– There is potential to expand for population growth. This land use limits further urbanisation in an area that is already limited in how it can deal with wastewater, it is a safeguard for the health of the adjacent waterbodies for current and future generations. – The site is not in a flood prone location or expected to be destabilised with the disposal loading rates. – The contaminants are treated and disposed of in catchment. – The necessity for a pump-driven solution means that in the event on an emergency where power is out, the system will not be able to operate and will likely result in discharge to the current floodplain area.	5	– Further information gathered by the technical team to be completed before score can be assigned. – Highlighted in the workshop that insufficient information at this stage to assess this option.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best score (+5) and rationale:

- Option 8a – Well Point or Soak holes on the Frankton. Aukaha rationale is: The groundwater table is substantially deeper than any other considered, minimising the risk of aquifer or surface water contamination. There is an anticipated 28 - 30 m depth between the injection point and the groundwater table. Out of all options considered, this one is expected to have the least impact on the GW aquifer and on the adjacent surface water bodies and has the best alignment with mana whenua cultural practices, protocols and values around waste and water. TAMI did not provide a finalised score, and more information is required before the score can be completed.

Worse scores (fatally flawed):

- Option 1a – High-rate land disposal via Delta infiltration basins. Fatally flawed by both Aukaha and TAMI.
- Option 1b – High-rate land disposal via Delta trenches. Fatally flawed by both Aukaha and TAMI.
- Option 4a – Land flow path to Shotover River. This option was deemed fatally flawed by Aukaha. While TAMI did not provide a formal score due to the option being eliminated early, verbal feedback during the workshop indicated that they do not support it.
- Option 4b – Land flow path to Kawarau River. This option was deemed fatally flawed by Aukaha. While TAMI did not provide a formal score due to the option being eliminated early, verbal feedback during the workshop indicated that they do not support it.
- Option 6a – Shallow well injections on the Delta. This option was deemed fatally flawed by Aukaha. TAMI did not provide a formal score due to the option being eliminated early.
- Option 7a – Subsurface Wetland on the Delta. Fatally flawed by both Aukaha and TAMI. TAMI requires further information before their score can be completed.

4.4.3.2 Social and environmental factor 2

The social and environmental factor 2 is **cultural impacts to sites of significance and access to sites for cultural activities**. These scores were done by Aukaha and TAMI. Please note that TAMI was unable to provide scores for all options. The scores and rationale for each option, as defined by Aukaha and TAMI, are outlined in the following Table 10.

Table 10 MCA assessment - cultural impacts to sites of significance and access to sites for cultural activities

Option	Score (Aukaha)	Rationale (Aukaha)	Score (TAMI)	Rationale (TAMI)
Base case (as intended under consent conditions)	**FF**	– The current system does not consider effects from the discharge on mahika kai values. – The current system is incompatible with allowing mana whenua to exercise cultural practices around food gathering and inhibits traditional mana whenua associations with the area.	**FF**	
Base case (as disposal field is currently performing)	**FF**	– The current system does not consider effects from the discharge on mahika kai values. – The current system is incompatible with allowing mana whenua to exercise cultural practices around food gathering and inhibits traditional mana whenua associations with the area.	**FF**	
Option 1 – High-rate land disposal a) Delta infiltration basins	**FF**	– From a mana whenua perspective it is culturally unacceptable to dispose of wastewater to water bodies, especially so if those waterbodies served is mahika kai.	**FF**	– Understood this option is considered as fatally flawed.
Option 1 – High-rate land disposal b) Delta trenches	**FF**	– From a mana whenua perspective it is culturally unacceptable to dispose of wastewater to water bodies, especially so if those waterbodies served is mahika kai.	**FF**	– Understood this option is considered as fatally flawed.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	**+4**	– There are no river crossings, – a larger disposal area than the floodplain options, – the SE corner is close to the Kawarau, which drops the score unless it could be guaranteed that careful management of the disposal would ensure no riverbank streams emerging and coursing toward the Kawarau.	**+4**	– Further information gathered by the technical team to be completed before score can be assigned.
Option 2 – Moderate rate land disposal b) Southern corridor	**-3**	– There is a high risk of the disposal field ponding and causing runoff into the Kawarau which is effectively the same issue as is seen currently, which will have the same impact on the mahika kai sites and the mauri of the surface water bodies as the current site.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	**-3**	– There is a high risk of the disposal field ponding and causing runoff into the Kawarau which is effectively the same issue as is seen currently, which will have the same impact on the mahika kai sites and the mauri of the surface water bodies as the current site. – As there is a third site, the overall contaminant loading would be expected to be less, but still apparent.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	**-1**	– Although this option does not further degrade the waterways, and in theory shifts the discharge further away from the Kimiākau and Kawarau, it is not aligned with providing for those cultural practices and values to be realised in the receiving catchment.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 4 – Land flow path to river a) Shotover	**FF**	– From a mana whenua perspective it is culturally unacceptable to dispose of wastewater to water bodies, especially so if those waterbodies served is mahika kai.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 4 – Land flow path to river b) Kawarau	**FF**	– From a mana whenua perspective it is culturally unacceptable to dispose of wastewater to water	**No score**	– No score, note that this option is

Option	Score (Aukaha)	Rationale (Aukaha)	Score (TAMI)	Rationale (TAMI)
		bodies, especially so if those waterbodies served is mahika kai.		eliminated from shortlisting.
Option 5 – Deep well injections a) Frankton	**-3**	– No river crossings. – High risk potential for groundwater and surface water contamination if bore ruptures in seismic event. – Highly sensitive to quality of injected water, so not as robust.	**No score**	– Further information gathered by the technical team to be completed before score can be assigned – Highlighted in the workshop that insufficient information at this stage to assess this option.
Option 5 – Deep well injections b) Bridesdale	**-2**	– Highly sensitive to quality of injected water, so not as robust. – High risk potential for groundwater and surface water contamination if bore ruptures in seismic event. – Highly sensitive to quality of injected water, so not as robust.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 6 – Shallow well injections a) Delta	**FF**	– From a mana whenua perspective it is culturally unacceptable to dispose of wastewater to water bodies, especially so if those waterbodies served is mahika kai. This method is effectively the same as the BAU scenario.	**No score**	– No score, note that this option is eliminated from shortlisting.
Option 7 – Subsurface Wetland on a) Delta	**FF**	– From a mana whenua perspective it is culturally unacceptable to dispose of wastewater to water bodies, especially so if those waterbodies served is mahika kai. The extra distance through the wetland does not sufficiently alter the disposal route from a mana whenua perspective, and mana whenua preference is to take the disposal area out of the delta	**FF**	– Further information gathered by the technical team to be completed before score can be assigned.
Option 8 – Well Point or Soak holes a) Frankton	**+5**	– There are no river crossings, – This is seen as culturally appropriate disposal to land – This option would help restore the mauri of Kawarau and Kimiākau to allow safe re-establishment of mahika kai practices in the area – there is 28 - 30m depth before reaching the GW aquifer, which is through suitably permeable gravels	**+5**	– Further information gathered by the technical team to be completed before score can be assigned. – Highlighted in the workshop that insufficient information at this stage to assess this option.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best score (+5) and rationale:

- Option 8a – Well Point or Soak holes on the Frankton. Aukaha rationale is: There are no river crossings. This is seen as culturally appropriate disposal to land. This option would help restore the mauri of Kawarau and Kimiākau to allow safe re-establishment of mahika kai practices in the area. There is 28 - 30m depth before reaching the GW aquifer, which is through suitably permeable gravels. TAMI did not provide a finalised score, and more information is required before their score can be completed.

Worse scores (fatally flawed):

- Option 1a – High-rate land disposal via Delta infiltration basins. Fatally flawed by both Aukaha and TAMI.

- Option 1b – High-rate land disposal via Delta trenches. Fatally flawed by both Aukaha and TAMI.
- Option 4a – Land flow path to Shotover River. This option was deemed fatally flawed by Aukaha. While TAMI did not provide a formal score due to the option being eliminated early, verbal feedback during the workshop indicated that they do not support it.
- Option 4b – Land flow path to Kawarau River. This option was deemed fatally flawed by Aukaha. While TAMI did not provide a formal score due to the option being eliminated early, verbal feedback during the workshop indicated that they do not support it.
- Option 6a – Shallow well injections on the Delta. This option was deemed fatally flawed by Aukaha. TAMI did not provide a formal score due to the option being eliminated early.
- Option 7a – Subsurface Wetland on the Delta. Fatally flawed by both Aukaha and TAMI. TAMI requires further information to before their score could be completed.

4.4.3.3 Social and environmental factor 3

The social and environmental factor 3 is the **impacts to the surrounding environment**. The scores and rationale for each option are outlined in the following Table 11.

Table 11 MCA assessment - impacts to the surrounding environment

Option	Score	Rationale
Base case (as intended under consent conditions)	0	– Baseline
Base case (as disposal field is currently performing)	-3	– Minor change in biodiversity due to ponding of overflowing wastewater. – Dominance of particular water fowl species due to presence of ponding.
Option 1 – High-rate land disposal a) Delta infiltration basins	-2	– Removal of riverbank area as habitat. – Protection of Kawarau river bank from erosion.
Option 1 – High-rate land disposal b) Delta trenches	-2	– Removal of large area of delta as habitat. – Further changes in Shotover River flood plain and river bank as habitat. – Opportunity for establishment of habitat in reclaimed areas. – Protection of Kawarau river bank from erosion.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	+4	– Removal of DAD. – Airport has minimal current biodiversity or catchment benefit.
Option 2 – Moderate rate land disposal b) Southern corridor	+2	– Removal of DAD. – Use of existing pasture land.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	+2	– Removal of DAD. – Use of existing pasture land.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	0	– Large scale land disturbance and maintenance needs – Use of existing scrubland. – Support establishment of new biodiversity area.
Option 4 – Land flow path to river a) Shotover	0	– Removal of DAD. – Riverbank protection works. – Intermittent engineering of flow channel at point of discharge
Option 4 – Land flow path to river b) Kawarau	+2	– Removal of DAD. – Removal of existing vegetation and replacement with indigenous vegetation around promoting habitat.
Option 5 – Deep well injections a) Frankton	+3	– Removal of DAD. – No evidence of discharge and minimal footprint. – Further away from existing receiving water

Option	Score	Rationale
Option 5 – Deep well injections b) Bridesdale	+3	– Removal of DAD. – No evidence of discharge and minimal footprint. – Further away from existing receiving water
Option 6 – Shallow well injections a) Delta	+2	– Removal of DAD. – Erosion protection and buildings in riverbank areas for infrastructure.
Option 7 – Subsurface Wetland on a) Delta	+2	– Removal of DAD. – Removal of existing vegetation and replacement with indigenous vegetation around promoting habitat. – Further improvements to existing stormwater management.
Option 8 – Well Point or Soak holes a) Frankton	+3	– Removal of DAD. – No visual evidence of discharge and minimal footprint required from the well points or soak holes. – Further away from existing rivers

When evaluating this social and environmental factor, options that involved the removal of the existing disposal area (DAD) and had minimal impact on the immediate ecosystem and biodiversity were rated more favourably. Additionally, options that provided protection against erosion and supported the establishment of new habitats were preferred. However, options that resulted in ponding, overflow, or significant land disturbance were rated less favourably.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best score (+4) and rationale:

- Option 2a – Moderate rate land disposal to Airport: Removal of the DAD. Airport has minimal current biodiversity or catchment benefit.

Worse scores (-1) and rationale:

- Option 1a – High-rate land disposal via Delta infiltration basins: High-rate land disposal via Delta infiltration basins
- Option 1b - High-rate land disposal via Delta infiltration trenches: Removal of large area of delta as habitat. Further changes in Shotover River flood plain and riverbank as habitat. Opportunity for establishment of habitat in reclaimed areas. Protection of Kawarau riverbank from erosion.

4.4.3.4 Social and environmental factor 4

The social and environmental factor 4 is **the environmental impacts to surrounding catchment land, soil and groundwater**. The scores and rationale for each option are outlined in the following Table 12.

Table 12 MCA assessment - environmental impacts to surrounding catchment land, soil and groundwater

Option	Score	Rationale
Base case (as intended under consent conditions)	0	– Baseline.
Base case (as disposal field is currently performing)	-3	– Overflows having evident surface water quality influences.
Option 1 – High-rate land disposal a) Delta infiltration basins	+2	– Improved treatment. – Undetectable change in fully mixed Kawarau River (same as current receiving environment). – Reduced extent of influence.
Option 1 – High-rate land disposal b) Delta trenches	+2	– Improved treatment. – Undetectable change in fully mixed Kawarau River (same as current receiving environment). – Reduced extent of influence.

Option	Score	Rationale
Option 2 – Moderate rate land disposal a) Airport and vicinity area	+4	– Improved treatment. – Opportunity for significant inground treatment and long flow path to Kawarau River. – Very diffuse discharge. – Groundwater not currently used for supply.
Option 2 – Moderate rate land disposal b) Southern corridor	0	– Cut and carry nutrient removal. – Shallow groundwater promoting limited inground treatment and discharge to local stream may result in measurable changes in stream water quality. – Needs consideration of where is the receiving environment and benchmarking of stream to provide understanding.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	+3	– Improved treatment. – Some locations have limited capacity and close to river.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	+4	– Improved treatment.
Option 4 – Land flow path to river a) Shotover	+1	– Improved treatment. – Point source.
Option 4 – Land flow path to river b) Kawarau	+2	– Improved treatment. – Broad mixing zone.
Option 5 – Deep well injections a) Frankton	+3	– Improved treatment. – Absence of groundwater takes and immediate proximity to receiving environment. – Widespread injection (across Franklin) provides greater dispersion of injected water.
Option 5 – Deep well injections b) Bridesdale	+2	– Improved treatment. – Absence of groundwater takes and immediate proximity to receiving environment.
Option 6 – Shallow well injections a) Delta	+2	– Improved treatment. – Absence of groundwater takes and immediate proximity to receiving environment.
Option 7 – Subsurface Wetland on a) Delta	+3	– Improved treatment via Stage 3 upgrades & filtration upgrades. – Broad mixing zone. – Provides additional treatment through sub surface wetlands. – Further improvements to existing stormwater management.
Option 8 – Well Point or Soak holes a) Frankton	+3	– Improved treatment via Stage 3 upgrades & filtration upgrades. – Absence of groundwater takes and immediate proximity to receiving environment. – Additional inground treatment above water table.

When evaluating the options against this social and environmental factor the potential for effects to soil and groundwater as resources, and erosion effects. Options that provide improved treatment and had minimal impact on the receiving environment during and following construction, and the potential for future use of natural resources, were rated more favourably. Additionally, options that offered significant inground treatment and diffuse discharge were preferred. However, options that resulted in overflows or had evident surface water quality influences were rated less favourably.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best score (+4) and rationale:

- Option 2a – Moderate rate land disposal at the Airport: Improved treatment, opportunity for significant inground treatment and long flow path to Kawarau River, very diffuse discharge and groundwater not currently used for supply.

- Option 3 – Low-rate disposal to Doc land / Coronet peak: Improved treatment.

Worse score (0) and rationale:

- Option 2b – Moderate rate land disposal at the southern corridor: Cut and carry nutrient removal. Shallow groundwater promoting limited inground treatment and discharge to local stream may result in measurable changes in stream water quality. Needs consideration of where the receiving environment is and benchmarking of stream to provide understanding.

4.4.3.5 Social and environmental factor 5

The social and environmental factor 5 is **visual effects**. The scores and rationale for each option are outlined in the following Table 13.

Table 13 MCA assessment – visual effects

Option	Score	Rationale
Base case (as intended under consent conditions)	0	– 0, as the baseline option, and effluent disposal is below ground.
Base case (as disposal field is currently performing)	-3	– Compared to consented status quo of 0, large area of treated wastewater spread over the Delta not contained with some evidence of discolouration. – Visible discharge into Kawarau. – Increased gravel structure height.
Option 1 – High-rate land disposal a) Delta infiltration basins	-2	– Higher visible structure rip-wrap structure at end of Delta than 1(b), also visible to Kawarau River users.
Option 1 – High-rate land disposal b) Delta trenches	-2	– Higher visible structure at end of Delta, also visible to Kawarau River users. Will also require moving the training wall with higher visible effects on Shotover River.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	+2	– Construction phase visible effects for land occupiers and users within a publicly non-accessible area.
Option 2 – Moderate rate land disposal b) Southern corridor	-1	– Construction phase visible effects for land occupiers/users and change in use of land from farming to open space.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	-1	– Construction phase visible effects for neighbouring landowners and change in use of land from farming to open space.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	-3	– Construction phase substantial visible effects for public due to elevation of sites. – Long-term ongoing effects from potential slips and slow re-vegetation.
Option 4 – Land flow path to river a) Shotover	+2	– Can be designed to fit in with surrounding landforms, currently with minimal public access, no large structure required, other than some minor riprap at outlet, and DAD gets removed.
Option 4 – Land flow path to river b) Kawarau	+1	– Can be designed to fit in with surrounding land forms, require plantings/landform modification softening, no large structure required, other than some minor riprap at outlet, and DAD gets removed.
Option 5 – Deep well injections a) Frankton	+2	– Nothing visible after construction and located within non-publicly accessible area. No construction in Delta.
Option 5 – Deep well injections b) Bridesdale	+2	– Nothing visible after construction. No construction in Delta.
Option 6 – Shallow well injections a) Delta	+1	– Minor structures visible near Kawarau River after construction. Some headworks and construction phase visible.
Option 7 – Subsurface Wetland on a) Delta	+2	– Similar to Option 4b, require softening via plantings and landforms. Offset by additional aesthetic improvements by subsurface wetlands.

Option	Score	Rationale
Option 8 – Well Point or Soak holes a) Frankton	+2	– Similar to Option 5a, nothing visible after construction and located within non-publicly accessible area and no construction in Delta.

When evaluating the options against this social and environmental effect, options that had minimal visible impact after construction and could be designed to fit in with surrounding landforms were rated more favourably.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best score (+2) and rationale:

- Options 2a, 4a, 5a, 7a and 8a share common features in these options with removal of DAD, and disposal design in keeping with surrounding land use.

Worse score (-3) and rationale:

- Option 3a receives the lowest score associated with substantial visible effects during construction and ongoing operation.

4.4.3.6 Social and environmental factor 6

The social and environmental factor 6 is **amenity effects**. The scores and rationale for each option are outlined in the following Table 14.

Table 14 MCA assessment – amenity effects

Option	Score	Rationale
Base case (as intended under consent conditions)	0	– 0, as the baseline option.
Base case (as disposal field is currently performing)	-3	– Overland flows from the extended bund of the disposal field, impacting recreational use nearby.
Option 1 – High-rate land disposal a) Delta infiltration basins	-2	– Large infiltration basins create inaccessible structure at end of Delta, impacting recreational use nearby.
Option 1 – High-rate land disposal b) Delta trenches	-3	– Larger area with inaccessible structure at end of Delta for recreation users than 1(a), but some additional impact on access to Shotover River from moving training wall.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	+3	– Not located within publicly accessible recreation area. Delta remains free of any new structure.
Option 2 – Moderate rate land disposal b) Southern corridor	-1	– Not located within publicly accessible recreation area. Delta remains free of any new structure. However, amenity effect on land occupier (farmer) from use of their land for disposal field around their house, especially during construction.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	-1	– Not located within publicly accessible recreation area. Delta remains free of any new structure. However, amenity effect on neighbouring houses from use of the land for disposal field, especially during construction.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	-3	– Not located within current publicly accessible recreation area, but could limit ability for future recreation in these areas. Delta remains free of any new structure. However, construction phase potential nuisance dust effects due to size of sites and steepness of slope, long-term effects from potential slips, access to DoC land likely to be restricted.
Option 4 – Land flow path to river a) Shotover	+2	– The existing channel is mostly hidden and away from public areas, no large structure required, other than some minor riprap at outlet, and DAD gets removed.
Option 4 – Land flow path to river b) Kawarau	+1	– Can be designed to fit in with surrounding land forms, no large structure required, other than some minor riprap at outlet, and DAD gets removed. Compared to 4(a) within more accessible area.

Option	Score	Rationale
Option 5 – Deep well injections a) Frankton	+3	– Nothing limiting recreational use after construction and located within non-publicly accessible area. No new structure added to Delta.
Option 5 – Deep well injections b) Bridesdale	+3	– Nothing visible after construction and area returns to be available for public recreation. No new structure added to Delta.
Option 6 – Shallow well injections a) Delta	+2	– Minor structures visible near Kawarau River after construction. Some headworks and construction phase visible.
Option 7 – Subsurface Wetland on a) Delta	+1	– Compared to 4(a), the lower score reflects the constructed wetland could taking away the access roads and areas in Delta, whilst can be designed to fit within the surrounding land forms.
Option 8 – Well Point or Soak holes a) Frankton	+3	– Similar to Option 5(a), no new structure added to Delta.

When evaluating the options against this social and environmental effects, options that had minimal impact on recreational use, or enabled enhanced recreational use of the Delta and could be designed to fit in with surrounding land forms were rated more favourably. Options that could create difficulties for publicly accessible areas, nuisance dust and noise effects, or significant amenity impacts during the construction and operation phase were rated less favourably.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best scores (+3) and rationale:

- Options 2a, 5a, 5b and 8a share common features that the new disposal infrastructure will be located outside of Delta, in areas currently not for public access and less disruption to nearby neighbours during construction and operation phase.

Worse scores (-3) and rationale:

- Options 1a, 1b and 3a could cause significant inconvenience and disruption to neighbours over the construction and operation phase. In particular the construction of infiltration basin and disposal trenches could impede and reduce recreation access in the Delta.

4.4.4 Critical success factors

4.4.4.1 Critical success factor 1

The critical success factor 1 is **constructability and technical feasibility**. The scores and rationale for each option are outlined in the following Table 15.

Table 15 MCA assessment - constructability and technical feasibility

Option	Score	Rationale
Base case (as intended under consent conditions)	0	– Using 0 as the baseline which assumes the DAD field is functioning correctly.
Base case (as disposal field is currently performing)	-3	– Not satisfactory operation, require routine clearing and silt removal. Performance expected to deteriorate and require higher maintenance over time if kept.
Option 1 – High-rate land disposal a) Delta infiltration basins	-3	– Large construction area requiring significantly large quantity of gravel/cobbles to raise the required area for forming the infiltration basins.
Option 1 – High-rate land disposal b) Delta trenches	-3	– Large construction area requiring large quantity of gravel/cobbles to raise the required area for forming the trenches.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	-4	– Complexity in construction methodology in a prolonged construction period to reduce disruption to the airport operation.
Option 2 – Moderate rate land disposal b) Southern corridor	-4	– Technical challenges including presence of glacial till and shallow groundwater would add considerably complexity in this option.

Option	Score	Rationale
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	**-5**	– Technical complexity associated with disconnected land parcels over dispersed area, significant unknowns, low-lying in part of Bridesdale area, as well as higher operational and maintenance input for assets located far away from the WWTP.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	**-5**	– Partial/seasonal disposal option only, also require very large area due to steep topography. These significantly affect the feasibility of this option.
Option 4 – Land flow path to river a) Shotover	**+1**	– Comparably simple to build and operate, by reinstating the historical discharge channel with some modifications (e.g. new gravel) for land contact, channel discharge end may require maintenance after future major floods.
Option 4 – Land flow path to river b) Kawarau	**+2**	– Comparably simple to build and operate, feasible to provide land contact before dispersing into the river. – May require gravel replacement/addition after future major flood events.
Option 5 – Deep well injections a) Frankton	**No score**	– No score, technical feasible based on current knowledge of aquifer (e.g. groundwater table > 40m deep), require field investigation to confirm location and rates.
Option 5 – Deep well injections b) Bridesdale	**No score**	– No score, very limited knowledge about the site (not carried forward in the workshop).
Option 6 – Shallow well injections a) Delta	**No score**	– No score, limited knowledge of the site-specific details to understand if it is feasible (not carried forward in the workshop).
Option 7 – Subsurface Wetland on a) Delta	**+2**	– Share a lot of common features as Option 4(a) Land contact provided by both subsurface wetland and the land flow path.
Option 8 – Well Point or Soak holes a) Frankton	**No score**	– No score, technical feasible based on current knowledge of aquifer (e.g. groundwater table > 40m deep), require field investigation to confirm soil profile and rates (technical field investigation to be carried out).

When evaluating the options against this critical success factor, higher scores were assigned to options offering simpler construction, fewer maintenance requirements, and good integration with existing landforms were rated more favourably. On the other hand, options that involved complex construction planning and sequencing, significant disruption to existing land uses were given low scores.

Several options (e.g. deep and shallow well injections), marked with * in the table, were not scored as they would require further technical investigations to confirm some of the site specific key parameters.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best Scores (+2) and Rationale:

- Options 4b and Option 7a both share common features of construction of land flow path near the Kawarau River, which is comparatively simpler in construction and operation than other disposal options.

Worst Score (-5) and Rationale:

- Options 2c and Option 3 were given lowest score as they are considered significantly more challenging than the other long list options.

4.4.4.2 Critical success factor 2

The critical success factor 2 is: **sustainability - carbon emissions and sustainable use of resources** supporting organisational goals. The scores and rationale for each option are outlined in the following Table 16.

Table 16 *MCA assessment - sustainability - carbon emissions and sustainable use of resources supporting organisational goals*

Option	Score	Rationale
Base case (as intended under consent conditions)	0	– Using 0 as the baseline which assumes the DAD field is functioning correctly.
Base case (as disposal field is currently performing)	-2	– Requires a continued supply of fresh gravel, and removal & disposal of excavated materials (including transport).
Option 1 – High-rate land disposal a) Delta infiltration basins	-3	– Very large quantity of gravel/cobbles required for the infiltration basin formation, and the associated construction activities.
Option 1 – High-rate land disposal b) Delta trenches	-3	– Very large quantity of gravel/cobbles required for the disposal trench construction and the amount of disturbance.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	-2	– Large quantity of gravel required, significant construction activities across a large area.
Option 2 – Moderate rate land disposal b) Southern corridor	-4	– Requires a long pipeline and a bridge to the new site in addition what's needed in Option 2(a). Also, significant operating cost associated with effluent transfer and pumping.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	-5	– Require long pipeline and multiple bridges to the new site in addition what's needed in Option 2(a) in a large geographical area. Also significant operating cost associated with effluent transfer and pumping.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	-4	– Large construction activities and disruption associated with construction/establishing the irrigation fields and long rising main. Also has a significant operating cost associated with effluent transfer and pumping.
Option 4 – Land flow path to river a) Shotover	+2	– Significantly less earthwork and routine maintenance work than current disposal operation.
Option 4 – Land flow path to river b) Kawarau	+1	– Less earthwork and routine maintenance than current operation.
Option 5 – Deep well injections a) Frankton	-1	– Effluent pumping and pipeline, in addition to increase of operating cost associated with pumping and cleaning.
Option 5 – Deep well injections b) Bridesdale	-3	– Compared to Option 5(a), the pumping distance is further away and large construction.
Option 6 – Shallow well injections a) Delta	-1	– Energy usage associated with pumping, and cleaning chemical used.
Option 7 – Subsurface Wetland on a) Delta	-1	– Compared to Option 4(a), higher quantity of gravels and materials for the construction of subsurface wetlands.
Option 8 – Well Point or Soak holes a) Frankton	-1	– Similar to Option 5(a), effluent pumping and pipeline, construction and operation phases.

When evaluating the options on this critical success factor, options that required less earthworks, fewer material volumes, and less ongoing maintenance were rated more favourably. In contrast, several options with significantly higher construction materials (e.g. pipeline, trenches and gravels) were given much lower scores. These options were seen as less sustainable.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best Scores (+2) and Rationale:

- Option 4a receives the highest score on the basis, it requires the least amount of construction materials and comparatively lower increase of operational costs.

Worst Score (-5) and Rationale:

- Option 2c was given the lowest score as it not only would require significantly large quantity of construction materials including new bridge(s) to access the site (outside of the project scope, but would involve other government agencies) to provide funding for the other infrastructure (e.g. bridges).

4.4.4.3 Critical success factor 3

The critical success factor 3 is the **operational reliability and maintainability**. The scores and rationale for each option are outlined in the following Table 17.

Table 17 MCA assessment - operational reliability and maintainability

Option	Score	Rationale
Base case (as intended under consent conditions)	-1	– Not much consideration in maintenance access in the initial design.
Base case (as disposal field is currently performing)	-3	– Operability is not satisfactory and requires regular clearing and silt removal. Management and disposal cost associated with this option, and this would increase over time if retain.
Option 1 – High-rate land disposal a) Delta infiltration basins	0	– Similar to original DAD concept with maintenance allowance.
Option 1 – High-rate land disposal b) Delta trenches	0	– Similar to original DAD concept with maintenance allowance.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	-2	– Much more O&M effort to operate and maintain for 75-90 ha area, and the need of planning around flight schedules for major maintenance activities due to proximity to the airport.
Option 2 – Moderate rate land disposal b) Southern corridor	-1	– Require more O&M effort to operate and maintain for 75-90 ha area, especially the site is quite far away from the WWTP. O&M activities all on the same/adjacent land parcels.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	-3	– Much more O&M effort than current operation, more pumping, conveyance and effluent disposal assets to inspect, operate and maintain scattered over a large geographic area.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	-4	– Considerable complex challenge and O&M complexity due to remoteness of the irrigation field, harsh environment and the large area coverage (~500ha).
Option 4 – Land flow path to river a) Shotover	+2	– Simpler operation as periodic gravel replacement is not needed.
Option 4 – Land flow path to river b) Kawarau	+1	– Simpler operation, require rock replacement/renewals after future flood events.
Option 5 – Deep well injections a) Frankton	-2	– On the basis of external specialist maintenance contractor required, and access to QAC land.
Option 5 – Deep well injections b) Bridesdale	-2	– On the basis of external specialist maintenance contractor required.
Option 6 – Shallow well injections a) Delta	-2	– On the basis of external specialist maintenance contractor required.
Option 7 – Subsurface Wetland on a) Delta	+1	– Considerable simpler operation, require rock replacement/renewals after future flood events only for the area near the Kawarau River.
Option 8 – Well Point or Soak holes a) Frankton	-2	– On the basis of large number of soakholes/wells (>50) require inspection and maintenance.

When evaluating the options based on this critical success factor, those that offered simpler, more centralized operations with minimal ongoing maintenance were rated more favourably. In contrast, options that involved remote locations, complex irrigation systems, or specialist maintenance requirements were given lower scores.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best Scores (+2) and Rationale:

- Option 4a was assigned with the highest score as the operation and maintenance is simpler than current.

Worst Scores (-4) and Rationale:

- Option 3a was given the lowest score as the remoteness, the topography and the large irrigation area adds significant complexity and effort needed to operate and maintain any new assets.

4.4.4.4 Critical success factor 4

The critical success factor 4 is **property difficulties and impacts**. The scores and rationale for each option are outlined in the following Table 18.

Table 18 MCA assessment - property difficulties and impacts

Option	Score	Rationale
Base case (as intended under consent conditions)	**0**	– 0, as the baseline option.
Base case (as disposal field is currently performing)	**0**	– 0, as the baseline option, minimal footprint increase.
Option 1 – High-rate land disposal a) Delta infiltration basins	**-2**	– Major disruption to publicly accessible area.
Option 1 – High-rate land disposal b) Delta trenches	**-2**	– Major disruption to publicly accessible area.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	**-4**	– Expect to be very difficult to obtain all required lands. Potential interference and conflict with existing land use/proposed developments.
Option 2 – Moderate rate land disposal b) Southern corridor	**-3**	– Difficult land access and impact on existing land use (farming).
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	**-3**	– Potential unsuitable for effluent disposal purpose, conflict with proposed land use change (large housing development) creating difficulties to obtain all required lands.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	**-3**	– Landscape is not suitable for irrigation, potential run off and landslip risks. Obtain land access/permit to use is expected to be challenging.
Option 4 – Land flow path to river a) Shotover	**0**	– Same as baseline.
Option 4 – Land flow path to river b) Kawarau	**0**	– Same as baseline.
Option 5 – Deep well injections a) Frankton	**-1**	– Anticipate some difficulties, due to interference with existing/proposed land use.
Option 5 – Deep well injections b) Bridesdale	**-1**	– Complication with land ownership associated with pipework access (new bridges or road corridors in built-up areas).
Option 6 – Shallow well injections a) Delta	**0**	– Same as baseline.
Option 7 – Subsurface Wetland on a) Delta	**0**	– Same as baseline.
Option 8 – Well Point or Soak holes a) Frankton	**-1**	– Similar to Option 5(a).

When evaluating the options based on this critical success factor, the options that did not require new land acquisition or posed minimal interference with existing land uses were rated more favourably. Options located on or near the existing Delta site (e.g., shallow well injections, subsurface wetlands, and land flow paths) were generally rated neutral (score of 0), reflecting their alignment with the baseline in terms of land access.

On the other hand, options that required significant land acquisition, had difficult access, or posed landscape challenges—such as steep terrain or risk of runoff and landslips were rated with low scores.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best Scores (0) and Rationale:

- Options 4a, 4b, 6a and 7a were assigned as zero, same as the baseline, on the basis that these options will place the disposal infrastructure on existing public land at the Delta. They do not require any land access or acquisition negotiation, which could add complexities and delays to the project investigation and implementation phases.

Worst Scores (-4) and Rationale:

- Option 2a was assigned with the lowest score as the land area requirements for moderate rate disposal is likely to conflict with existing land uses and proposed development.

4.4.4.5 Critical success factor 5

The critical success factor 5 is the **implementation timeline**. The scores and rationale for each option are outlined in the following Table 19.

Table 19 MCA assessment - implementation timeline

Option	Score	Rationale
Base case (as intended under consent conditions)	0	– 0, as the baseline option.
Base case (as disposal field is currently performing)	-5	– Not viable option and unacceptable long term, performance issue not addressed.
Option 1 – High-rate land disposal a) Delta infiltration basins	-2	– Extended disruption period due to construction activities, and completion in 2028-2029 at the earliest.
Option 1 – High-rate land disposal b) Delta trenches	-2	– Extended disruption period due to construction activities, the need of relocating the training line, and completion in 2028-2029 at the earliest.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	-2	– Extended disruption period due to construction activities, plus negotiation with landowners. Completion in 2029 at the earliest.
Option 2 – Moderate rate land disposal b) Southern corridor	-4	– Significant complexity associated with co-ordination with other agencies (for uses of the new bridge) and other approvals required. Completion date could be beyond 2030.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	-5	– Significant complexity associated with co-ordination with other agencies (for uses of the new bridges) and other approvals required. More complex than Option 2(b), completion date likely beyond 2030.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	-2	– Complexity and disruption in design and construction, completion in 2029 at the earliest.
Option 4 – Land flow path to river a) Shotover	+1	– Comparatively simpler implementation for the channel modification to resolve current situation, possibly complete in 2027-28.
Option 4 – Land flow path to river b) Kawarau	+1	– Similar reason to Option 4 (a).
Option 5 – Deep well injections a) Frankton	-2	– Detailed field investigation before consent application is highly desired, completion date in 2028-29.
Option 5 – Deep well injections b) Bridesdale	-5	– Similar to Option 2(c), significantly more complex co-ordination and project implementation challenges, likely complete after 2030. Also require detailed field investigation to support consent application as in Option 5(a).
Option 6 – Shallow well injections a) Delta	-2	– Detailed field investigation before consent application is highly desired, completion date in 2028-29.
Option 7 – Subsurface Wetland on a) Delta	0	– Comparatively less complex implementation as in Option 4(a), possibly complete in 2028.
Option 8 – Well Point or Soak holes a) Frankton	-2	– Similar to Option 5(a) and 6, detailed field investigation before consent application is highly desired, completion date in 2028-29.

When evaluating the options based on this critical success factor, those that could be implemented quickly and complete before 2027-28 (on the most optimistic timeline, assuming no consent hearing or other delays) were

given a score of +1. Options with more complex implementation hurdles and challenges were given -2, assuming they could be implemented between 2028 to 2030, to reflect the longer timeframe needed. Options that cannot be completed until after 2030 due to significantly higher complexity involving co-ordination and seeking support from other funding agencies were given a score of -4 or -5 to reflect the extended time for the current situation to continue.

It should be noted that the above timeframes (for the purpose of implementation timeline scoring) are based on no consent hearing and construction taking between 6 to 18 months depending on complexity. However, the timeline could be extended subject to further technical investigations, consent strategy, changes of planning regulations, extended community consultation, consent hearing and other factors that cannot be reasonably foreseen when the long list options were assessed.

A summary of the key scores (best and worse) are outlined below, excluding the base case scores:

Best scores (+1) and rationale:

- Options 4a and 4b – these two land flow path options would have the shorter implementation timeframe than other options on the long list.

Worst scores (-5) and rationale:

- Options involved construction of new bridges to Southern Corridor or Bridesdale/areas across the Kawarau River (Options 2b, 2c and 5b) are expected to incur significant challenges to seek funding and approval to implement these options. It could take a very long time for these options to come to realisation if they are selected to proceed.

4.4.4.6 Costs and affordability

The final critical success factor is the **costs and affordability** of the option. When evaluating the options based on the cost and affordability, the following scoring scales were used (see Table 20).

Table 20 Table of score and cost range

Score	Criteria
+5	Does not incur any capital investment
+4	Upper bound of cost range is less than $15M
+3	Upper bound of cost range is less than $30M
+2	Upper bound of cost range is less than $45M
+1	Upper bound of cost range is less than $60M
0	Upper bound of cost range is less than $77M (i.e. within the current LTP budget allowance)
-1	Upper bound of cost range is less than $90M
-2	Upper bound of cost range is less than $100M
-3	Upper bound of cost range is less than $120M
-4	Upper bound of cost range is less than $150M
-5	Upper bound of cost range is greater than $150M

The scores and rationale for each option are outlined in the following Table 21.

Table 21 MCA assessment – cost and affordability

Option	Score	Rationale
Base case (as intended under consent conditions)	**0**	– 0, as the baseline option.
Base case (as disposal field is currently performing)	**-3**	– The current setup requires routine clearing and silt removal. Management and disposal cost associated with this option.
Option 1 – High-rate land disposal a) Delta infiltration basins	**-4**	– Estimated CapEx will exceed the current LTP budget provision.
Option 1 – High-rate land disposal b) Delta trenches	**-5**	– Estimated CapEx significantly exceeds the current LTP budget provision.
Option 2 – Moderate rate land disposal a) Airport and vicinity area	**-5**	– Estimated CapEx exceeds the current LTP budget provision, after factoring in land purchase.
Option 2 – Moderate rate land disposal b) Southern corridor	**-3**	– Estimated CapEx could exceed the current LTP budget provision.
Option 2 – Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	**-5**	– Estimated CapEx significantly exceeds the current LTP budget provision.
Option 3 – Low-rate disposal a) Doc land / Coronet peak	**-5**	– Estimated CapEx significantly exceeds the current LTP budget provision.
Option 4 – Land flow path to river a) Shotover	**+2**	– Estimated CapEx is less than the current LTP budget provision.
Option 4 – Land flow path to river b) Kawarau	**+2**	– Estimated CapEx is less than the current LTP budget provision.
Option 5 – Deep well injections a) Frankton	**0**	– Estimated CapEx is around the current LTP budget provision, excluding land purchase.
Option 5 – Deep well injections b) Bridesdale	**-2**	– Estimated CapEx could exceed the current LTP budget provision.
Option 6 – Shallow well injections a) Delta	**+1**	– Estimated CapEx is within the current LTP budget provision.
Option 7 – Subsurface Wetland on a) Delta	**0**	– Estimated CapEx is around the current LTP budget provision.
Option 8 – Well Point or Soak holes a) Frankton	**0**	– Estimated CapEx is around the current LTP budget provision, excluding land purchase.

The better scores in Options 4a and 4b reflect the expected lower capital cost than other options.

The cost ranges presented in this report should be treated as indicative values only. The estimates were developed based on very limited information available at the time, and some of the options including injection wells, deep/shallow bore injection, wetlands/land flow paths are subjected to further technical investigations and concept design development in the subsequent phases.

4.5 Long list assessment summary

Following the long list MCA assessment and workshop discussions, the long list options have been refined to five options to carry forward to the short list stage.

The long list options which been excluded from advancing to the short list stage are outlined in Table 22 below. The key rationale for options being discontinued relate to high cost, social and technical feasibility reasons at the sites assessed, as outlined in the assessment results in Section 4.4.

Table 22 Summary of options and shortlisted progression

Option	Shortlist progression	Justifications / Reasons
Option 1 - High-rate land disposal a) Delta infiltration basins	Not progressed to short list	This option is **not progressed to short list** based on the following reasons: – It would remove a significant area in the Delta impacting recreation users, also has a high visual effect – It would require an excessive amount of materials for construction of the infiltration basin – The implementation cost will likely exceed the LTP current budget provision – Aukaha and TAMI considered this option is culturally fatally flawed due to its location.
Option 1 - High-rate land disposal b) Delta trenches	Not progressed to short list	This option is **not progressed to short list** based on the following reasons: – It would remove a significant area in the Delta impacting recreation users, also has a high visual effect – It would require an excessive amount of materials for construction of the infiltration basin – The implementation cost is expected to be significantly higher than the LTP current budget provision – Aukaha and TAMI considered this option is culturally fatally flawed due to its location.
Option 2 - Moderate rate land disposal a) Airport and vicinity area	Carried forward to the short list.	This option is **carried forward** based on the following reasons: – Strong support from TAMI and Aukaha (Option 2a here was originally the highest scoring, but became second highest scoring after the addition of option 8a) – Better visual and amenity effect as the disposal field will be removed from the Delta. However, this option is likely to be severely constrained by land access or availability (potential conflict with planned development/land use) and very high capital cost. As a result, it was agreed during the MCA workshop to carry forward this option, for further investigation and discussion with landowners in the Frankton Flat area.
Option 2 - Moderate rate land disposal b) Southern corridor	Not progressed to short list	This option is **not progressed to short list** based on the following reasons: – Technical challenges associated with shallow groundwater and presence of glacial till – Complexity and uncertainties added by the new bridge and landuse permission under QE II covenant on the land – The implementation cost is likely to exceed the LTP current budget provision.
Option 2 - Moderate rate land disposal c) Alternate locations across the Shotover or Kawarau River	Not progressed to short list	This option is **not progressed to short list** based on the following reasons: – Technical challenges and uncertainties due to dispersed land parcels across a large area, conflict with planned development and low-lying in part of Bridesdale site – Complexity and uncertainties added by the requirement of new bridges/access, possible land acquisition, and impact on implementation timeline – The implementation cost is likely to significantly exceed the LTP current budget provision.
Option 3 – Low-rate land disposal a) Doc land / coronet peak	Not progressed to short list	This option is **not progressed to short list** based on the following reasons: – Technical solution only functions during certain times of the year, with seasonal limitations due to frost/snow in winter months

Option	Shortlist progression	Justifications / Reasons
		– Significant concerns about suitability of irrigation are due to steep topography, surface run-off, and low operability of very large irrigation area (~500ha) – The implementation cost is likely to significantly exceed the LTP current budget provision – As a supporting solution it would be costly and impractical only operating part of the year.
Option 4 – Land flow path to river a) Shotover	Not progressed to short list	This option is culturally unacceptable as it is culturally considered a direct discharge to the river. This option is similar to option 4b but is considered less favourable due to lower and less consistent river flows and is therefore **not progressed to short list**.
Option 4 – Land flow path to river b) Kawarau	Carried forward to the short list.	Option 4b was initially not progressed past the Long List selection in the MCA assessment as the cultural impacts of this are evaluated as fatally flawed by Aukaha or TAMI. After the long list workshop this option was added into the short list at the request of the QLDC and following discussions with the project team. The intention of this is to include an option that complies with the proposed national wastewater environmental performance standards from Taumata Arowai, which are planned to be implemented in August 2025. There is an expectation within QLDC and the QLDC Councillors that an option that meets these impending standards is included in the short list to allow them a full understanding of what the benefits, risks and implications of such an option would be if undertaken. It is expected that Option 4b or a similar version of this option will be able to meet these upcoming standards and will provide a comparator as a 'Do Minimum' that complies with the latest environmental standards. Other benefits for this option include: – Broad mixing zone at the receiving environment – Modest capital expenditure – Implementation timeline is relatively clear and short.
Option 5 – Deep well injections a) Frankton	Carried forward to the short list.	This option is **carried forward** based on the following reasons: – Discharge of treated effluent is not within the Delta – Bore injections have been used in other sectors and overseas for treated effluent disposal – Within the LTP budget allowance (assuming no land acquisition required). Whilst it was agreed during the MCA workshop to carry forward this option, Aukaha and TAMI indicated that more information is needed to inform a cultural assessment during the shortlist assessment stage. Additionally, field investigations need to take place to understand site specific parameters to develop the concept design and more accurate cost estimates to confirm the viability of this option.
Option 5 – Deep well injections b) Bridesdale	Not progressed to short list	This option is **not progressed to short list** based on the following reasons: – Complexity and uncertainties added by the requirement of new bridges/access, possible land acquisition, and impact on implementation timeline – The implementation cost is likely to exceed the LTP current budget provision – Similar comments raised by TAMI and Aukaha as in Option 5a, as well as the Bridesdale area being a noted flood prone area
Option 6 – Shallow well injections a) Delta	Not progressed to short list	This option is **not progressed to short list** based on the following reasons: – Is considered to have similar cultural impacts as Option 4a/4b but with additional capital and ongoing costs – Compared to Option 5a, the effluent disposal is more directly connected to the surface water and is not considered to have land contact. This option is considered by Aukaha and TAMI to be culturally fatally flawed.
Option 7 – Subsurface Wetland a) On Delta	Carried forward to the short list.	This option was discussed during the MCA workshop and agreed to be **carried forward** for refinement.

Option	Shortlist progression	Justifications / Reasons
		Option 7a is similar to Option 4b but includes a subsurface wetland prior to the land flow path to the Kawarau River. Constructed wetlands provide additional treatment and potential amenity and ecological benefits. Option 7a is considered fatally flawed from a cultural perspective by Tami and Aukaha. However, due to the existing infrastructure on the Shotover Delta, existing QLDC land and designations, an option to discharge on the Delta is required to be taken through to the short list for development and comparison. Option 7a, with the inclusion of a sub-surface wetland was considered a more favourable alternative than just option 4a or b. Option 7a was discussed at the workshop held 13/3/25 and agreed to be carried forward as a short list option, with updated description and scoring provided following the Long List Assessment Workshop.
Option 8 – Well Point injection / Soakholes	Carried forward to the short list.	This option was discussed and agreed to be refined during the MCA workshop and agreed to be **carried forward** to the short list for the following reasons: – Positive score from Aukaha as the effluent disposal will receive in-ground treatment – Discharge of treated effluent is not within the Delta – Injection wells/soakholes have been used in other sectors and overseas for treated effluent disposal – Likely to be within the LTP budget allowance (assuming no land acquisition required) Similar to Option 5a, further field investigations are necessary to refine the feasibility and understanding of this option. Moreover, this option will involve a higher number of disposal wells than Option 5a and therefore the land availability may become a constraint.

5. Summary and next steps

This section summarises the short-listed options and the next steps recommended following the MCA workshop.

5.1 Proposed short list options

Following the long list MCA assessment and workshop, four proposed short list options were identified for further development and assessment.

A fifth option was added to the short list at the request of the QLDC Project Manager and Sponsor. The intention of this is to include an option that complies with the proposed national wastewater environmental performance standards from Taumata Arowai, which are planned to be implemented in August 2025. It is expected that this option will be similar to Option 4b – Land Flow Path to the Kawarau River and will provide a comparator as a 'Do Minimum' that complies with the latest environmental standards. Option 4b was not progressed past the Long List assessment as the option was considered fatally flawed from a cultural perspective as evaluated by Aukaha and TAMI.

As of 31st March 20205, QLDC has diverted the treated effluent discharge into the channel northeast of the DAD field. This current discharge will become a "Base Case/Do Nothing" option for future options analysis.

5.1.1 Shortlisted options

The following list outlines the shortlisted options, where the Base Case option is required as part of the business case.

- Base Case
- Option A – Do Minimum (Option 4a) – Land flow path to Kawarau River
- Option B (Option 7a) – Wetlands and land flow path to Kawarau River
- Option C (Option 2a) – Moderate rate land disposal to Airport and surrounding area
- Option D (Option 5a) – Deep well injections at Frankton
- Option E (Option 8a) – Well point injection at Frankton

5.2 Next steps

The project team will continue to develop and investigate the short listed options based on the descriptions detailed above. Specific actions captured from of the MCA assessment workshop process, include:

- Update population projections to match the latest data, as this could affect the sizing and requirements for options.
- Continue the investigations for the bore injection options.
- Refine the required areas and potential for each option
- Provide more detail on the deep well injection and well point requirements.
- Confirm the retention time for the wastewater discharge for Option 7a.
- Check the district plan and airport designation and confirm plants we use do not attract birds for the wetland option within the airport approach path.

A future workshop will be held with GHD, QLDC, Aukaha, TAMI and key stakeholders to consider and assess the short list options against the full MCA framework. This will be to determine a recommended option to progress for further development and assessment.

The process for the next steps for the project is summarised below and in Figure 20:

- Scope the investigation requirements for each short listed option
- Review gap analysis

- Undertake field investigations, environmental modelling, and technical analysis resulting from the information gathered
- Prepare concepts, layouts, and more detailed cost estimates for each option
- Undertake a risk and opportunities assessment of the short listed options
- Prepare and hold an option selection workshop in person with GHD, QLDC, Aukaha, TAMI and key stakeholders
- Finalise reporting of the preferred option selection process
- Prepare Business Case for the preferred option
- Undertake a Safety in Design workshop for the preferred option
- Prepare for the preliminary design and consenting process.

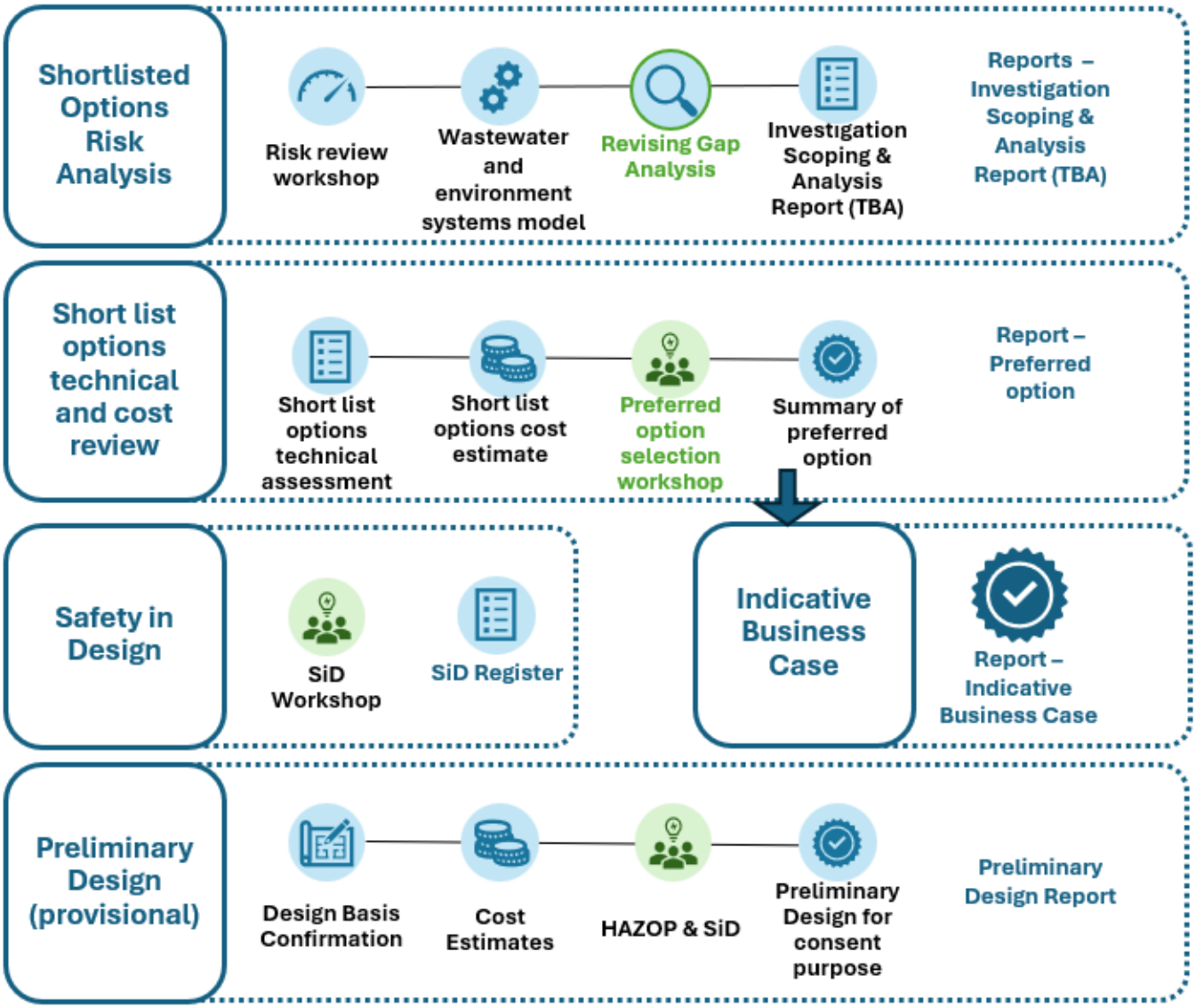

Figure 20 Short list option development methodology

Appendices

Appendix A

Long List Options MCA Scoresheet

Multi Criteria Assessment - Criteria

Options

Investment Objectives	KPIs	Scoring Lead	Option	Score	Key considerations	Assumptions	Rationale for scoring
The health and well-being of the surrounding waterways are maintained, protected and improved where practicable to support water quality.	• Ecosystem / Aquatic health effects. • Human health effects. • Nuisance growth. • Recreation impacts.	Anthony Kirk	Base Case (as intended under consent conditions)	0	-Disposal to ground, providing in ground treatment. -Groundwater flow path of approx. 400m. -Diffuse discharge to Kawarau River.	-Entirely subsurface flow. -Expandable to accommodate increases in flow or reduction in infiltration capacity. -Current level of treatment.	
			Base Case (as disposal field is currently performing)	-4	-Treated wastewater on surface water quality -Occurrence of algal growth -Influence on trophic state	-As evidenced during site inspection by GHD.	--Overflow and ponding of treated wastewater in downgradient areas --Daylighting of impacted groundwater and overland flow when GW levels are high --Discolouration and algal growth in discrete channels, and downgradient flow paths --Potential human health risks
			1 a) High-rate land disposal by delta infiltration basins	2	- Adjacent to receiving environment. - broad mixing zone. - minimal potential for public contact. - Potential for discrete areas of algal growth.	-Filtration upgrade at WWTP. -Engineered to accommodate future flows.	--Improved level of treatment, lower nutrient load --Minimal public contact --Potential for minor daylighting of discharges at rivers edge during high groundwater levels
			1 b) High-rate land disposal by delta trenches	3	- Adjacent to receiving environment. - Broad mixing zone. - Minimal potential for public contact. - Potential for discrete areas of algal growth.	-Filtration upgrade at WWTP. -Engineered to accommodate future flows. -Sufficient space to provide surface.	--Improved level of treatment, lower nutrient load --Minimal public contact --Diffuse discharge across extent of Kawarau River bank --Less likely to daylight at rivers edge
			2 a) Moderate rate land disposal to Airport	4	-Removal from sensitive water environment and public access.	-Filtration upgrade at WWTP. -Land access. -Geological conditions are amenable to disposal.	--Improved level of treatment, lower nutrient load --Significant inground treatment due to depth to GW --Broad diffuse discharge to Kawarau
			2 b) Moderate rate land disposal to Southern Corridor	0	-Uncertainty regarding receiving environment. -Limited potential for public access.	-Filtration upgrade at WWTP. -Land access. -Geological conditions are amenable to disposal.	--Improved level of treatment, lower nutrient load --Moderate inground treatment --Cropping opportunity --Localised influence on stream and inflow to Kawarau River. --Significant disturbance to access in the area
			2 c) Moderate rate land disposal to alternate locations across the Shotover or Kawarau	3	- Broad distribution of wastewater across multiple sites.	-Filtration upgrade at WWTP. -Shallower groundwater levels relative to Frankton terrace. -Two parcels of land in close proximity to Kawarau River and with limited infiltration capacity. -Land Access.	--Improved level of treatment, lower nutrient load --Moderate inground treatment for some areas --Distributed irrigation provides more diffuse impact on GW and water quality
			3 a) Low rate land disposal - irrigation to Doc land and/or Coronet Peak	4	-Very broad distribution of wastewater at low rates. -Low potential for leaching or impacts to water.	-Filtration upgrade at WWTP. -Only suitable for seasonal operation (a part solution). -Tree plantings. -Geology suitable for installation and irrigation.	--Significant removal of wastewater from immediate Kawarau -River Catchment --Seasonal use provides for minor plant nutrient uptake and evapotranspiration
			4 a) Land flow path to river with shotover	-1	-Point source discharge in potentially accessible river environment .	- Filtration upgrade at WWTP -Point source discharge to channel in Shotover -Maintenance of Shotover channel at discharge location required to achieve dilution -Transition zone to Shotover river blended with river bank	--Improved level of treatment, lower nutrient load to Kawarau. --Potentially elevated nutrient concentrations during very low flow periods, resulting in algal growth. --Disturbance of river bed mobilises sediment, but also limits periphyton growth
			4 b) Land flow path to river via Kawarau	2	-Public access issues and need to maintain separation from treated wastewater.	- Filtration upgrade at WWTP. -Using natural landform to shape flow paths. -Use of transition zones for connection to Kawarau River.	--Improved level of treatment, lower nutrient load --Uses similar flow paths to the Kawarau as present discharge to ground
			5 a) Deep well injections at Frankton	3	-Geological conditions and ability to maintain bore performance.	- Filtration upgrade at WWTP. - Acceptable geology for injection. - Distributed across terrace.	--Improved level of treatment, lower nutrient load --Uses similar flow paths to the Kawarau as present discharge to ground
			5 b) Deep well injections at Bridesdale	2	-Geological conditions and ability to maintain bore performance.	- Filtration upgrade at WWTP. -Acceptable geology for injection.	--Improved level of treatment, lower nutrient load --Limited inground treatment --Potential for localised mixing in Kawarau
			6 a) Shallow well injections at Delta	2	-Geological conditions and ability to maintain bore performance.	- Filtration upgrade at WWTP. -Not distributed as bore field, concentrated into 1-2 locations. -Installed beneath river to promote upwelling. -Acceptable geology for injection.	--Improved level of treatment, lower nutrient load --Minimal inground treatment --Likely to form areas of localised mixing in Kawarau
			7 a) Subsurface Wetlands on Delta	3	-Public access issues and need to maintain separation from treated wastewater.	- Filtration upgrade at WWTP. -Using natural landform to shape flow paths. -Use of transition zones for connection to Kawarau River. -Additional treatment provided by subsurface wetland.	--Improved level of treatment, lower nutrient load --Uses similar flow paths to the Kawarau as present discharge to ground
			8 a) Well point injections or Soakholes at Airport or surroundin	3	-Geological conditions and ability to maintain bore performance.	- Filtration upgrade at WWTP. -Acceptable geology for injection. -Distributed across terrace.	--Improved level of treatment, lower nutrient load --Potential inground treatment Potential to distribute broadly to allow more diffuse inflow to Kawarau River
The disposal of treated wastewater aligns with tikanga as guided by mana whenua.	• Mana whenua values and knowledge. • Alignment with mana whenua cultural practices, protocols and values.	Alex Gorrie	Base Case (as intended under consent conditions)	FF	-The system is not function as intended, and is effectively discharging to surface water.	-Continuation of this option is as it is functioning now, not how it was intended to function.	-The system is not working as intended and is effectively discharging to the Kimiākau and Kawarau rivers.
			Base Case (as disposal field is currently performing)	FF	-The system is not function as intended, and is effectively discharging to surface water.	-Continuation of this option is as it is functioning now, not how it was intended to function.	-The system is not working as intended and is effectively discharging to the Kimiākau and Kawarau rivers.
			1 a)	FF	-From a mana whenua perspective this is no different from the BAU case. The overall treatment in the ground is minimal.	-The receiving soil characteristic at the proposed disposal field is the same as the soil characteristic at the current disposal field.	- Disposal beds are in the floodplain, and are adjacent to the Kawarau meaning that there is inadequate land based treatment prior to reaching the receiving waterbody to water - does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01
			1 b)	FF	-From a mana whenua perspective this is no different from the BAU case. The overall treatment in the ground is minimal.	-The receiving soil characteristic at the proposed disposal field is the same as the soil characteristic at the current disposal field.	- Disposal beds are in the floodplain, and are adjacent to the Kawarau meaning that there is inadequate land based treatment prior to reaching the receiving waterbody to water - does not give effect to mana whenua aspirations for TMoTW as per the Draft Otago RPS -LF-WAI-01

Appendix B

MCA Framework

17 February 2025

To	QLDC - Andrew Hill	**Contact No.**	+64 27 321 1116
Copy to	LandPro - Claire Perkins, GHD - Helen Barclay, Ian Ho	**Email**	tim.eldridge@ghd.com
From	Tim Eldridge	**Project No.**	12645246
Project Name	Shotover WWTP Disposal Field Alternative Discharge		
Subject	MCA set up workshop summary notes *(Revised for second issue on 17th Feb 2025 after receiving comments from QLDC and iwi, original issue was 20th December 2024)*		

1. Introduction

Queenstown Lakes District Council (QLDC) has engaged GHD to identify and develop an alternative discharge solution for the treated effluent from the Shotover Wastewater Treatment Plant (WWTP). The existing disposal field is no longer operating as designed, is struggling to meet current flows, and is not compliant with the conditions of the resource consent.

GHD conducted an interactive MCA setup workshop with QLDC and Iwi representatives (TAMI and Aukaha) using Mural to develop and agree the assessment criteria that will form the project multi-criteria analysis (MCA) framework.

This MCA framework is to be used to assess the performance of the long list and short list options with the aim of identifying a preferred option to take forward. We anticipate the criteria will remain the same for both the long list and short list assessments.

Figure 1 below outlines an indicative methodology for the project, showing where the MCA set-up workshop fits within the broader programme.

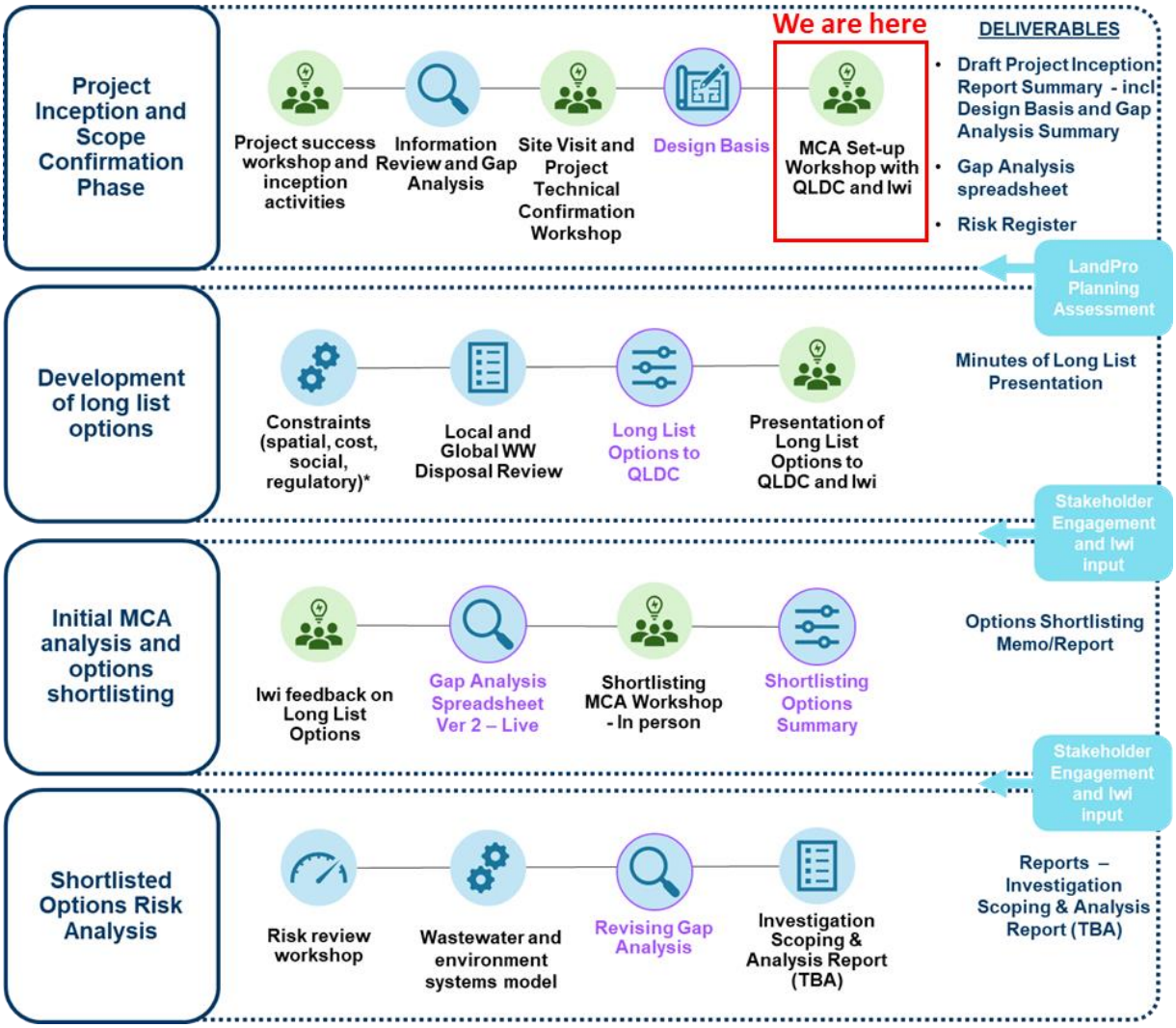

Figure 1 QLDC Shotover WWTP Disposal Field indicative program.

1.1 Purpose of this Memorandum

The purpose of the memorandum is to outline the MCA framework and assessment criteria discussed at the MCA set up workshop on December 12th, 2024, and to seek agreement prior to application of the MCA for the long list assessment which is programmed to occur in February 2025. It also provides a summary of the discussions from the workshop that contributed to the framework's development.

1.2 Scope and limitations

This technical memorandum has been prepared by GHD for Queenstown Lakes District Council. It is not prepared as, and is not represented to be, a deliverable suitable for reliance by any person for any purpose. It is not intended for circulation or incorporation into other documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out.

2. Summary

A summary of the agreed assessment criteria that will form the project multi-criteria analysis (MCA) framework is outlined in the following Table 1.

Table 1 Summary

Criteria	Description	Key performance indicators
Investment objectives 	The health and well-being of the surrounding waterways are maintained, protected and improved where practicable to support water quality.	• Ecosytem / Aquatic health effects • Human health effects • Nuisance growth • Recreation impacts
	The disposal of treated wastewater aligns with tikanga as guided by mana whenua.	• Mana whenua values and knowledge. • Alignment with mana whenua cultural practices, protocols and values.
	Ability to service the community's and visitor wastewater needs now and into the future up to the equivalent flows projected for 2060.	• Can accommodate forecast population or economic growth over time • Can accommodate peak day inflows • Can be resilient to extreme climate events, climate change and natural disasters
Social and environmental effects 	Mō tātou, ā, mō kā uri ā muri ake nei For us and our children after us	• Integration of whakapapa Intergenerational equity, innovation, and knowledge. • Te mana o te wai Mauri of the water is upheld or enhanced. • Ki uta ki tai Whole of catchment impact and holistic consideration.
	Cultural impacts to sites of significance and access to sites for cultural activities.	• Sites of cultural significance impacts • Physical access to site for cultural and recreational activities.
	Impacts to the surrounding environment	• Natural waterway impacts • Biodiversity
	Environmental impacts to surrounding catchment land, soil and groundwater	• Surface water effects • Soil health effects • Groundwater effects
	Visual effects – the extent to which there is a visual impact from options that differ from existing land use or impact the surrounding natural environment.	• Visual impacts
	Amenity effects – the extent to which there is a receptor or social impact from options	• Noise impacts • Risk to potential receptors • Recreational access • Air quality / odour risk

Critical Success Factors 	Constructability and technical feasibility	• Technical feasibility • Technical / constructability risks • Compatibility • Technical robustness and operational resilience.
	Sustainability - Carbon emissions and sustainable use of resources supporting organisational goals	• Carbon emissions (operation carbon included) • Beneficial reuse
	Operational reliability and maintainability	• Ease of operations / maintenance • Operational complexity and risks • Functionality
	Property difficulties and impacts	• Property requirements, impacts and difficulties.
	Implementation timeframe	• Timeline • Addressing current performance issues
Costs 	Costs and affordability	• Capital costs • Operation costs (annual) • Whole of life costs (NPV) • Stage ability

3. Framework

The MCA framework consists of four categories of assessment criteria, these are outlined in the following Figure 2.

Figure 2 MCA framework

The key and notable features of this bespoke MCA framework include:

- Cultural considerations are often within the social and environmental effects, however for this project some of the cultural considerations are captured investment objectives as well as the effects. – As discussed in workshop this will not dilute or take away from the cultural considerations.
- Consentability is not a separate criteria, it is captured in each specific criteria (i.e. visual impact) and their impact on the ability of an option to be consented.

The individual MCA assessment criteria proposed to assess options for this project (under each category) are described in section 4 to 0. The proposed key performance indicators, measures and considerations that will be used to inform the option scoring each criteria are also shown in section 4 to 0.

4. Proposed Investment objectives

Following the workshop and incorporating QLDC and Iwi feedback, below are the proposed investment objectives to be used during the MCA assessment.

Health and well-being of surrounding waterways

The health and well-being of the surrounding waterways are maintained, protected and improved where practicable to support water quality.

The proposed key performance indicators are:

Ecosystem and aquatic health effects

- Macroinvertebrate Community Index (MCI) indices.
- Potential of hydrogen (pH).
- Dissolved oxygen (DO).
- Biochemical oxygen demand (BOD).
- Temperature.
- Suspended solids.
- Ammoniacal nitrogen.
- Nitrate nitrogen.

Human health effects

- Pathogens.
- Cyanobacteria.
- Clarity.

Nuisance growth

- Total nitrogen.
- Dissolved inorganic nitrogen.
- Total phosphorous.

Alignment with tikanga

The disposal of treated wastewater aligns with tikanga as guided by mana whenua.

The proposed key performance indicators are:

Mana whenua values and knowledge.

Alignment with mana whenua cultural practices, protocols and values.

Ability to service now and future flows

Ability to service the community's and visitor wastewater needs now and up to the equivalent flows projected for 2060.

The proposed key performance indicators are:

Can accommodate forecast population or economic growth over time

- Supports and informs southern corridor planning over time.

Can accommodate peak day inflows

- Hydraulic load.

Can be resilient to extreme climate events, climate change and natural disasters

- Flooding and earthquakes.

5. Social & environmental effects

Following the workshop and incorporating QLDC and Iwi feedback, below are the agreed social and environmental effects to be used during the MCA assessment.

Mō tātou, ā, mō kā uri ā muri ake nei - Cultural impacts

Mō tātou, ā, mō kā uri ā muri ake nei (For us and our children after us).

The proposed criteria scoring considerations are:

Integration of whakapapa Intergenerational equity, innovation and knowledge.

Te mana o te wai (Mauri of the water is upheld or enhanced).

Ki uta ki tai (Whole of catchment impact and holistic consideration).

Cultural impacts

Cultural impacts to sites of significance and access to sites for cultural activities.

The proposed criteria scoring considerations are:

Sites of cultural significance impacts

- Impacts to known sites of cultural significance.

Physical access to site for cultural and recreational activities

- Access to river for cultural practices such as mahinga kai.

Surrounding environment

Impacts to the surrounding environment.

The proposed criteria scoring considerations are:

Natural waterway impacts

- Avoiding WWTP discharges (direct and indirect) to natural waterways and water pipe crossings over waterways.

Biodiversity

- Birds and other biodiversity in delta.
- Bird strike.

Surrounding catchment land, soil and groundwater

Environmental impacts to surrounding catchment land, soil and groundwater.

The proposed criteria scoring considerations are:

Surface water effects

- Ecotoxicity from contaminants.
- Nutrient influence on eutrophication status and nuisance algae/plant growth.
- Impact on potential for resource and recreational use.

Soil health effects

- Contaminant accumulation.
- Impact on use.

Groundwater effects

- Impact on groundwater levels and quality.
- Impact on potential for groundwater resource use.

Visual effects

Visual effects – the extent to which there is a visual impact from options that differ from existing land use or impact the surrounding natural environment.

The proposed criteria scoring considerations are:

Visual impacts

- The likely visual impact of options on the surrounding environment.
- Existing land uses sites of natural significance.

Amenity effects

Amenity effects – the extent to which there is a receptor or social impact from options.

The proposed criteria scoring considerations are:

Noise impact

- The likely intensity of noise impacts.
- Frequency and duration of noise (construction and operation).

Risk potential receptors

- Distance to receptors.

Recreational access

- Ability to maintain access to the Delta and surrounding area for recreational purposes.

Air quality / odour risk

- Odour.
- Spray drifts.
- Aerosols.

6. Critical success factors and Cost

Following the workshop and incorporating QLDC and Iwi feedback, below are the agreed proposed critical success and cost factors to be used during the MCA assessment.

Constructability and feasibility

Constructability and technical feasibility.

The proposed criteria scoring considerations are:

Technical feasibility

- To what extent is the proposed solution a known engineering or technical approach.

Technical / constructability risks

- Risks with this approach including capability and competency within New Zealand
- Risks with respect to sourcing skills and materials internationally to implement the proposed solution.

Compatibility

- Ability to tie in with existing infrastructure.

Technical robustness and operational resilience

- The extent that the proposed solution can handle treated effluent from the Shotover WWTP, particularly in terms of variability in quality and quantity.

Sustainability

Sustainability - Carbon emissions and sustainable use of resources supporting organisational goals.

The proposed criteria scoring considerations are:

Carbon emissions (embodied and operational).

Beneficial reuse.

Operational reliability and maintainability

Operational reliability and maintainability.

The proposed criteria scoring considerations are:

Ease of operations / maintenance

- Access to plant equipment and repair.
- Ability to train and maintain appropriate workforce skill requirements.

Operational complexity and risks

- Increase of wastewater treatment and disposal system complexity.
- Risk of operational issues.

Functionality

- Confidence that the option considered will perform as expected.

Property

Property difficulties and impacts.

The proposed criteria scoring considerations are:

Property requirements, impacts and difficulties.

- Scale of land required
- Availability of suitable land for technical solution
- Property acquisition (time and legal requirements)

Implementation timeframe

Implementation timeframe

The proposed criteria scoring considerations are:

Timeline

- Timeframe to implement solution.

Addressing current performance issues

- The ability and timeline required to address the current performance issues.

Costs

Costs and affordability.

The proposed criteria scoring considerations are:

Capital costs.

Operation costs (annual).

Whole of life costs (NPV).

Affordability (relative to expected budget allocations).

Stageability.

7. MCA scoring system

MCA enables a wide range of different aspects to be taken into consideration in evaluating options and provides a systematic framework for working through the merits and disadvantages of each option.

It is a tool that can help decision making, but it does not make the decision.

Done well, it provides an open, traceable, and repeatable process. It enables consideration of a range of criteria which are both qualitative and quantitative.

The scoring system which will be adapted for this project will have 11 tier system, as outlined in Table 2 below.

Table 2 MCA scoring system

Score	Scoring Description
+ 5	Substantial benefits and a high degree of confidence of benefits being realised and/or long term / permanent benefits
+ 4	High extent of benefits and confidence of benefit being realised and/or medium – long term benefits
+ 3	Good benefits and/or medium term
+ 2	Low or localised benefits and/or short term
+ 1	Very low benefits and/or very short term
0	The current solution, if it were working as intended and meeting the consent requirements (RM13.215.03.V2).
- 1	Few difficulties, very low cost or low impact on some resources/values and/or very short term
- 2	Minor difficulties, low cost or minor impacts on resources/values and/or short term
- 3	Some difficulties, moderate cost or some impact on resources/values and/or medium term
- 4	Clear difficulties, high cost or high impact on resources/values and/or medium – long term
- 5	Substantial difficulties, very high cost or substantial impact on resources/values and/or long term / permanent
FF	Fatally Flawed. Extreme difficulties, extremely high cost or substantial impact on resources/values and/or long term / permanent which cannot be mitigated by reasonable measures and may not be able to be mitigated by extraordinary mitigation

The future year of 2060 has been proposed for these MCA assessments in line with potential 35-year consent. It is assumed that all elements of each option are in place by 2060 for scoring purposes.

8. Workshop key notes and record of changes

During the workshop, attendees used Mural to leave their notes and feedback.

It was clarified that the WWTP plant capacity design upgrade is to occur to 2048, however the disposal field upgrade to be designed to 2060.

The MCA framework feedback mainly focussed on updating the scoring definitions for what zero means. During the workshop it was agreed that the zero score should align with the current solution had it been designed as intended and therefore achieving the current resource consent (RM13.215.03.V2) conditions.

The following table outlines the original scoring description and updated description.

Score	Scoring Description	Updated Scoring Description (blue text indicates updates)
+ 5	Substantial benefits and a high degree of confidence of benefits being realised and/or long term / permanent benefits	Substantial benefits and a high degree of confidence of benefits being realised and/or long term / permanent benefits
+ 4	High extent of benefits and confidence of benefit being realised and/or medium – long term benefits	High extent of benefits and confidence of benefit being realised and/or medium – long term benefits
+ 3	Good benefits and/or medium term	Good benefits and/or medium term
+ 2	Low or localised benefits and/or short term	Low or localised benefits and/or short term
+ 1	Very low benefits and/or very short term	Very low benefits and/or very short term
0	No change in benefits, impacts or difficulties from current situation	The current solution, if it were working as intended and meeting the consent requirements (RM13.215.03.V2).
- 1	Few difficulties, very low cost or low impact on some resources/values and/or very short term	Few difficulties, very low cost or low impact on some resources/values and/or very short term
- 2	Minor difficulties, low cost or minor impacts on resources/values and/or short term	Minor difficulties, low cost or minor impacts on resources/values and/or short term
- 3	Some difficulties, moderate cost or some impact on resources/values and/or medium term	Some difficulties, moderate cost or some impact on resources/values and/or medium term
- 4	Clear difficulties, high cost or high impact on resources/values and/or medium – long term	Clear difficulties, high cost or high impact on resources/values and/or medium – long term
- 5	Substantial difficulties, very high cost or substantial impact on resources/values and/or long term / permanent	Substantial difficulties, very high cost or substantial impact on resources/values and/or long term / permanent
FF	Fatally Flawed. Extreme difficulties, extremely high cost or substantial impact on resources/values and/or long term / permanent which cannot be mitigated by reasonable measures and may not be able to be mitigated by extraordinary mitigation	e.g. the current disposal scheme, in that performance does not meet requirements for wastewater management.

The investment objectives were each reviewed and the following table outlines the proposed objectives and changes made to these following the workshop.

Table 3 Investment objectives

Originally presented for discussion - investment objectives	Updated or added investment objectives (BLUE text indicates changes)	Comments
Investment objective 1: The health and well-being of the surrounding waterways are maintained and protected to support mahinga kai. **Proposed key performance indicators:** • Ecosystem/ Aquatic health effects • Toxicity effects • Nuisance growth.	**Updated investment objective:** The health and well-being of the surrounding waterways are maintained, protected and improved where practicable to support water quality. **Updated proposed key performance indicators:** • Human health effects • Recreation impacts • Ecosystem/Aquatic health effects • Nuisance growth.	Combined objective 1 & 2. Toxicity effects is now included as part of Ecosystem / Aquatic health effects.
Investment objective 2: The waterways are maintained and protected to support swimming and recreation activities. **Proposed key performance indicators:** • Human health effects • Recreation impacts.		Combined objective 1 & 2, as outlined in row above. Added new investment objective as follows: • *General feedback on Access Mahinga Kai being part of cultural competency.*
	Added New Investment Objective 2 The disposal of treated wastewater aligns with tikanga as guided by mana whenua. **Updated proposed key performance indicators** • Mana whenua values and knowledge. • Alignment with mana whenua cultural practices, protocols and values.	This is a new investment objective and has been developed following the workshop which identified the need a specific investment objective reflecting cultural competencies. *Iwi to provide input regarding specific aspects of this investment objective and key performance indicators and measurable outcomes*
Investment objective 3: Ability to service the community's and visitor wastewater needs now and into the future. **Proposed key performance indicators:** • Can accommodate forecast population or economic growth over time • Can accommodate peak day inflows • Can be resilient to extreme climate events and climate change.	**Updated investment objective 3:** Ability to service the community's and visitor wastewater needs now and into the future up to the equivalent flows projected for 2060. **Updated proposed key performance indicators:** • Can accommodate forecast population or economic growth over time • Can accommodate peak day inflows • Can be resilient to extreme climate events, climate change and natural disasters.	Updated to include "2060" as the future flows. Updated to include earthquakes. • *General feedback: Ability for the plant to go beyond the design horizon of 2060 should also be scored.* • *General feedback: Will plant / field modularity be incorporated into the evaluations?* • *General feedback: Uunderstanding the enduring nature of the infrastructure.*

The social and environmental effects were each reviewed and the following table outlines the proposed effects and changes made to these following the workshop.

Table 4 Social and environmental

Originally presented for discussion - social & environmental effects	Updated or added social and environmental effects (BLUE text indicates changes)	Comments
	Social & Environmental Effect 1 updated: *Mō tātou, ā, mō kā uri ā muri ake nei* For us and our children after us. **Updated proposed criteria scoring considerations:** • Integration of whakapapa *Intergenerational equity, innovation and knowledge.* • Te mana o te wai *Mauri of the water is upheld or enhanced.* • Ki uta ki tai *Whole of catchment impact and holistic consideration*	Added extra criteria scoring considerations. • *General feedback: Catchment needs to be part of the focus here too.*
Social & Environmental Effect 2 (previously effect 1): Cultural impacts to sites of significance and access to sites for cultural activities. **Proposed criteria scoring considerations:** • Sites of cultural significance impacts • Access to site for cultural and recreational activities.	**Social & Environmental Effect 2**: Cultural impacts to sites of significance and access to sites for cultural activities. **Proposed criteria scoring considerations:** • Sites of cultural significance impacts • Physical access to site for cultural and recreational activities.	Updated access to be defined as "physical" • *General feedback to* define access as "physical" • *General feedback: Iwi to score this.*
Social & Environmental Effect 3 (previously effect 2): Impacts to the surrounding environment. **Proposed criteria scoring considerations:** • Natural waterway impacts.	**Social & Environmental Effect 3 updated:** Impacts to the surrounding environment. **Updated proposed criteria scoring considerations:** • Natural waterway impacts • Biodiversity.	Added an extra criteria scoring considerations. • *General feedback: Biodiversity, birds and bird strikes to be included here.*
Social & Environmental Effect 4 (previously effect 3): Environmental impacts to surrounding catchment land, soil and groundwater. **Proposed criteria scoring considerations:** • Surface water effects • Soil health effects • Groundwater effects.	**Social & Environmental Effect 4:** Environmental impacts to surrounding catchment land, soil and groundwater. **Proposed criteria scoring considerations:** • Surface water effects • Soil health effects • Groundwater effects.	No change. • *General feedback: Ki Uta Ki Tai impacts E.g. approaching the solution from a catchment-wide perspective rather than considering it in isolation.*
Social & Environmental Effect 5 (previously effect 4): Visual effects – the extent to which there is a visual impact from options that differ from existing land use or impact the surrounding natural environment. **Proposed criteria scoring considerations:** • Visual impacts.	**Social & Environmental Effect 5:** Visual effects – the extent to which there is a visual impact from options that differ from existing land use or impact the surrounding natural environment. **Proposed criteria scoring considerations:** • Visual impacts.	No change.

Originally presented for discussion - social & environmental effects	Updated or added social and environmental effects (BLUE text indicates changes)	Comments
Social & Environmental Effect 6 (previously effect 5): Amenity effects – the extent to which there is a receptor or social impact from options. **Proposed criteria scoring considerations:** • Noise impacts • Risk to potential receptors • Recreational access.	**Social & Environmental Effect 6 updated:** Amenity effects – the extent to which there is a receptor or social impact from options. **Updated proposed criteria scoring considerations:** • Noise impacts • Risk to potential receptors • Recreational access • Air quality / odour risk.	Updated to add the air quality / odour risk as agreed in workshop.
Social & Environmental Effect 7 (previously effect 6): Air quality – risk of odour potential. **Proposed criteria scoring considerations:** • Objectionable or offensive odours beyond site boundary • Risk to potential receptors • Spray drift and aerosols.		Relocated to social & environmental effect 5 as a criteria.

The critical success factors and cost factors were each reviewed and the following table outlines these, and the changes made following the workshop.

Table 5 Critical success factors and Cost

Originally presented for discussion - critical success and cost	Updated critical success factors (BLUE text indicates changes)	General feedback or comments during workshop
Critical Success Factor 1: Constructability and technical feasibility. **Proposed criteria scoring considerations:** • Technical feasibility • Technical / constructability risks • Compatibility.	**Critical Success Factor 1 updated:** Constructability and technical feasibility. **Updated proposed criteria scoring considerations:** • Technical feasibility • Technical / constructability risks • Compatibility • Technical robustness and operational resilience	"Technical robustness and resilience" added as a criteria scoring consideration in response to the following feedback: *Does the technical solution address the issues with the existing plant (aka the causes of the existing issues).*
Critical Success Factor 2: Carbon emissions - Sustainable use of resources supporting organisational goals. **Proposed criteria scoring considerations:** • Carbon emissions.	**Critical Success Factor 2 updated:** Sustainability - Carbon emissions and sustainable use of resources supporting organisational goals. **Updated proposed criteria scoring considerations:** • Carbon emissions (incl. operation carbon emissions) • Beneficial re-use.	Updated name. Added two extra criteria. • *General feedback: Operation carbon emissions, beneficial re-use, nitrous oxide – green house gases.*
Critical Success Factor 3: Operational reliability and maintainability. **Proposed criteria scoring considerations:** • Ease of operations / maintenance	**Critical Success Factor 3:** Operational reliability and maintainability. **Proposed criteria scoring considerations:** • Ease of operations / maintenance	No change. • *General feedback: Important for solution to be easy to comply with consent conditions - from an*

Originally presented for discussion - critical success and cost	Updated critical success factors (BLUE text indicates changes)	General feedback or comments during workshop
• Operational complexity and risks • Functionality.	• Operational complexity and risks • Functionality.	*operational perspective.*
Critical Success Factor 4: Property difficulties and impacts. **Proposed criteria scoring considerations:** • Property requirement difficulties • Property impacts.	**Critical Success Factor 4:** Property difficulties and impacts. **Proposed criteria scoring considerations:** • Property requirements, impacts and difficulties.	Removed property impacts as already covered in investment objective 3. • *General feedback: New bill - positive changes - Resource Management (Consenting and Other System Changes) Amendment Bill.*
Critical Success Factor 5: Stageability of solution. **Proposed criteria scoring considerations:** • Ability to provide future capacity if required (future scalability) • Improvements can be staged to share cost over a longer time horizon.		Deleted the success factor as already included in investment objective 3 and costs. Relocated the second criteria "Improvements can be staged to share cost over a longer time horizon" to the cost factor.
	Added Critical Success Factor 6: Implementation timeframe. **Proposed criteria scoring considerations:** • Timeline • Addressing current performance issues.	Added critical success factor following feedback on the construction and technical feasibility success factor. • *Feedback to include and the impact and risk on when the solution can be implemented.*
Cost: Costs and affordability. **Proposed criteria scoring considerations:** • Capital costs • Operational costs (annual).	**Cost updated:** Costs and affordability. **Updated proposed criteria scoring considerations:** • Capital costs • Operational costs (annual • Whole of life costs (NPV) • Stage ability.	Updates to include Whole of life costs and stability as criteria. • *General feedback: NPV, Whole of life costs and stage ability.*

Kind Regards

Tim Eldridge
Executive Advisor

ghd.com

The Power of Commitment