Report

03 March 2026

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From	GHD	**Project No.**	12645246
Project Name	Shotover WWTP Disposal Field Alternative Discharge		
Subject	High Level Assessment of Option E		

1. Introduction

This short report summarises an assessment of Option E, which provides a full disposal to land option for the discharge of treated wastewater from the Shotover Wastewater Treatment Plant. GHD has prepared the Short List Options Report (Nov 2025) which evaluated four short listed options (Options A to D). The additional Option E was prepared at Queenstown Lakes District Council's (QLDC's) request and was developed on a high-level spatial analysis, undertaken to identify potential land-based disposal areas for land disposal.

A range of low, medium, and high-rate land-based disposal options were considered and scored during the long list optioneering phase. A solely low to moderate rate land disposal option was not taken through to the short list stage due to the highly constrained Queenstown and Frankton Flat environment, including limited land availability, challenging geology and topography, environmental sensitivities, and the high capital and operational costs associated with conveyance and large-scale infrastructure.

Option E has been reintroduced to respond to peer review feedback reflecting iwi values and to transparently test whether a fully land-based disposal option could be feasible despite the constraints of such an option.

1.1 Purpose of this report

This report summarises the desktop analysis used to identify Option E, including potential site locations and infrastructure requirements. It also describes the option itself and presents a multi-criteria assessment comparing Option E with previously evaluated alternatives from the GHD Short List Options Report (GHD, 2025).

The purpose of this report is to detail the comparison of short-listed options, document the opportunity and challenges of a full land disposal option, and consider costs and possible wider issues associated with this option.

2. Scope and limitations

2.1 Scope of work

The scope of this work is to incorporate Option E into the Shotover wastewater disposal shortlist. This includes providing a clear description of Option E, preparing an indicative cost estimate, and undertaking a high-level assessment of the option. The outcomes of this assessment summarised in this report can be assessed alongside the previously shortlisted disposal options for comparison.

Consideration of a wastewater disposal to land option, comprising only low to medium rate disposal methods and further to those considered in the long list assessment, is assessed to provide further understanding and demonstration of the feasibility, scale, risks and costs of such a land-disposal approach in the Wakatipu Basin.

However, due to time constraints in preparing and assessing this option, it has not been developed to the same level of detail as the shortlisted options A to D.

2.2 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 section 2.1 of 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 the indicative cost estimate set out in section 6 of this report ("Cost Estimate") using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD .The Cost Estimate has been prepared for the purpose of option comparison only and must not be used for any other purpose.

The Cost Estimate is a rough order 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 project can or will be undertaken at a cost which is the same or less than the Cost Estimate.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

2.3 Assumptions

In terms of Option E, the following assumptions apply:

– Land required for disposal fields, buffers and a part of the land for conveyance is not currently owned by QLDC and would require negotiation or acquisition. No allowance has been made for land availability constraints.
– No geotechnical, hydrogeological, soil or groundwater investigations have been undertaken to confirm site suitability. It has been assumed that no significant hydraulic or environmental constraints exist that would preclude the option as it has been assessed. It is assumed that the actual environmental conditions and effects associated with Option E would be confirmed with detailed investigation and assessment.
– Any land-disposal scheme would need to comply with the Wastewater Environmental Performance Standards 2025 (WEPS), including limits on hydraulic loading, nutrient application rates and site classification. The high-level sizing for the disposal scheme is based on the current WEPS requirements.
– The assessment does not include a consenting strategy, land valuation, assessment of social, cultural and ecological impact, property negotiations or constructability planning beyond high-level identification of risks.

3. WEPS requirements for land disposal

The WEPS for the discharge of wastewater to land provides limits related to the area of application as kilograms of nutrients per hectare per year, with different limits provided for the following disposal rates:

- **rapid-infiltration discharge,** meaning the discharge of treated wastewater to land at a rate that results in the land receiving an annual hydraulic load of 6 metres or more.
- **slow-infiltration discharge** means the discharge of treated wastewater to land at a rate that results in the land receiving an annual hydraulic load of less than 6 metres.

The WEPS outline a procedure for assigning a land class[1], based on undertaking an assessment to assign a site classification category and a risk assessment category. These site and risk assessments cover the broad range of considerations that may influence the rate of wastewater discharge and the effects to environment and public health.

The site classification category is determined based on a number of different parameters including drainage, soil type, slope, climate, depth to ground water and differentiate between rapid and low infiltration rates. These are summarised in Table 1 for slow infiltration discharges. There are different category requirements for rapid infiltration discharges[2,3].

Table 1 Determination of site classification category for land suitable for slow infiltration discharge[4]

	Site classification Category 1	Site classification Category 2	Site classification Category 3
Drainage	Well draining and free of any drainage impediments in an unsaturated zone	Moderately well draining and free of any drainage impediments in an unsaturated zone	Imperfectly drained and free of any drainage impediments in an unsaturated zone
Soil Type	Fine sand, loamy sand, sandy loam, loam, or silt loam	-	Fine-grained clay loam or silty clay loam,
Site climate and moisture	Soil remains below field capacity year-round with irrigation,	Irrigation brings the soil above field capacity but the soil never reaches field saturation	Irrigation occasionally brings the soil to field saturation in winter,
Nutrient uptake	400 kg/ha/year	-	100 - 400 kg/ha/year
Slope	< 10 deg	-	10 – 17 degrees
Depth to Groundwater	>5 m	3-5 m	1.5 – 3 m

A risk assessment category is then assigned for a range of risks including environmental risks and public health risks with the likelihood and consequence of each risk categorised. This process is used to assign a land class. The areas identified in the land disposal assessment (Section 4) are assumed to be Class 2 based a high-level desktop assessment.

The standards provide limits for the amount of total nitrogen and total phosphorus can be discharge per hectare each year based on the class of land and disposal method and these are presented in Table 2.

Table 2 Application limits for different land classifications (only slow rate infiltration is shown)

Method		Class 1	Class 2	Class 3
Slow-infiltration	TN limit	550 kg/ha/yr	250 kg/ha/yr	150 kg/ha/yr
	TP limit	110 kg/ha/yr	50 kg/ha/yr	30 kg/ha/yr

[1] WEPS 2025, Part 4 r 91 Procedure for assigning land class to site
[2] WEPS 2025, Part 4 r 96 Discharge concentration limits: slow-infilration discharges
[3] WEPS 2025, Part 4 r 97 Discharge concentration limits: rapid-infilration discharges
[4] WEPS 2025, Part 4 r 93 Determination of site classification category : slow-infiltration discharge

4. Land disposal assessment

4.1 Land disposal locations

Due to the limited area available for disposal to land at Frankton, and potential limitations of the Frankton aquifer capacity to accommodate the full projected discharge volume for Options C and D, a re-evaluation of possible land disposal options was conducted to determine whether any alternative land disposal areas were appropriate. For a full summary of the high-level spatial assessment that was carried out to refine the evaluation of potential areas suitable for land disposal refer to the Land Disposal Assessment (GHD, 2025).

The high-level spatial assessment identified only a limited number of potential land areas likely to be suitable for consideration as a viable option for broad scale land disposal. Much of the Wakatipu basin area is highly constrained with geology, other environmental constraints, land use and topographical constraints presenting significant challenges to the application of wastewater at a large scale.

The assessment provided cumulative constraints scores for land within the areas assessed (25 km radius of WWTP), ranged from a constraint score of 0 to 560, reflecting a level of constraints ranging from no constraint to numerous very significant constraints. For the purpose of identifying areas for land application of wastewater, only those areas with a total constraint score of 250 or less were considered. For this assessment of low to medium rate land disposal, constraints scores of 50 of less are considered most suitable.

Figure 1 below illustrates the land areas and constraint ranges identified by spatial analysis within 25 km of the Shotover WWTP, with this excluding any constraint scoring related to distance from the WWTP or elevation difference.

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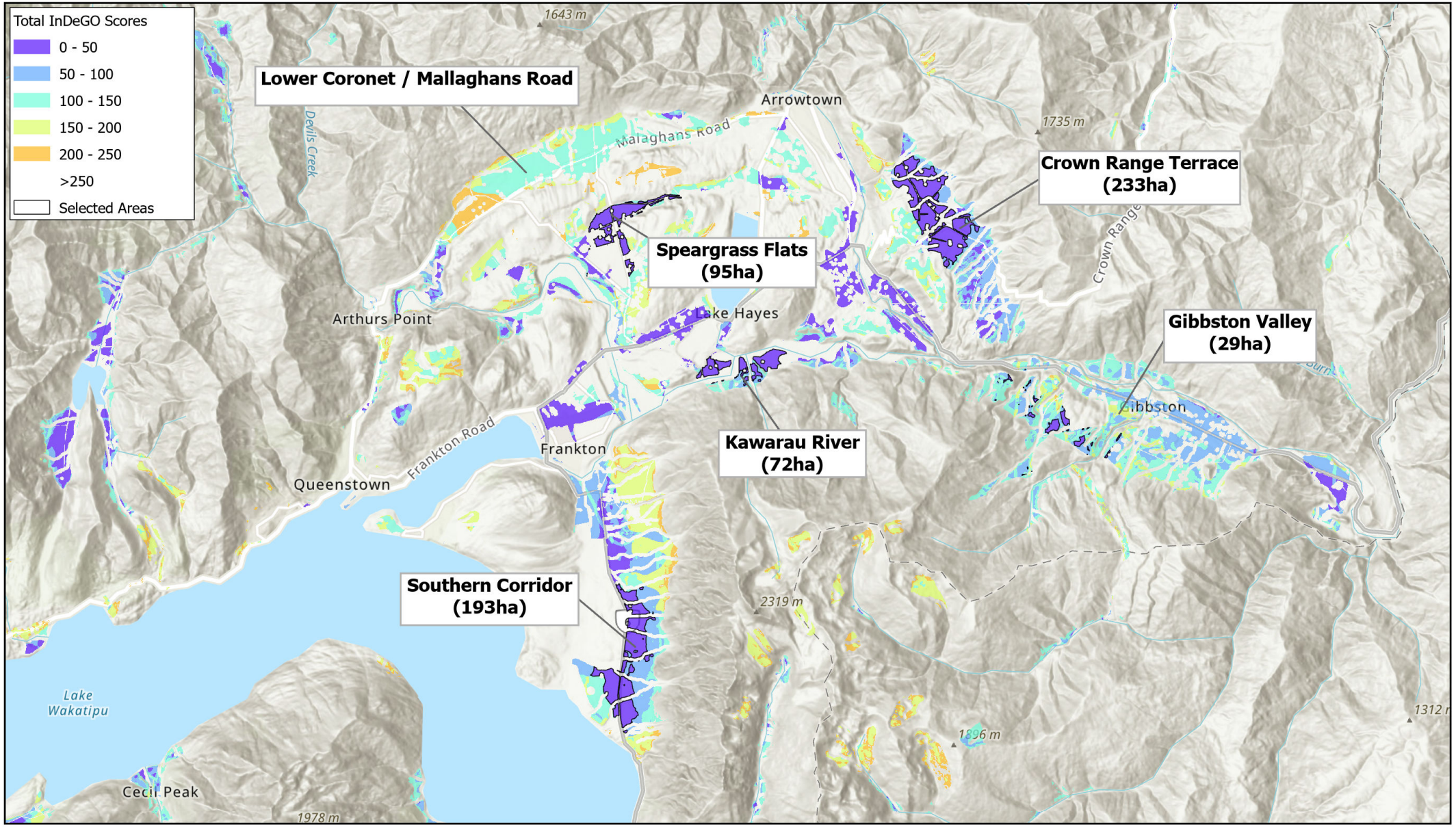

Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: NZGD 2000
Grid: NZGD 2000 New Zealand Transverse Mercator

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GHD

Queenstown Lake District Council
Shotover WWTP Disposal Field Alternative Discharge

Option E – Land Disposal Location Analysis

Project No. **12645246**
Revision No. **0**
Date **20260226**

FIGURE 1

N:\NZ\Christchurch\Projects\51\12645246\GIS\Maps\Deliverables\12645246_InDeGO_v3.aprx - 12645246_InDeGO_Scores - V3
Print date: 26 Feb 2026 - 12:18

Data source: GHD: InDeGO Scores V3 - 20260219; LINZ Data Service: Property information - 20251016 World Topographic Map: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
World Hillshade: Esri, NASA, NGA, USGS. Created by: jhchen

4.2 Option E requirements

The Option E disposal method has been developed to align with the WEPS, and to manage long-term nutrient and hydraulic loading within what is considered, based on high level review, to be potentially feasible. The following assumptions have been made in determining the requirements for Option E land disposal:

– Land areas with a spatial assessment constraint score of 50 or less are assumed to provide site conditions and risk relating to land disposal consistent with the WEPS Land Class 2.
– Disposal is assumed to be via subsurface disposal method suitable of providing irrigation rates up to 25 mm/day, with this hydraulic loading rate assumed to achievable for areas with WEPS Land Class 2.
– A maximum daily disposal rate equivalent to the estimated 2060 peak discharge flows of approximately 60 ML/day is required to be discharged through 100% use of the disposal area. This is assumed to provide the minimum required footprint to accommodate the daily peak discharge volume.
– Disposal areas require resting for long term operation and is assumed that under regular daily flow (e.g. average volume in 2060), at least 50% of the disposal area can be rested. This is equivalent to requiring 12.5 mm/day continuous loading over the full disposal area.
– A further 20% allowance of maximum disposal area is assumed to accommodate buffer distances from streams, roads and various infrastructure requirements.

4.2.1 Disposal area requirement

The hydraulic limitation of 25 mm/day results in disposal area required to accommodate 2060 peak day flow of approximately 240 ha. Consideration of the average 2060 daily flow (approximately 26 ML) provides, with approximately 50% disposal field resting, a disposal area requirement in the order of 210 ha. Hence, the peak flow area requirement has been adopted for Option E, to provide sufficient capacity for peak discharge volume, and to allow >50% disposal field resting to assist with long term operability.

Allowing for an additional 20% area for buffer distances, a total area requirement for Option E of 288 ha is assumed, where such land has a constraint score of 50 or less from spatial assessment.

4.2.2 Wastewater treatment requirement

The assumption of WEPS Class 2 disposal area introduces the requirement to maintain loading rates to within the TN and TP limits of 250 kg TN/ha/yr and 50 kg TP/ha/yr.

Meeting the WEPS limits requires treated wastewater to have an average TN of 6 g/m^3 or less, and a TP of 1 g/m^3. This would require supplementary chemical dosing and plant optimisation as outlined in the WEPS impact on treatment technical memo (5th February 2026).

Additionally, tertiary filtration is proposed, to reduce the risk of clogging of the disposal field, similar to other short list options.

4.3 Location of land disposal for Option E

A number of areas were identified as being potentially suitable for land disposal. These areas are listed in Table . Identification of potential locations took into consideration:

– Other disposal to land options already considered Frankton Flats and its land availability is not sufficient. Therefore, Frankton Flats was not included in the identification of Option E location.
– The size of land parcels, with larger land parcels >4 ha considered more favourable, allowing for negotiating land acquisition or use with fewer landowners. Larger land parcels are also expected to provide for more cost-effective use of land.
– The connectedness of individual parcels as groupings of few land parcels as large, potential disposal areas (>100 ha). For efficiency in the construction and operation of the land disposal scheme, close grouping of land parcels is expected to provide more efficient construction and operation of the scheme. This radial approach to grouping smaller parcels into the larger land disposal area favoured an Option E location that provided areas with more radial distribution of parcels (relatively small radius) over long, narrow distributions of parcels (larger radius of option).

Table 3 Land disposal potential areas

Location	Estimated available area[1] (ha)	Comments
Crown Range terrace	233	Largest area of low constraint land
Gibbston Valley	29	Limited area with low constraints
Speargrass Flats	95	Insufficient low constraint land available
Kawarau River	72	Insufficient land available
Southern Corridor	193	Disconnected/long area, QE2 covenant over part of the area

[1]*Low constraint (<50) area*

From this analysis and adopted approach to location selection, the area on the Crown Range terrace, comprising 233 ha of low constraint land (constraint score <50) was identified as the preferred location for Option E. It is assumed that the shortfall in low constraint land can be made up with nearby low-medium constraint land (score 50-100).

It should be noted that whilst it is possible to spread the disposal areas across multiple disjoint locations, this adds complexity in terms of construction of the conveyance pipeline, the operation and maintenance requirements and the associated cost.

5. Option summary – Option E

Option E represents an exclusively land-based wastewater disposal option for the Shotover WWTP, developed in response to short list feedback and to transparently test whether a fully land-based disposal pathway, including low-medium rate disposal could be feasible despite the known constraints.

5.1 Description

Option E involves the conveyance of treated effluent from the Shotover WWTP to a land disposal area, with the Crown Range terrace identified as a preferred location based on the outcomes of a high-level spatial assessment. Refer to Figure 2 for location and approximate footprint for Option E land only effluent disposal.

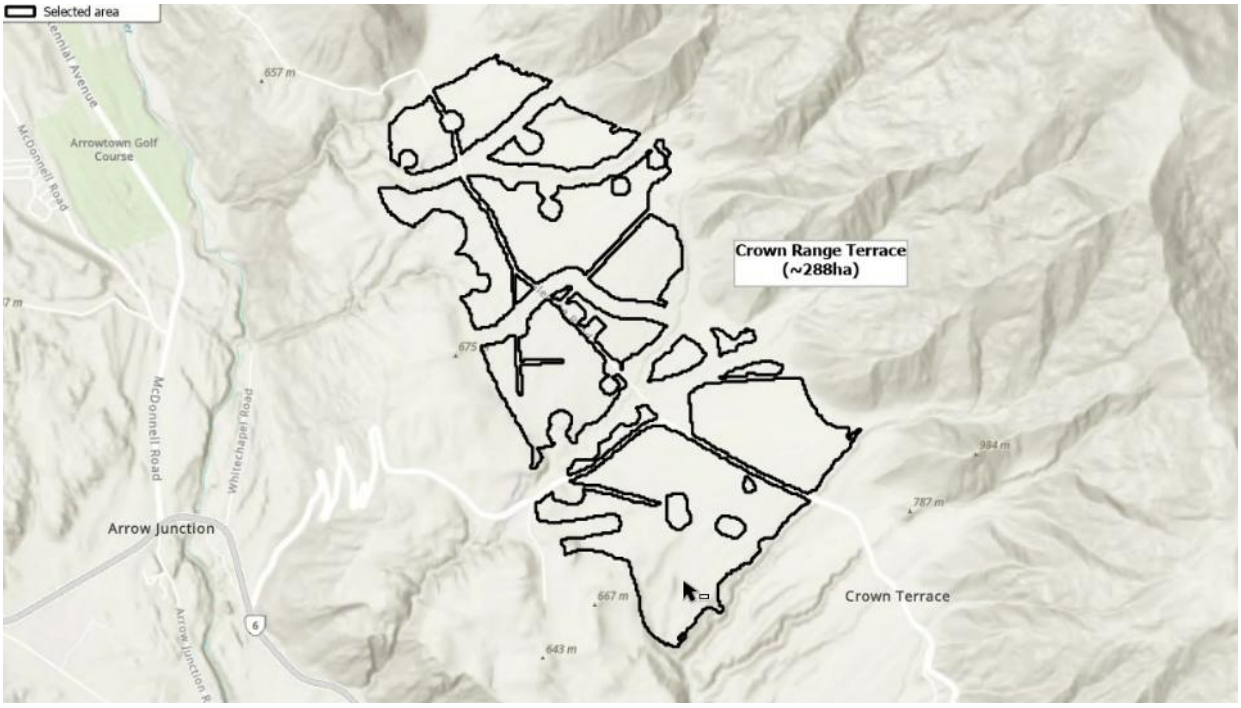

Figure 2 Approximate location and area for Crown Range terrace

The option assumes tertiary treatment upgrades, provision of additional calamity storage, and a dedicated effluent conveyance system to the land disposal location and a land disposal scheme to support the land application to allow consistency for comparison with Options A through to D.

The assessment of Option E has focused on:

- The availability and suitability of land for large-scale wastewater application, compliance with the WEPS,
- Treatment performance requirements to meet nutrient loading limits,
- Conveyance infrastructure requirements and staging opportunities, and
- Key risks associated with land acquisition, cost, and technical feasibility.

Table 4 provides a summary of the elements required for Option E.

Table 1 Option E summary

Elements	Option E details
UV treatment upgrade	After 2040
Pond 3 calamity storage	By Dec 2027, 40 ML volume
Tertiary filtration	Two units, capable of handling up to 60 ML/d, same as Option A
Recycle water for tanker use	Located near the secondary clarifier, assumed demand of 100 m^3/day
2030 discharge volumes	~15,000 m^3/day average volume to land ~34,600 m^3/day peak daily wet volume to land ~100 m^3/day reuse
2060 discharge volumes	~25,900 m^3/day average volume to land ~59,500 m^3/day peak daily wet volume to land ~100 m^3/day reuse
Wastewater quality limits to meet WEPS	Average TN of 6 g/m^3, Average TP of 1 g/m^3
Land required	Net irrigation area: 240 ha (minimum), Total area: 288 ha (minimum, based on 20% buffer)
Disposal method	Moderate rate land disposal. For costing purposes trenched methodology is assumed. Pipe depth approximately 1.5m at 2 m spacings
Effluent conveyance	To land in Crown Range, pipe length 15 km and elevation gain of approx. 360 m 15km of DN700mm pipe Peak design discharge flow: 694 L/s Annual pumping power requirement 8,700 MWh
Financial	(refer to Section 6 for more detail on costing)

5.2 Option E risks

The following key risks include:

- Land acquisition may be difficult and could impact consenting timeline and cause delays to project timeline
- Risk of increased costs, as both capital and operational expenses are high, and these costs could rise further depending on land prices.
- There are technical difficulties and uncertainties related to land suitability for wastewater disposal. For instance, the potential peak loading rate, suitability for long term use, optimal wastewater quality and optimal hydraulic loading rates. Additionally, the identification of suitability and WEPS limits includes consideration of risks to the environment and human health. Extensive site investigations are expected to be required to address these uncertainties.

- Risk of damage to pipes and infrastructure during prolonged periods of freezing temperatures, ground instability or other potential outcomes in the local environment.

6. Cost estimates

A high level cost estimate was prepared by GHD, based on conceptual sizing. The cost estimate used rates and assumptions from the long and short list cost estimates to support with the costing, including rates and assumptions made by cost estimators at ALTA. Cost assumptions

The following general assumptions are applicable to the cost estimate:

- The costing for the tertiary filtration, recycled water reuse, and treated calamity pond interface has been included to provide consistency with the other Short List cost estimates
- Cost estimates presented in this report are solely for the purpose of options comparison, and the estimate is not intended for budgeting purposes. Once the preferred option has been selected, further design development at preliminary design level and detailed estimating will be necessary to establish more definitive cost estimates for project budgeting.
- GHD provided a preliminary schedule of quantities based on conceptual sizing and information provided by several suppliers on proprietary plant equipment such as membrane filtration, tertiary filtration to assist ALTA compiling the preliminary cost estimates.
- Contingency uplifts were determined by applying 40% and 60% to the base estimates to work out P50 and P90 allowance, consistent with the approach for the short list cost estimates.
- These costs are presented in current dollar terms and do not include cost escalations.

The following items are not included in the cost estimate, as for the Options A to D

- Capacity upgrade to the existing UV channel, in 2040 circa, pending future capacity review.
- Calamity pond sludge removal and pond base reshaping, as this will be separately executed as another project by QLDC, for completion by December 2027 or earlier.
- Power supply to site is assumed to be adequate, subject to future consultation with the lines company.
- Cost associated with providing additional treatment related to plant optimisation and supplementary chemical dosing.

Significant unit rates adopted in the cost estimates include (contractor's onsite and offsite margins excluded):

- Conveyance pipeline from Shotover WWTP to disposal field is $3,500 per m, with an additional 5% allowance for fittings and valves.
- As there is no space available for additional services on the Shotover River bridge, an allowance of $10M is included for conveyance over the Shotover River
- An allowance of $6,500 / kW for the required 2,700kW pump station power requirement .
- Net disposal field is 240 ha, and trench spacing of 2m.
- The cost of land was derived from available QLDC ratings values, with an assumed average of $26/m^2. No valuation has been undertaken, and land cost are likely to be significantly more.

Operating cost assumptions include

- Operating costs include labour, electricity, and renewals. The cost range reflects projected operating expenses from 2030 to 2060 based on average daily flow, calculated in today's dollars.

Other inclusion

- Contractor's onsite, offsite and risk percentage values to the option's construction cost are 25%, 12% and 5% respectively.
- Consenting including legal support is estimated at $1.5M, in line with other short list options.
- Technical assessments cost is estimated at $1M

- Engineering design is estimated at 3 % of the construction cost.
- Construction tendering and MSQA is assumed to be 2% of the construction cost.

6.1 Cost estimate summary

Table 2 below presents a summary of the cost estimate for Option E.

Table 2 Option E – capital, operating and whole of life costs

	Option E – Crown Terrace	Comment
Capital Costs (P50 to P90)		
Capital cost of conveyance	$189 M to $206 M	*DN700 pipe, 15km, 360m elevation gain, multiple pump stations*
Capital cost of land disposal	$320 M to $374 M	*Disposal trenches across 240ha*
Capital cost of land	$50 M to $75 M	*Based on QLDC rating valuation data.*
Consenting, design, and investigations	$16 to 20 M	
Total capital cost	**$575 M to $675 M**	*P50 to P90 cost range*
Operating Costs		
Power	$1.9 to 3.3M	*Range for 2030 to 2060 flows*
Chemical and Power	$4.7k	
Labour additional	$71k	
Civil and maintenance costs	$2.5M	*Based on % of the new assets*
Estimated Operating Cost (Annual)	**$4.5 M to $5.9 M**	*Includes labour, electricity, and renewals. Cost range is for 2030 to 2060 flows*
Whole of life costs		
Net Present Value - 30yr timeline - (Circa)	**$671 M to $771 M**	

7. Options assessment

This section summarises the multi-criteria assessment for Option E, using the approach used in the Short List Options Report. Refer to the Short List Report (GHD, 2025) for the full MCA framework and a summary of Option A to D scores.

7.1 MCA assessment

As part of this assessment of Option E, cultural scores were not assigned due to the short turnaround of time with respect to the development of Option E and putting it into QLDC Decision Report. GHD were requested to provide information on Option E on the 10th February 2026, with the development of option and scores required for the Council review and then Council workshop on the 19th February 2026.

The Rūnaka statement, accompanying the Short List Report, articulates the position of the iwi partners involved in this project. They have explicitly stated that they do not support any options that rely on discharges into the Kimi-ākau/Shotover or Kawarau Rivers, as presented in the Short List Report (GHD, 2025).

7.1.1 Investment objectives

Table 3 below presents the scores and rationale for each investment objective against Option E.

Table 3 Investment objectives – score and rationale for Option E

Investment objective	Score	Rationale
Investment objective 1 – the health and well-being of the surrounding waterways are maintained, protected, and improved where practicable to support water quality.	4	- Land based distribution of nutrient load across large area, providing high potential for attenuation. - Removes delta groundwater effects. - Reduces water quality effects in shallow riverbank areas of Frankton, but may introduce such effects to Arrow and downstream Kawarau Rivers, where impacted groundwater discharges. - Reduces potential for algal growth and nuisance growth. - Public health risks mitigated by long subsurface travel times.
Investment objective 2 – The disposal of treated wastewater aligns with tikanga as guided by mana whenua.		Not scored or evaluated at this time
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.	2	A better option than the Base Case (Current Situation) as it can accommodate future flows (2060 Design horizon) if the appropriate site can be purchased, accessed or acquired

7.1.2 Social and environmental impacts

Table 4 below presents the scores and rationale for each social and environmental impact against option E.

Table 4 Social and environmental impacts – score and rationale for Option E

Social and environmental objective	Score	Rationale
Social and environmental impact 1 – Mō tātou, ā, mō kā uri ā muri ake nei For us and our children after us		Not scored or evaluated at this time
Social and environmental impact 2 – Cultural impacts to sites of significance and access to sites for cultural activities.		Not scored or evaluated at this time
Social and environmental impact 3 – Impacts to the surrounding environment	2	- No river diversions required - Removes wastewater disposal from delta area, to areas more distant from surface water. - Subsurface disposal, but nitrogen load remains within catchment, with diffuse discharge to surface water more proximal to Crown Range (Kawarau River, Arrow River, and tributaries of Arrow River).
Social and environmental impact 4 – Environmental impacts to surrounding catchment land, soil and groundwater	1	- Improvement in delta groundwater conditions. - Possible impact on crown range groundwater quality. - Localised effects to surface water quality. - potential for extensive soil disturbance (dependent upon disposal methodology).
Social and environmental impact 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.	2	- location of discharge is not highly visible to users of area other than traffic driving through Crown Range. Score could be changed if above ground infrastructure substantial in size or not flexible on location. Benefit to base case in that discharge will not occur in widely used recreational areas (cyclists/walkers/river users). Localised visual effect for owners/neighbours of disposal site during construction
Social and environmental impact 6 – Amenity effects - The extent to which	3	- significant improvement for recreational users (e.g. trail /river users) with no discharge in Delta area or on publicly accessible land.

Social and environmental objective	Score	Rationale
there is a receptor or social impact from options.		

7.1.3 Critical success factors

Table 5 Critical success factors – scores and rationale for Option E

Critical success factors	Score	Rationale
Critical success factor 1 – Constructability and technical feasibility	-3	– Consideration given for technical challenges and uncertainties relate to the construction of the effluent conveyance and large area of land disposal
Critical success factor 2 – Sustainability - Carbon emissions and sustainable use of resources supporting organisational goals.	-4	– Consideration given for much higher construction volume than Base Case for the disposal trenches over a large area and long conveyance pipeline, and significant energy required for pumping over the life time of the asset
Critical success factor 3 – Operational reliability and maintainability	-2	– Higher O&M input than the Base Case considering operation and maintaining disposal infrastructure over the vast land disposal area (240ha)
Critical success factor 4 – Property difficulties and impacts	-4	– Significant difficulties and challenges related to reaching agreement to use the land or will require full land purchase
Critical success factor 5 – Achievability of indicated outcomes	-2	– Uncertainty about soil characteristics, particularly handling peak wet weather flows – Uncertainty around location and conditions of surface water receiving environment for locally impacted groundwater flow
Critical success factor 6 – Consent, design, and construction, and implementation timeframe	-2	– Complexities associated with technical investigations of potential land parcels, and subsequent land purchase would likely push the complete date outside the Dec 2030 timeframe as specified in the Enforcement Order
Critical success factor 7 – Costs and affordability	-5	– Significantly higher CAPEX, OPEX and NPV than Base Case and other short list options (CAPEX >$575M vs LTP budget of $77M), this would significantly impact rates

7.2 Option E assessment summary

This section compares MCA scores for Option E against the short list optioned. The following Table 6 provides a MCA scoring summary across all the options.

Table 6 Shotver Shortlist MCA score summary – including the additional Option E

Investment Objectives	Current short-term situation - Discharge to Shotover River	Option A Land flow path to river via Kawarau	Option B Wetland on Delta + Land Flow Path to Kawarau	Option C Boreholes at Frankton (+ Option B)	Option D Soakholes at Frankton (+ Option B)	Added* Option E – Land disposal only
The health and well-being of the surrounding waterways are maintained, protected, and improved where practicable to support water quality.	0	2	2	3	3	4
The disposal of treated wastewater aligns with tikanga as guided by mana whenua. (Aukaha)	No score	No score	No score	No score	No score	Not evaluated
The disposal of treated wastewater aligns with tikanga as guided by mana whenua. (TAMI)	No score	No score	No score	No score	No score	Not evaluated
Ability to service the community's and visitor wastewater needs now and into the future up to the equivalent flows projected for 2060.	0	2	2	2	2	2
Environmental and Social Impacts						
Mō tātou, ā, mō kā uri ā muri ake nei For us and our children after us (Aukaha)	No score	No score	No score	No score	No score	Not evaluated
Mō tātou, ā, mō kā uri ā muri ake nei For us and our children after us (TAMI)	No score	No score	No score	No score	No score	Not evaluated
Cultural impacts to sites of significance and access to sites for cultural activities. (Aukaha)	No score	No score	No score	No score	No score	Not evaluated
Cultural impacts to sites of significance and access to sites for cultural activities. (TAMI)	No score	No score	No score	No score	No score	Not evaluated
Impacts to the surrounding environment	0	2	2	2	2	2
Environmental impacts to surrounding catchment land, soil and groundwater	0	2	2	1	1	1
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.	0	-1	0	-1	-2	2
Amenity effects - The extent to which there is a receptor or social impact from options.	0	0	1	1	1	3
Design, Delivery and Operation						
Constructability and technical feasibility	0	0	0	-2	-3	-3
Sustainability - Carbon emissions and sustainable use of resources supporting organisational goals.	0	-1	-2	-4	-4	-4
Operational reliability and maintainability	0	1	0	-2	-3	-2
Property difficulties and impacts	0	0	0	-2	-3	-4
Achievability of indicated outcomes	0	2	2	-3	-4	-2
Consent, design, and construction, and implementation timeframe	0	1	-1	-3	-3	-2
Costs and affordability	0	-1	-2	-4	-5	-5

8. Overall remarks

This report assessed Option E against the short list options (Options A to D) using a similar approach for the purpose of transparently testing whether a fully land-based disposal option could be feasible despite the constraints of such an option. Key findings are:

– A large land area requirement (a minimum of 288 ha as total area) would be needed. There is limited suitable land within the potential catchment. Acquisition or access to land of this size could be difficult and potentially not possible. For this assessment, the potential disposal site is on the Crown Range terrace, about 15 km away from the Shotover WWTP and an elevation gain of 360 metres. This would require pump stations, a conveyance pipeline and disposal infrastructure.
– An exclusive discharge to land option performs well against the projects key investment objectives related to the health and wellbeing of waterways, with more favourable scores for visual and amenity effects.
– Rūnaka have not undertaken an assessment of Option E against the cultural objectives, but it is likely that this option would be viewed more favourable than all other short list options due to it not involving a direct discharge to water.
– The option scores poorly compared to Options A and B in most other criteria, from constructability, technical feasibility, sustainability (construction carbon and energy use related to pumping), operability, property difficulties (uncertainties around access of suitable land), certainty of achieving the desired outcomes and completion timeframe and cost.

In addition, Option E would incur significantly higher capital expenditure and operating costs than Option A and Option B. The preliminary capital estimate of Option E is in the range of $575 to 675M, with a net present value of $671 to 771M. The high implementation cost could result in affordability difficulties for the community.

Based on our assessment, the benefits of this option do not sufficiently offset its significant cost, deliverability, and risk/disadvantages to be considered a practicable or preferred solution.

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