

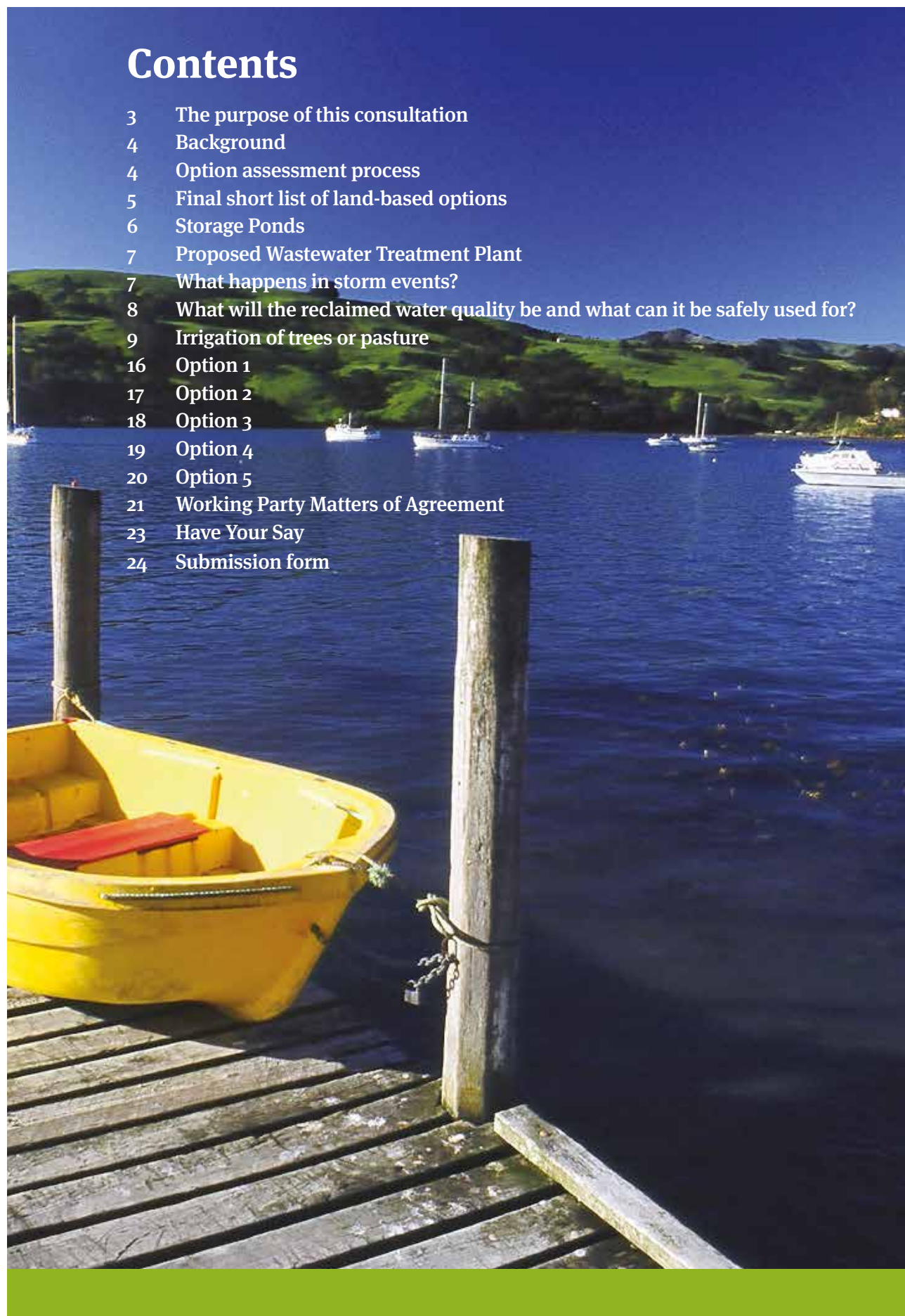
# Akaroa Reclaimed Water Beneficial Reuse, Treatment and Disposal Options

Consultation 3 – 30 April 2017



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# The purpose of this consultation

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This consultation is to seek public feedback on five options for the beneficial reuse, treatment or disposal of reclaimed water from a new wastewater treatment plant planned for Akaroa. Reclaimed water is wastewater (sewage) that has been treated to remove solids and other impurities to the point where it can safely be reused by the public for non-potable (non-drinking) uses, such as watering public parks and flushing toilets.

Christchurch City Council resolved in 2011 to close the wastewater treatment plant at Takapūneke and its disposal pipeline to the harbour. Currently, the wastewater is discharged into Redhouse Bay via a 100 metre long pipeline. The Council has budgeted \$33 million in its Long Term Plan to upgrade the Akaroa Wastewater Scheme, including upgrading wastewater mains and three existing pump stations, and to build a new pump station, a new wastewater treatment plant and a new discharge system for reclaimed water. The consent for the existing wastewater treatment plant at Takapūneke expires in 2020.

In 2015, the Council obtained resource consents to build and operate a new Akaroa Wastewater Treatment Plant on Old Coach Road and a new pump station in the boat park at Childrens Bay, and to upgrade wastewater mains and three existing pump stations.

However, the Council's applications for resource consents to construct a new pipe outfall to Akaroa Harbour, and discharge reclaimed water via that pipe outfall, were declined. Under the Resource Management Act (RMA) 1991, applications for discharge to water must establish that alternatives have been investigated and reasonably discounted. The Hearing Commissioners considered that the Council had not satisfied this requirement, and that the cultural concerns of Ngāi Tahu regarding avoiding discharge to water had not been adequately addressed.

The Council lodged an appeal against the decline of the resource consent for discharge into the harbour but has left that appeal on hold while it again investigates alternatives.

After much research, the Council is now consulting on five options:

1. Irrigation of trees or pasture in Robinsons Bay
2. Irrigation of trees or pasture at Pompeys Pillar
3. Irrigation of trees or pasture in Takamātua Valley, in combination with another area
4. Non-potable re-use in Akaroa, in combination with another option
5. Disposal via a new outfall pipeline to the mid-harbour (the original proposal for which consent was sought)

You'll find more information about each option further on in this consultation booklet. More detailed information about the project and the options considered, including all the technical reports and the consent application for the harbour outfall can be found at <https://ccc.govt.nz/services/wastewater/wastewater-projects/akaroa-wastewater-scheme>

The purpose of the Akaroa wastewater scheme is to provide Akaroa with a suitable means of treating and reusing or discharging its wastewater.

The Council will be making a Local Government Act (LGA) decision on which reclaimed water disposal option to pursue. It must take into account social, cultural and economic interests; the option must be efficient, effective and appropriate; and it must be consentable as sustainable management under the Resource Management Act (RMA). Discharge to water is not sustainable management under the RMA unless land-based options have been adequately investigated and reasonably discounted.

The Council has not chosen a preferred option but considers some discharge to land options to be more efficient, effective, feasible and appropriate than was originally thought.

The Council is now seeking public feedback on the options for reuse, treatment and disposal of reclaimed water from Akaroa and these options are explained in more detail in this booklet. Public feedback on the outlined options will help inform a decision on which option to take forward for consenting and implementation.



# Background

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The Council has been considering options for Akaroa's wastewater for many years. It is a complex problem with no easy answers.

Banks Peninsula District Council amalgamated with Christchurch City Council in 2006. Christchurch City Council applied to Environment Canterbury for a new resource consent for the Akaroa wastewater treatment plant discharge, as the current consent was about to expire. A short term resource consent for continued discharge into the harbour at Takapūneke was granted in 2008 which expired in 2013. The Council established the Akaroa Area Water Services Working Party in 2008 to consider other options for the treatment and disposal of Akaroa's wastewater.

In November 2011 the Council resolved to build a new wastewater treatment plant away from Takapūneke, which would produce high quality wastewater, to be discharged into the middle of the harbour.

A short term consent for continued discharge at Takapūneke (CRC133179) was granted in 2013 to allow more time to get resource consents for and to build the Akaroa wastewater scheme.

In June 2014 the Council applied for resource consents for the new Akaroa Wastewater Scheme, including:

- A new wastewater treatment plant on Old Coach Road, including membrane filtration
- An upgrade of existing pump stations and wastewater mains
- A new pump station in the boat park at Childrens Bay
- A harbour outfall pipe and discharge to the mid-harbour.

Consents were granted in July 2015 for all of the above apart from the outfall pipe and discharge to the mid-harbour.

The Council has lodged an appeal against the decline of those consents but will not take it further until it has reassessed alternatives to discharging into the harbour. The two consent authorities under the RMA (Environment Canterbury and the Christchurch City Council) are defending their decision to decline the consent applications. Ōnuku Rūnanga, Wairewa Rūnanga, the Akaroa Taiāpure Management Committee and Te Runanga o Ngāi Tahu (the Ngāi Tahu parties), as submitters to the resource consent process, decided to join this legal process to support the decision to decline resource consent for the discharge into the harbour.

In their submission, the Ngāi Tahu parties advised that Ngāi Tahu rights and interests associated with Akaroa Harbour are strongly focused on mahinga kai (food gathering). Discharge of treated human waste to the harbour is culturally offensive and incompatible with the customary use of the harbour as a 'food basket'. As tāngata whenua, Ngāi Tahu have kaitiaki rights and responsibilities to actively protect natural resources in Akaroa for future generations. Protecting and enhancing the mauri (life force) of the harbour requires eliminating the discharge of wastewater into Akaroa Harbour. This has been the Ngāi Tahu position for many decades and is detailed in their Ngāi Tahu resource management planning document (Mahaanui Iwi Management Plan, 2013).

The Council has worked with the Ngāi Tahu parties, the community and Environment Canterbury to explore land-based alternatives to a harbour outfall.

## Options assessment process

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Once the wastewater has been treated, it needs to be discharged. A long list of options was considered and several were discounted:

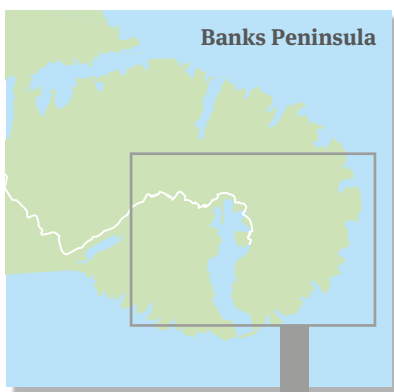
- Pumping or taking wastewater by tanker to the Christchurch wastewater treatment plant had negative environmental effects and was too expensive.
- Overland flow or a Rakahore chamber (typically a concrete chamber with rocks embedded in it which allows the wastewater to come into contact with the land) before discharging to the harbour were discounted for not using natural processes and for discharging into the harbour.

The option of an outfall beyond the heads of Akaroa Harbour was considered in the Akaroa Wastewater Selection Options 2008 report (MWH, 2008). The cost estimate at that time was \$28-\$47 million and it would be significantly more expensive now. The pipeline would be 11km long. The Akaroa Harbour marine chart notes that the harbour entrance has "generally heavy ground swell" and "loose seabed, bad holding ground". The heads of Akaroa Harbour face south and are expected to experience significant water currents and swells, particularly during bad weather. Outfall construction involves a high degree of risk and complexity due to the nature of the environment (changeable sea and weather conditions, and underwater work in near zero visibility). Due to the high cost and technical difficulty, this option was discounted.

# Final short list of land-based options

A desktop study was undertaken to identify possible areas for irrigation of reclaimed water. Irrigation is challenging on Banks Peninsula due to its steep hillsides and soils which have low permeability and are slip-prone. The following criteria were used:

- Within a reasonable distance of the new wastewater treatment plant on Old Coach Road, to avoid excessive capital and operating costs. All of eastern Banks Peninsula was considered.
- Relatively flat to reduce the risk of instability in the irrigation area and to downhill land. A slope of less than 19 degrees was used for the irrigation area, and no more than 15 degrees downhill of the irrigation area.



- A buffer distance of at least 25 metres from a residential zone for spray irrigation to pasture, or at least 5 metres for drip irrigation to trees. A smaller buffer distance is appropriate for drip irrigation as there is no spray drift.
- A buffer of 1 hectare around individual houses in the possible irrigation area, to allow for on-site wastewater disposal.
- A 25 metre buffer around the perimeter of the irrigation area for spray irrigation and a 5 metre buffer around the perimeter of the irrigation area for drip irrigation (within the property boundary).
- A buffer distance of at least 25 metres to permanent streams and the coast, and 10 metres to ephemeral streams, to minimise the risk of nutrients migrating to surface water.
- Property size of at least 2 hectares for spray irrigation to pasture, or 1 hectare for drip irrigation to trees. Due to the smaller buffer distance, smaller land parcels can be considered for drip irrigation.
- Not known to have land stability issues.
- Excluding land identified as High Natural Character or Outstanding Natural Landscape in the District Plan, plus a 50 metre buffer, to avoid negative landscape effects.

These criteria have restricted technically suitable land for irrigation to relatively flat populated valleys and a remote headland with no downhill infrastructure. The locations that meet these criteria are in Takamatua Valley, Robinsons Bay and Pompeys Pillar (see Figure 1 for a map). Geotechnical investigations and infiltration testing have been undertaken and the results confirm their suitability for irrigation with reclaimed water.

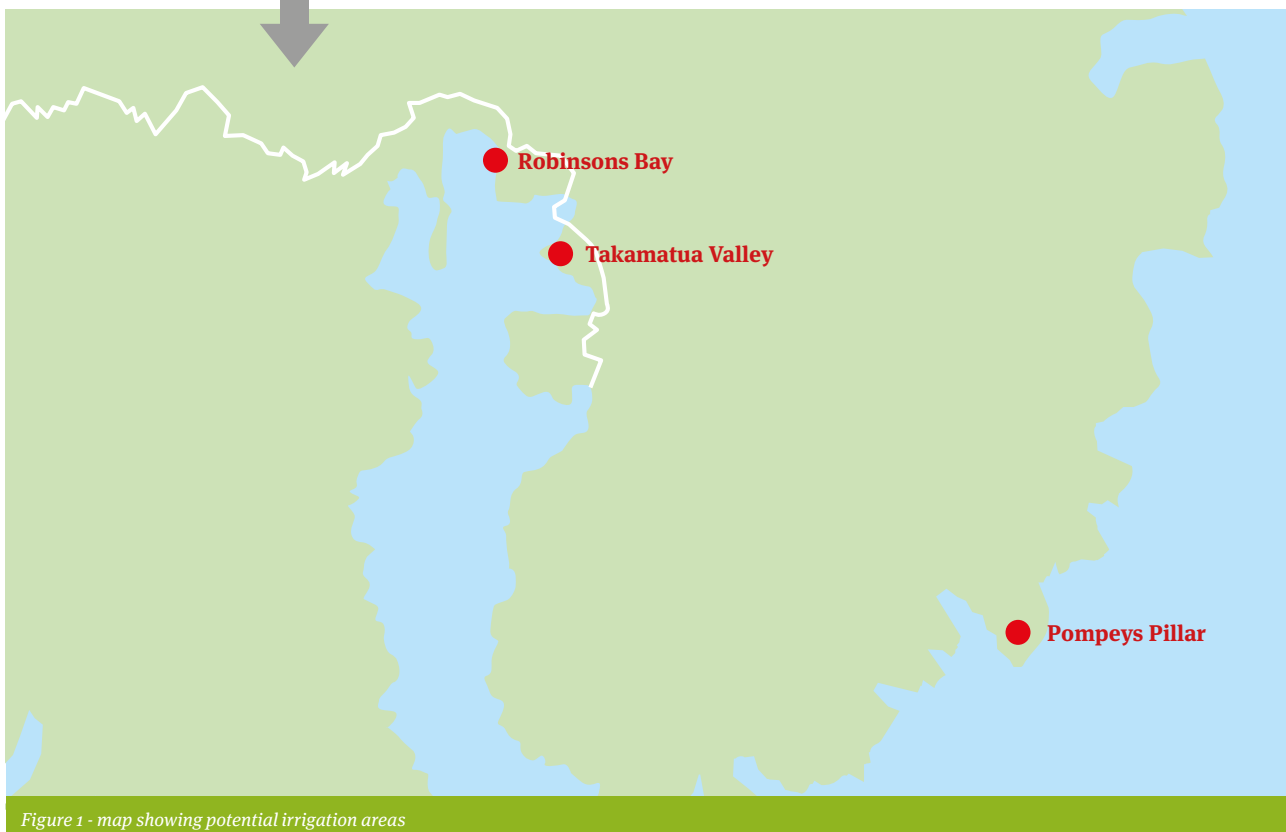


Figure 1 - map showing potential irrigation areas

# Storage Ponds

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Reclaimed water storage pond(s) would be required to hold the reclaimed water when the ground is too wet and irrigation isn't possible. A desktop study and site visit was undertaken to identify possible areas for storage ponds. The following criteria were used:

- Relatively flat (slope of less than 4 degrees) to minimise the embankment height and construction costs
- A buffer distance of 25 metres to roads, to allow for landscape planting
- A buffer distance of 100 metres to houses, to avoid nuisance effects (e.g. midgets)
- A buffer distance of 25 metres to waterways, to avoid stream floodplains
- Property area of at least 1 hectare
- At an elevation of at least 2 metres above Mean High Water Springs, to allow for sea level rise
- Elevation of less than 200 metres above sea level to avoid excessive pumping and construction costs
- Not known to have land stability issues.

The most favourable location for a storage pond is over the road from the treatment plant site on Old Coach Road (pond site 10), as this is close to the treatment plant and could be used to store water for any of the irrigation areas or for non-potable reuse in Akaroa. Please see Figure 2 for a photo of the site and Figure 3 for an artist's impression of a storage pond. This is indicative only and has not been prepared in accordance with the NZ Institute of Landscape Architects Best Practice Guide, Visual Simulations."

Please see pages 11 to 13 for maps showing possible irrigation areas and storage pond locations. It would be possible to locate the storage volume required in one or more ponds, and these don't need to be located within the irrigation area.

The land required for irrigation and storage ponds could be acquired by the Council by purchase, lease or licence (or a combination of all three). It is the Council's strong preference to obtain the land from willing property owners. However, compulsory purchase under the Public Works Act may be required if agreement with landowners cannot be reached. The need for compulsory purchase is not sufficient justification to exclude an option from consideration under the RMA and the Council must consider all technically feasible options.



Figure 2 - Actual view of pond site 10



Figure 3 - artist's impression of pond site 10

# Proposed Wastewater Treatment Plant

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The new Akaroa Wastewater Treatment Plant on Old Coach Road will be state-of-the-art technology and will produce virtually clear water as shown in Figure 4. Almost all of the bugs (bacteria and viruses) will be eliminated and the reclaimed water would be safe for irrigation or garden watering (except for raw food crops).

The new Akaroa Wastewater Treatment Plant will include the following treatment:

- Fine screening (3mm gap) and grit removal at the new terminal pump station in the Childrens Bay boat park (preliminary treatment)
- Buffer tank at the treatment plant site to smooth out peak flows and for settling solids
- Peak flow storage pond near the treatment plant site to smooth out peak flows
- Anoxic zone followed by aerobic zone to reduce biological oxygen demand (BOD) and nitrogen (full primary and secondary treatment)
- Membrane filtration (1 micron ( $\mu\text{m}$ )) for disinfection (99.9% removal of viruses) (tertiary treatment) and removal of suspended solids (sludge)
- The sludge will then be transported to the Christchurch wastewater treatment plant at Bromley for conversion into biogas (for heating and generating electricity) and biosolids (for rehabilitating the soil at the Stockton Mine).



Figure 4 – Tap water (left) and reclaimed water from the Turangi wastewater treatment plant (which uses membrane filtration as proposed for Akaroa).

## What happens in storm events?

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There are separate pipe networks for wastewater and stormwater in Akaroa. However, during severe storms, some stormwater and groundwater gets into the wastewater network (e.g. through cracks in the pipes and direct connections from roofs to the wastewater network) which increases flows to the treatment plant. The average design flow for the Akaroa population (including tourists) in the year 2041 from Akaroa is 4 litres per second (L/s) and the main treatment plant will be sized to treat flows of up to 21 L/s. During severe weather (once or twice a year) flow in excess of 21 L/s and up to 65 L/s would be stored in a small (1,000 m<sup>3</sup>) covered storage pond near the treatment plant, until there is capacity in the treatment plant to treat the additional wastewater. This means that all wastewater will receive full treatment. The peak flow storage pond could be located on the land opposite the treatment plant site on Old Coach Road, shown as pond site 10, or next to SH75 at pond site 9 (see the map on page 13). The Council would need to purchase the land for the peak flow storage pond.

# What will the reclaimed water quality be and what can it be safely used for?

The proposed reclaimed water quality is shown in Table 1.

Parameter	Median	95th percentile <sup>1</sup>
Total suspended solids (grams per cubic metre, g/m <sup>3</sup> )	5	10
Carbonaceous biological oxygen demand (CBOD) (g/m <sup>3</sup> )	5	10
Total nitrogen (g/m <sup>3</sup> )	20	30
Faecal coliforms (colony forming units per 100 millilitres, cfu/100mL)	5	50

Note: 1. The 95th percentile is the value which will be achieved at least 95% of the time.

The reclaimed water quality from the new Akaroa wastewater treatment plant, compared with other types of treatment plants, is shown in the graphs in Figure 5. It will be significantly better quality than septic tank effluent and also better quality than the current treatment plant is able to achieve. It is better than that achieved by a proprietary

treatment plant supplied by Organica, except for total nitrogen. The treatment plant design could be changed to achieve a total nitrogen concentration of 5 g/m<sup>3</sup> if needed to avoid adverse effects on the receiving environment.

E. coli (a pathogen indicator) has been measured in the Takamātua Stream by Environment Canterbury (ECan) since 2002, with a median value of 390 MPN/100 mL (most probable number per 100 milliliters). ECan does not measure water quality in Robinsons Bay Stream. The reclaimed water quality will be better than the current water quality in Takamātua Stream from a public health perspective.

The reclaimed water quality will be better than the guideline values for indirect irrigation of raw human food crops (edible product separated from contact with water e.g. by peel or use of drip irrigation), irrigation of pasture for grazing with a 48 hour stock withholding period, stock drinking water and irrigation of publicly accessible recreation areas (ANZECC 2000, Title 22 standard of the Californian Health Law used by Fonterra, Ministry of Health 1992). It will not be suitable for drinking water for humans or for irrigating raw food crops such as salad greens.

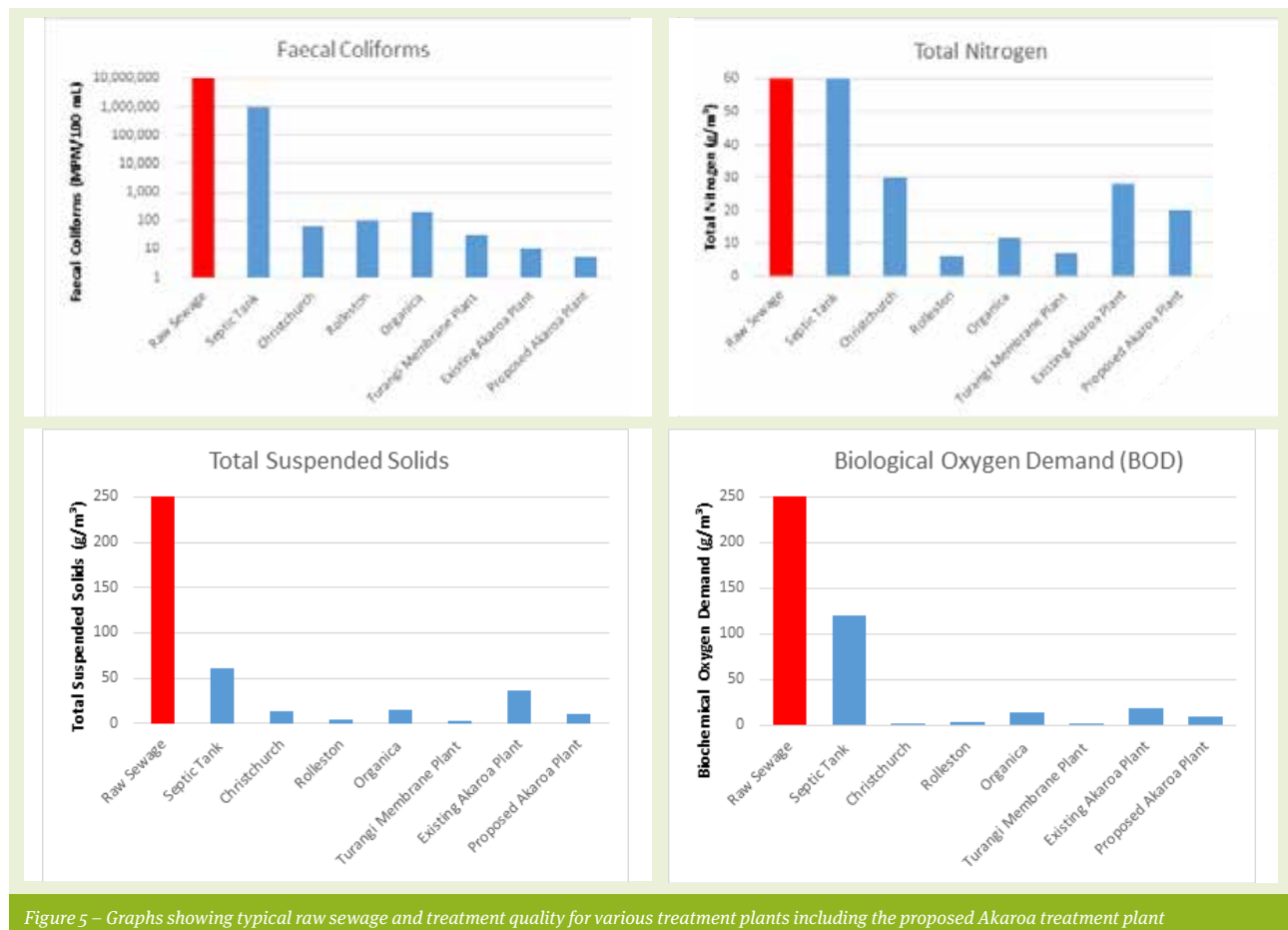


Figure 5 – Graphs showing typical raw sewage and treatment quality for various treatment plants including the proposed Akaroa treatment plant



# Irrigation of trees or pasture

## Description

Reclaimed water is irrigated onto the soil beneath trees or onto pasture, where it drains slowly through the ground. The trees or pasture absorb nutrients from the reclaimed water and filtration through the soil further removes nutrients, and any remaining bacteria and viruses. This option does not discharge reclaimed water to the harbour.

In the case of trees, the canopy provides some cover when it rains, which means the ground can absorb more reclaimed water during wet weather than if there were no trees. Various tree species are being considered, but would likely be a mixture of native species which would gradually become regenerating native bush and could be a biodiversity area. Lincoln University is undertaking a trial of irrigating various native species using reclaimed water in Duvauchelle and the results would be used to inform tree selection. Low-growing species would be used along boundaries to neighbouring properties to avoid shading effects. Public access to the area could be provided due to the high standard of reclaimed water. Drip irrigation on the surface is the most favourable irrigation method for simplicity and ease of installation, but subsurface drip irrigation would also be possible. A long establishment time would be required to grow the trees (at least five years), so an alternative discharge for most of the wastewater would be needed once the current discharge consent expires in 2020. This could be a new short term consent for the current wastewater treatment plant at Takapūneke.

In the case of pasture, spray irrigation would be the most cost-effective irrigation method, but drip irrigation would also be possible. K-line or fixed type irrigation would be most likely due to the shape of the areas that are suitable for irrigation. Photos of reclaimed water irrigation systems are shown in Figure 6.

Based on local infiltration testing results and experience elsewhere with similar systems, the concept design is based on irrigating 7 mm per day during summer and 3 mm per day at other times of the year. However, it will not be possible to irrigate every day as there would be times when the soil is too wet to be irrigated. It would be necessary to store the reclaimed water in storage pond(s) at these times. For irrigation to pasture this would mean storing all wastewater over the winter, and storing wastewater at other times of the year during and immediately after rainfall. Trees intercept a proportion of rainfall, so it is possible to irrigate trees year round.

The storage pond(s) would be constructed with earthen bunds, lined with high density polyethylene, designed to withstand earthquakes and other natural disasters and would include landscape planting to fit in with the surrounding environment. If a pump was required to pump the reclaimed water to an irrigation area, this would be located next to the pond, either in a small shed in keeping with the rural environment or below ground. Depending on the option(s) chosen the pond(s) may be visible from public areas and private houses. Depending on ground conditions, the pond could be partly or wholly above ground, with water depth of up to 3 metres. The design would include a spillway in the unlikely event that the pond capacity was exceeded, in which case the reclaimed water would overflow and make its way to the nearest stream. The pond(s) would be empty for much of the year, particularly in summer.



Figure 6 - Drip irrigation of reclaimed water to trees at Wainui (left) and K-line spray irrigation of reclaimed water to pasture at Blenheim (right)

Forty years of local historical rainfall data was used to calculate the irrigation area required for trees and pasture and the storage pond volume (see Table 2). The area required for storage ponds depends on the topography and pond depth. For irrigation to trees, the pond would cover an area of around 0.9 ha (slightly smaller than a rugby field) and for irrigation to pasture the pond would cover an area or around 2.5 ha (equivalent to 2.5 rugby fields).

Table 2 – Storage pond volume and irrigation area required			
Option	Wastewater storage volume	Minimum area for storage pond	Minimum area for irrigation
Drip irrigation to trees	17,500 m <sup>3</sup>	0.9 ha	25 ha
Spray irrigation to pasture	35,000 m <sup>3</sup>	2.5 ha	27 ha

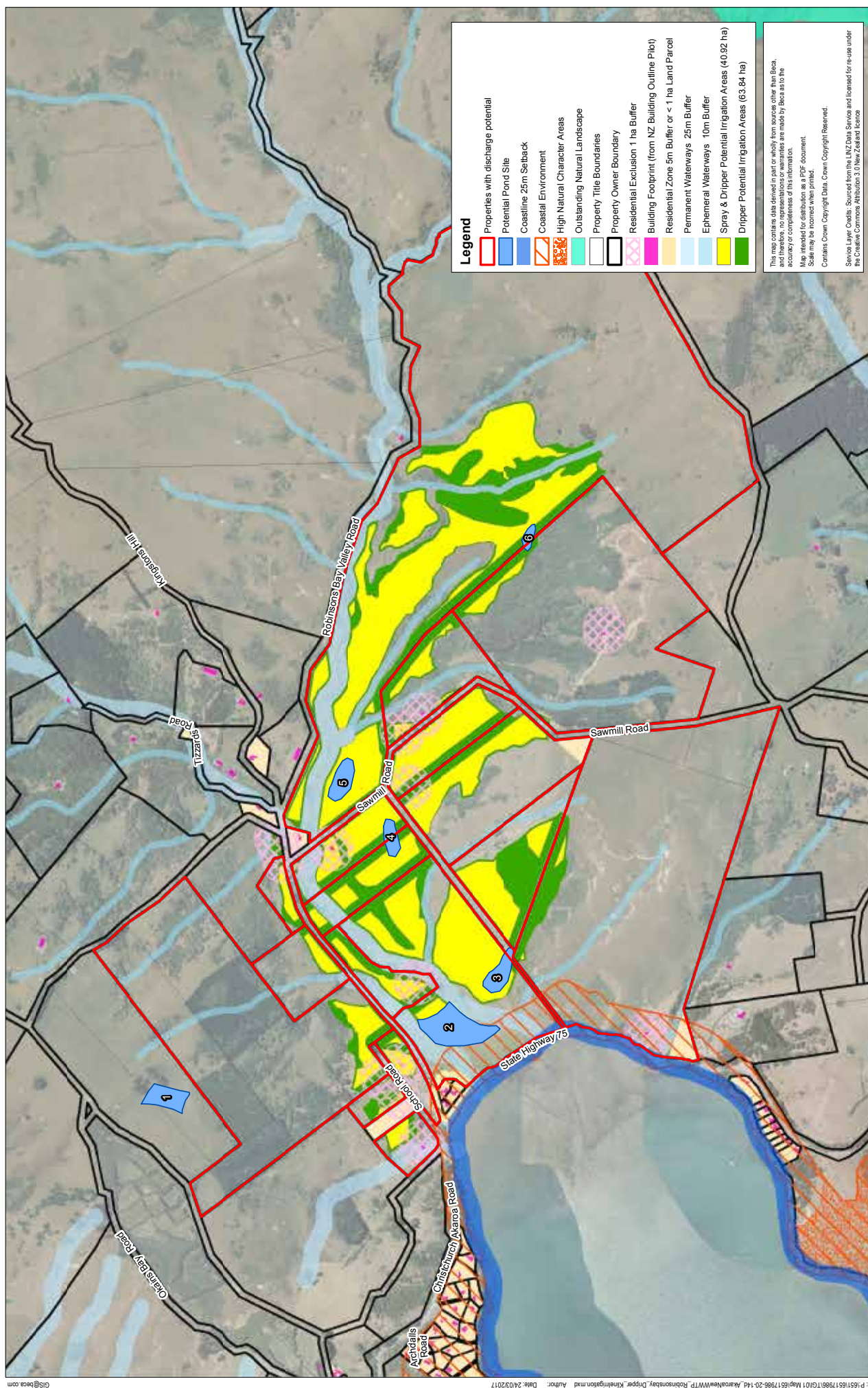
The irrigation scheme including storage pond(s), pump station(s) and pipelines would be designed to be resilient to natural disasters such as earthquakes and floods, and in accordance with Council’s Infrastructure Design Standards and Construction Standard Specifications, and other relevant New Zealand standards and guidelines. This design process includes consideration of possible failure modes and whether these are mitigated through design or operational measures (e.g. standby generators in the event of power failure). Pipes from the treatment plant to the irrigation scheme would be laid along public and paper roads, for ease of access during construction and future maintenance.

Depending on who owned the land, the irrigation scheme could be operated by a contractor on behalf of Council, or by the farmer. An irrigation management plan would set out how the scheme should be operated and this could be included as a condition of resource consent.

Please see pages 11 to 13 for maps showing the areas that meet the criteria for irrigation of reclaimed water to trees or pasture, and possible storage pond locations. Geotechnical investigations and infiltration testing have been undertaken in Takamātua Valley, Robinsons Bay and Pompeys Pillar and this testing found that the land is suitable for irrigation of reclaimed water. The maps are based on a desktop assessment, preliminary geotechnical investigations and infiltration testing. The areas shown on the maps may change as more detailed investigations will be needed to confirm the exact extent of suitable land.









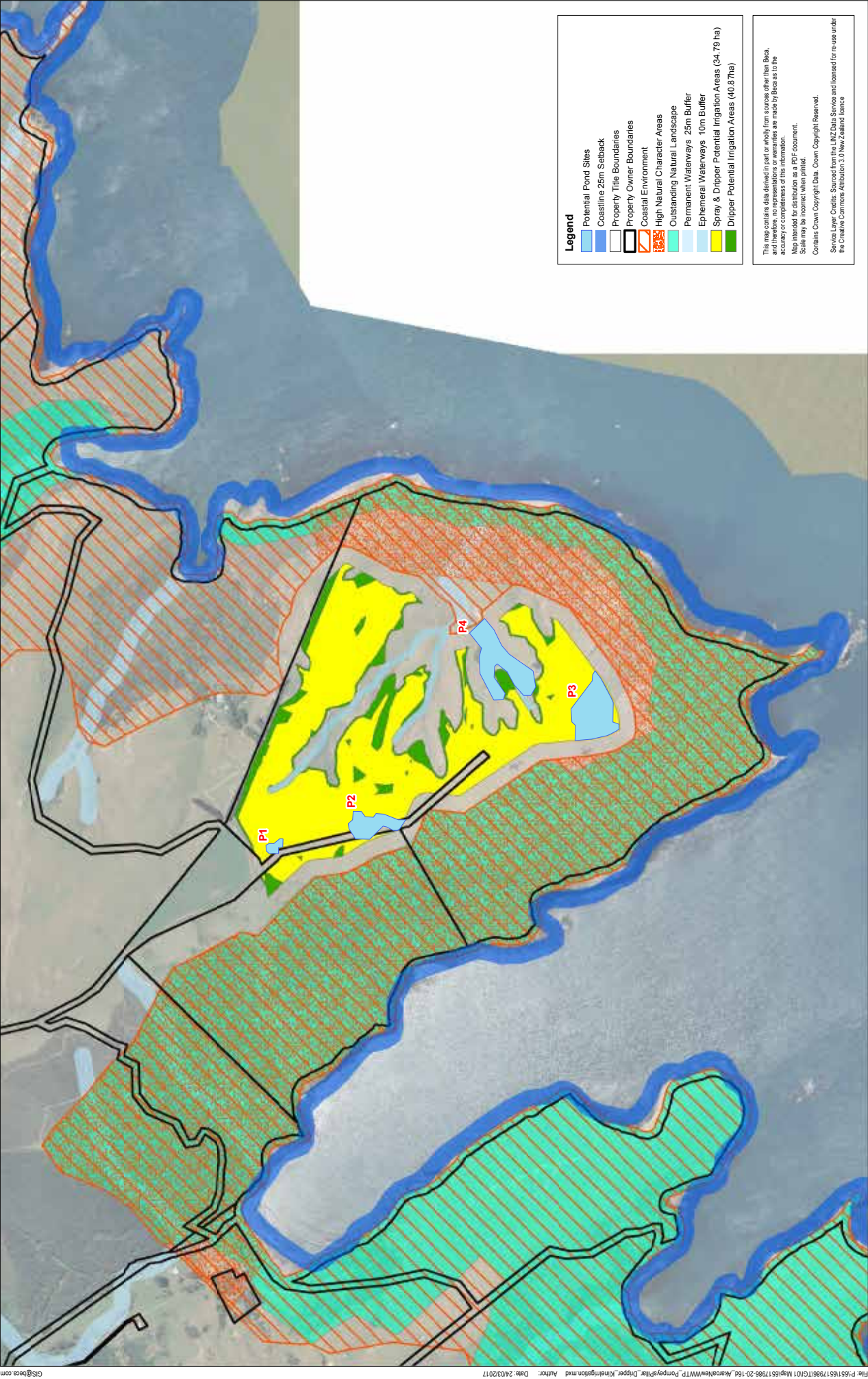


Fig. P-1651651798617986-20-16d\_AkaroaNewWWTP\_PompeysPillar\_Dripper\_Kinohianga.mxd Author: Date: 24/03/2017

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The capital cost estimates and whole of life (net present value) cost estimates for each option are shown in Table 3. The cost estimates for Takamātua Valley include some irrigation in Robinsons Bay, as there is insufficient suitable land for irrigation in Takamātua Valley as a standalone option. These are concept cost estimates and are accurate to  $\pm 30\%$ . The current project budget includes \$7.4 million for disposal via a harbour outfall. If a more expensive option was chosen, the Council would need to find additional funds.

Table 3 – Capital Cost Estimates		
Option	Capital Cost Estimate	Net Present Value Cost Estimate
Irrigation of trees in Robinsons Bay	\$6.6 million	\$7.1 million
Irrigation of pasture in Robinsons Bay	\$7.7 million	\$8.6 million
Irrigation of trees in Takamātua Valley, in combination with irrigation of some land in Robinsons Bay	\$8.4 million	\$8.9 million
Irrigation of pasture in Takamātua Valley, in combination with irrigation of some land in Robinsons Bay	\$11.8 million	\$12.9 million
Irrigation of trees at Pompeys Pillar	\$11.9 million	\$13.3 million
Irrigation of pasture at Pompeys Pillar	\$13.7 million	\$15.7 million
Non-potable re-use in Akaroa for irrigating public parks and flushing public toilets (partial solution)	\$1.7 million	\$2.1 million
Disposal via a new outfall pipeline to the mid-harbour	\$7.4 million	\$7.6 million

A hybrid option using some irrigation to trees and some irrigation to pasture is possible. It would also be possible to irrigate in more than one location, and this would need to be the case if irrigation in Takamātua Valley was selected. If non-potable reuse was chosen, this would need to be in combination with another option as it is estimated to use around a quarter of the total annual reclaimed water volume.

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## Effects

The geographical and geotechnical criteria have limited the areas that may be suitable for irrigation to two populated valleys (Robinsons Bay and Takamātua Valley) and a remote headland (Pompeys Pillar).

The report Akaroa Wastewater Investigation of Alternative Sites for Land Irrigation (CH2M Beca, 2017) includes a preliminary assessment of environmental effects and these are summarised below.

A high level assessment of landscape and visual effects found that Robinsons Bay and Takamātua Valley have the potential to accommodate an irrigation scheme (trees or pasture) with little or no impact on the existing character, views, or general amenity of the residents and/or visitors. This is because the landscapes already comprise a patchwork of various types of land cover and the introduction of another 'patch' would not result in adverse effects of any real note. However, the Pompeys Pillar site is highly natural, has high scenic values and is relatively unmodified compared to other sites. Therefore an irrigation scheme (trees or pasture) and storage pond(s) at this site has a high potential for negative landscape effects. Storage Pond Sites 1 (northern side of Robinsons Bay), 4 (west side of Sawmill Road, Robinsons Bay) and 10 (Old Coach Road, opposite the treatment plant site) have the lowest risk of negative landscape and visual effects.

The reclaimed water quality will be suitable for land application and none of the remaining contaminants are likely to affect soil structure. It would be applied at rates which the soil and plants can assimilate, both in terms of water and nutrients, and there would be no ponding or runoff to surface water. There would be some increased drainage to the subsoil and groundwater. The treatment plant and irrigation area would be sized and designed to avoid adverse effects from nitrogen leaching through the soil into groundwater and streams. Alternative water supplies would be provided by the Council for any wells or springs used for drinking water that could be affected by the irrigation scheme.

The distance travelled by wastewater spray droplets is influenced by droplet size, landscape and wind conditions. The low pressure K-line irrigators proposed for the spray irrigation option emit relatively large droplets of water that tends to settle onto the land surface reasonably close to the spray nozzles. Shelter belts around the boundary of spray irrigation areas also reduce the risk of spray drift. This in combination with the high reclaimed water quality means that there would be a very low risk to public health.

The reclaimed water will be highly treated and will not have an offensive or objectionable odour. The potential pond odour risk is low. Aeration of the pond, or covering the pond, would address this.

The reclaimed water pipeline from the treatment plant to the storage pond would be made of robust and resilient material (polyethylene (PE) for Robinsons Bay and Takamātua Valley, or stainless steel for Pompeys Pillar due to the high pressure). The pipeline would be designed to last at least 50 years and to withstand damage from earthquakes and other natural hazards.

The construction of the pipelines and ponds would produce

a temporary localised increase in noise levels, but this would be mitigated by compliance with the NZ Standard for Construction Noise and expected separation distances. Drip irrigation produces no noise and low pressure spray irrigators are a very low source of noise. If mechanical aeration or a pump is needed at the storage pond, potential noise effects can be mitigated by noise insulation of equipment and adequate separation distances. Overall, there would be minimal potential for noise nuisance.

Irrigation would be at a low rate (less than 7mm/day) and there would be no ponding of water, so there would be no opportunities for mosquitos or midges to breed. Midges may breed in the pond when there is water in it. While midges are not harmful, a separation distance of at least 100 metres to the nearest house is proposed to avoid nuisance effects.

The Beca report stated that the amenity values of the surrounding areas are not expected to be significantly affected by an irrigation scheme. These facilities are not out of place in a rural environment and factors affecting amenity such as noise, odour and spray drift are expected to be minimal.

However, the residents of the valleys have expressed concerns about the irrigation proposed.

Irrigation of reclaimed water is strongly supported by Ngāi Tahu, as there is no direct discharge to streams or the harbour and it is consistent with their cultural values. The opportunity to create an area of regenerating bush, biodiversity area or irrigate productive farmland would mean the reclaimed water was used in a beneficial way in an area short of water. Other landowners along the pipeline route could also use the water for irrigation.

**The short-listed options are described below. Comments on advantages and disadvantages are the preliminary views of Council staff. People are invited to comment on these, or on any other advantages or disadvantages of the options.**



# Option 1 – Irrigation of trees or pasture at Robinsons Bay

## Summary

The area of land that meets the criteria for spray irrigation in Robinsons Bay is 41 hectares and for drip irrigation is 64 hectares. Therefore, there is enough land in Robinsons Bay for a spray or drip irrigation scheme. A 5 kilometre pipeline from the treatment plant to Robinsons Bay would be required, with wastewater flowing by gravity.

Please see page 11 for a map showing the areas that meet the criteria for spray and drip irrigation and spray irrigation to pasture in Robinsons Bay, and possible storage pond locations.

There are four locations where wastewater storage ponds could be constructed in the valley, and two other locations on the north and south sides of the valley. If the ponds were located in the valley, they would be able to be fed by gravity from the proposed wastewater treatment plant as it is at a higher elevation. A pump station would be needed next to the storage pond(s) to pump the reclaimed water to the irrigation area.

Please see Figure 7 for a photo of the site and Figure 8 for an artist's impression of irrigation to trees in upper Robinsons Bay. This is indicative only and has not been prepared in accordance with the NZ Institute of Landscape Architects Best Practice Guide, Visual Simulations.

The current land use comprises of residential lifestyle blocks, tourist accommodation and pastoral farming developed from its rich pioneering history, with associated archaeological areas and several historic cottages. The current landscape reflects this history.

The estimated cost of a scheme for drip irrigation to trees in Robinsons Bay is \$6.6 million, which is the least expensive standalone option. It is less expensive than a similar scheme in Takamātua Valley as there are better sites for storage ponds. The estimated cost for a scheme for spray irrigation to pasture in Robinsons Bay is \$7.7 million. This is slightly more expensive than the estimated cost of \$7.4 million for a harbour outfall, so additional budget would be required to fund this option.

## Advantages

- Opportunity for beneficial reuse
- Enough suitable land for irrigation, with several potential pond sites
- Fewer land owners with whom to negotiate land acquisition, compared with Takamātua Valley
- A known landowner willing to sell an area suitable for irrigation to trees
- Most favourable soil types of the three irrigation areas being considered
- Low groundwater level, compared with Takamātua Valley
- Suitable distance from treatment plant to allow conveyance by gravity
- Least expensive standalone option – lower capital and whole-life costs; irrigation to trees is within project budget

## Disadvantages

- Reclaimed water from Akaroa is disposed in an area which is populated and does not have a reticulated wastewater system
- There would be an increased risk of instability of stream banks near the irrigation area
- The valley is prone to flooding; this would be taken into account in the design of the irrigation area and pond(s).



Figure 7 – Actual view of Robinsons Bay viewed from the paper road between Robinsons Valley Road and Okains Bay Road



Figure 8 – Artist's impression of irrigation to native trees in upper Robinsons Bay viewed from the paper road between Robinsons Valley Road and Okains Bay Road



## Option 2 - Irrigation to trees or pasture at Pompeys Pillar

### Summary

The area of land that meets the criteria for spray irrigation at Pompeys Pillar is 35 hectares and for drip irrigation is 41 hectares, so there is enough land for either option. This location has the benefit of being on one property which is remote, has no residential dwellings onsite and has few neighbouring properties.

However, Pompeys Pillar is much further from the treatment plant than Robinsons Bay or Takamātua Valley, and wastewater would need to be pumped through a 10 kilometre long pipeline. The pipeline would pass over a 620 metre high hill, so would need to be a high-pressure pipeline made of stainless steel. There are three potential pond sites on flatter areas, or a storage pond could be formed by damming a gully.

Please see Figure 9 for a photo of the site and Figure 10 for an artist's impression of irrigation to pasture at Pompeys Pillar. This is indicative only and has not been prepared in accordance with the NZ Institute of Landscape Architects Best Practice Guide, Visual Simulations.

Please see page 12 for a map showing the areas that meet the criteria for spray and drip irrigation, and possible storage pond locations.

The estimated cost of a scheme for drip irrigation to trees in Pompeys Pillar is \$11.9 million and for spray irrigation to pasture \$13.7 million. These are amongst the most expensive options due to the high pipeline cost. It is significantly more expensive than the estimated cost of \$7.4 million for a harbour outfall, so additional budget would be required to fund this option.

This site is in the takiwā of Te Rūnanga o Koukourārata. The rūnanga has advised that the area has cultural significance and a cultural impact assessment is being undertaken.

### Advantages

- Opportunity for beneficial reuse
- Enough suitable land
- Area within one land parcel
- Could provide additional stock drinking water in a dry area
- Lowest groundwater level
- Suitable for a fire storage pond
- Suitable for small-scale hydro electricity generation on the downhill pipeline

### Disadvantages

- Potential negative effect on a sensitive landscape
- Distance from treatment plant; pump station and high-pressure pipeline needed
- May be a culturally significant site
- Expensive option; additional budget would be needed



Figure 9 – Actual view of Pompeys Pillar



Figure 10 - Artist's impression of irrigation to pasture at Pompeys Pillar

## Option 3 – Irrigation of trees or pasture at Takamātua Valley, in combination with another area

### Summary

The area of land that meets the criteria for spray irrigation in Takamātua Valley is 9 hectares and for drip irrigation is 19 hectares. A larger area is required for spray irrigation due to the larger buffer distances. There is not enough land in Takamātua Valley for a spray or drip irrigation scheme to be solely located here, so it would need to be in combination with another area. A 2.5 kilometre long pipeline from the treatment plant to Takamātua Valley would be required.

A Takamātua Valley irrigation scheme would be problematic due to land constraints and areas of high groundwater. The topography of the valley dictates that suitably sloping and potentially irrigable land in the valley floor is a long and thin zone close to the Takamātua Stream. It is divided into many small areas owned by many different landowners, making the scheme more difficult to construct and operate. In addition the path to groundwater is likely to be shortest for this location, with the highest risk of nutrients leaching to groundwater.

Ōnuku Rūnanga has advised Council that they support investigations to determine the feasibility of discharge of treated wastewater to land within the Silent File area. The Council will continue to work closely with Ōnuku Rūnanga to address concerns if they arise.

There is one location within Takamātua Valley that meets the criteria for a storage pond. Nearby locations are on Old Coach Road opposite the treatment plant site or on the ridge above Takamātua Valley Road.

Please see page 13 for a map showing the areas that meet the criteria for spray and drip irrigation, and possible storage pond locations.

The estimated cost of a scheme for drip irrigation to trees in Takamātua Valley combined with some land in Robinsons Bay is \$8.4 million, which is more than the cost of a harbour outfall. The estimated cost for of a scheme for spray irrigation to pasture in Takamātua Valley combined with some land in Robinsons Bay is \$11.8 million. This is amongst the most expensive options due to the fragmented nature of the land that is potentially suitable for irrigation. Additional budget would be required to fund both options.

### Advantages

- Opportunity for beneficial reuse
- Proximity to treatment plant; wastewater could be conveyed by gravity
- Reclaimed water used in more than one location

### Disadvantages

- Small amount of land in fragmented parcels
- Negotiations needed with many landowners
- Not enough land for a standalone irrigation scheme
- Single pond site; groundwater close to surface, requiring above ground pond, which increases the cost
- Reclaimed water from Akaroa is disposed of in a populated area that has no reticulated wastewater system
- Increased risk of instability for stream banks near the irrigation area
- The valley is prone to flooding; this would be taken into account in the design of the irrigation area and pond
- Expensive option; additional budget would be needed

## Option 4 - Non-potable reuse in Akaroa

### Summary

Further work has been done which has found that non-potable reuse in Akaroa is a realistic option for around a quarter of the annual reclaimed water volume. A reclaimed water pipe (“purple pipe”) could be constructed at the same time as the upgrades to the wastewater network to bring reclaimed water to Akaroa for beneficial reuse. This could be used to keep parks and reserves lush and green all summer long (e.g. Akaroa Recreation Ground, Jubilee Park, L’Aube Hill Reserve, Stanley Park) and flush public toilets.

The estimated cost is \$1.7 million and would need to be in combination with another option.

In future, a reticulated “purple pipe” residential supply, for flushing toilets, watering gardens and washing cars could be installed for all of Akaroa. While in theory it may be possible to use the annual volume of reclaimed water, it may not be possible or practical to build enough storage ponds to store the required volume over winter when water use is low. The Council also needs certainty that it can dispose of all of Akaroa’s reclaimed water all of the time, rather than relying on voluntary use so even in the long term this would need to be in combination with another disposal or reuse option.

### Advantages

- Beneficial reuse
- Improved park amenity
- Reduced demand on drinking water supply
- Proximity to treatment plant; wastewater could be conveyed by gravity
- Reclaimed water used in more than one location
- Paves the way for a more extensive “purple pipe” scheme in Akaroa

### Disadvantages

- Not a standalone solution

# Option 5 – Disposal via a new outfall pipeline to the mid-harbour

## Summary

This is the option that the Council originally preferred and applied for resource consents to implement. Resource consents for the outfall and the discharge were declined. This consultation is assisting the Council to assess whether a land-based discharge option is now preferred.

The outfall pipe would reach from the new treatment plant, out into the middle of the harbour (around 2.5km out from Childrens Bay) with a diffuser at the end for the discharge. This compares with the current outfall pipe from the existing treatment plant at the Takapūneke site, which extends only 100 metres from Redhouse Bay. The outfall pipe would be fully buried over its entire length in Council land and roadway, and then out into the harbour in Childrens Bay. The potential location of the outfall has been discussed with the Harbourmaster to ensure there is no conflict with boat mooring sites.

The diffuser would be 9.5 metres below the water surface, and the wastewater would be diluted at least 78 times before it reaches the surface, and further dilution is achieved as the plume spreads out.

A public health risk assessment found that the illness risk to swimmers would be generally low when compared to tolerable risks inherent in the New Zealand water quality guidelines for recreational areas. It also found that the illness risk to people eating raw shellfish would be higher than for swimmers, but would be still low. This would be a significant improvement on the public health risks from the current discharge from Redhouse Bay. There would be no ecological effects from the harbour outfall, other than disturbance of seagrass beds at Childrens Bay during construction, which would be replanted afterwards.

## Advantages

- No additional land area required
- Low operation and maintenance costs; wastewater would flow by gravity
- Relatively low cost, within the project budget

## Disadvantages

- No beneficial reuse of reclaimed water
- Some risk to public health from contact recreation or eating raw shellfish
- Offensive to the Ngāi Tahu parties
- Not supported by the RMA unless there has been reasonable consideration and discounting of other options



# Working Party Matters of Agreement

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In its joint statement, the Working Party has expressed the matters it agrees on. In terms of the options in this booklet, these are:

- A reclaimed water storage pond over the road from the treatment plant site (pond site 10) is the best of the 10 potential pond sites, as it is near the treatment plant, has the lowest overall impact, is in the best position to provide reclaimed water for non-potable reuse in Akaroa and could provide storage of water for irrigation at any of the locations being considered. There is not enough room to store the all the required volume at this site, so at least one other pond would be required.
- Non-potable reuse of reclaimed water to irrigate public parks and flush public toilets in Akaroa is supported, as this demonstrates the safety of the water for beneficial reuse and Council's commitment to a sustainable solution for Akaroa's wastewater

- Irrigation to trees on the upper southern slopes of Robinsons Bay (generally south of the paper road) is more acceptable than on the valley floor where it is closer to residences
- Irrigation to pasture at Pompeys Pillar is more acceptable than irrigation to trees, as this would allow farming of the land to continue.

Please refer to the Akaroa wastewater scheme webpage for the full joint statement of the Working Party: <https://ccc.govt.nz/services/wastewater/wastewater-projects/akaroa-wastewater-scheme/>



# Have your say

Your views on the five short-listed options for the Akaroa Wastewater Scheme are important to us, and we encourage you to provide feedback. Anyone can comment on these options or suggest other options. Written submissions can be made to the Council during the consultation period which opens on Monday 3 April and closes on Sunday 30 April 2017.

Once the consultation has closed, a report on the options and the feedback will be prepared and there will be an opportunity for submitters to be heard by a hearings panel on Monday 29 May and on Friday 2 June if a second day is required. The Council will decide which option to pursue for the purposes of obtaining land and gaining resource consent at its meeting on Thursday 22 June. Before the Council makes its decision, the project team will inform submitters of the feedback from the community and provide an update on the next steps.

A consultation meeting will be held at Ōnuku Marae, where Council staff and consultants will provide information and answer questions about the five options, and Ōnuku Rūnanga will explain the cultural significance of this project to local Rūnanga.

Date	Time	Venue
Tuesday 18 April 2017	6 – 8.30pm	Ōnuku Marae, 389 Onuku Road, Onuku, Akaroa

There will also be drop-in sessions where you can find out more about the options and ask questions of Council staff (drop in at any time during the below events):

Date	Time	Venue
Sunday 9 April 2017	1 – 4pm	Gaiety Hall, Rue Jolie, Akaroa
Tuesday 11 April 2017	5.30 – 7.30pm	Civic Offices, Function Room, 53 Hereford St, Christchurch

You can make your views known at the consultation meeting and drop-in sessions.

Please also let us know:

- If you would like to speak to your submission
- If you are making a submission as an individual or as part of an organisation.

Copies of this consultation booklet are available:

- Online via the Council's website: [ccc.govt.nz/haveyoursay](http://ccc.govt.nz/haveyoursay)
- At Civic Offices, 53 Hereford Street, Christchurch
- At all Council libraries and customer service desks.

If you have any questions, contact Tara King, Senior Engagement Advisor on (03) 941 5938 or email [tara.king@ccc.govt.nz](mailto:tara.king@ccc.govt.nz).

## Timeline

- Monday 3 April 2017 – Consultation opens
- Sunday 9 April 2017 – Drop-in session at Gaiety Hall in Akaroa
- Tuesday 11 April 2017 – Drop-in session at Council Civic offices Christchurch
- Tuesday 18 April 2017 – Information meeting at Onuku Marae
- Sunday 30 April 2017 – Consultation closes
- Monday 29 May 2017 – Submissions heard by hearings panel
- Friday 2 June 2017 - Submissions heard by hearings panel (second day if required)
- Thursday 22 June 2017 - Council decides which option to pursue

# Submission form

haveyoursay

[www.ccc.govt.nz/haveyoursay](http://www.ccc.govt.nz/haveyoursay)

## PLEASE READ BEFORE COMPLETING YOUR SUBMISSION

The Christchurch City Council is seeking your feedback on the five proposed options for the Akaroa wastewater project:

- Option 1 – Irrigation of trees or pasture in Robinsons Bay
- Option 2 – Irrigation of trees or pasture at Pompeys Pillar
- Option 3 – Irrigation of trees or pasture in Takamātua Valley, in combination with another area
- Option 4 – Non-potable re-use in Akaroa, in combination with another option
- Option 5 – Disposal via a new outfall pipeline to the mid-harbour

### Submissions are public information

**Please note:** Your full name, address and telephone number are required because this information is important for transparency, and for Christchurch City Council's decision-making process. It also means we can update you on progress. Ideally we would like your email address too, if you have one, as this makes it easier for us to stay in touch with you throughout the engagement process.

Your submission, including your name and contact details, will be made available to the decision-making body, for example the Community Board, Committee and/or Council, to help them make an informed decision.

Submissions, with names but without contact details, are made available online once the Board, Committee or Council agenda goes live on the Council website.

If requested, Council is legally required to make all written and/or electronic submissions available to the public, including the name and contact details of the submitter, subject to the provisions of the Local Government Official Information and Meetings Act 1987.

If you believe there are compelling reasons why your contact details and/or submission should be kept confidential, please contact the Council's Engagement Manager on (03) 941 8999 or 0800 800 169 (Banks Peninsula residents).

### How to give us your feedback

You can use this submission form or you can provide your feedback in a number of ways:

- **Online:** You may enter your submission using the online form provided on the Council's website at [ccc.govt.nz/haveyoursay](http://ccc.govt.nz/haveyoursay)
- **By email:** [akaroawwproject@ccc.govt.nz](mailto:akaroawwproject@ccc.govt.nz)  
Please make sure your full name and address is included with your submission.
- **By mail (no stamp required):**  
Freepost 178  
Attention: Hearings Team  
Akaroa Wastewater Scheme  
Christchurch City Council  
PO Box 73016  
Christchurch Mail Centre  
Christchurch 8154
- **By hand delivery to:** Civic Offices, 53 Hereford Street, Christchurch or at the drop-in sessions

Consultation closes on Sunday 30 April 2017

## Fundamentally, what environment would you prefer Akaroa wastewater is discharged into?

- ☐ Irrigation of reclaimed water to trees or pasture
- ☐ Disposal via a new outfall pipeline to the mid-harbour
- ☐ Other (please describe)

Please state your reasons why:

Please rate the options listed below with a number according to your preference, with 1 being your most preferred option and 5 your least preferred option (please note the options below are in no particular order).

- ☐ Option 1 – Irrigation of trees or pasture in Robinsons Bay
- ☐ Option 2 – Irrigation of trees or pasture at Pompeys Pillar
- ☐ Option 3 – Irrigation of trees or pasture in Takamātua Valley, in combination with another area
- ☐ Option 4 – Non-potable reuse in Akaroa, in combination with another option
- ☐ Option 5 – Disposal via a new outfall pipeline to the mid-harbour
- ☐ Other (please describe)

Please state your reasons for this ranking:

Continued overleaf



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**Would you be more supportive of spray irrigation of treated wastewater to pasture or drip irrigation to trees? Please state your reasons why:**

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**Do you have a preference for the location of reclaimed water storage pond(s)? Please state your reasons why:**

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**Do you think the Council should add aspirational projects to the Akaroa wastewater scheme (e.g. fire storage ponds, providing a reticulated wastewater scheme in Takamātua Valley)? If so, which ones do you support and why?**

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**Do you have any other comments? (Please use additional paper if required):**

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Thank you for taking the time to respond. Please include you contact details over the page.

# Submission form continued

## Contact details

Contact name \_\_\_\_\_

Organisation name (if representing) \_\_\_\_\_

Contact address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ Postcode \_\_\_\_\_

Phone number (day) \_\_\_\_\_ Phone number (evening) \_\_\_\_\_

Email (if applicable) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

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## Do you wish to present your submission at the hearing? Please tick one of the boxes below:

*Please note that deputations will not be permitted at the meeting where the Council makes its decision.*

☐ Yes – I/We would like to be heard

☐ No – I/We do not want to be heard

No anonymous submissions/feedback will be accepted.

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FREEPOST Authority No.178



Attention: Hearings Team  
Akaroa Wastewater Scheme  
Christchurch City Council  
PO Box 73016  
Christchurch Mail Centre  
Christchurch 8154

tape here

tape here





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Attention: Hearings Team  
Akaroa Wastewater Scheme  
Christchurch City Council, PO Box 73016  
Christchurch 8154  
Email: [akaroawwproject@ccc.govt.nz](mailto:akaroawwproject@ccc.govt.nz)  
Website: [ccc.govt.nz/haveyoursay](http://ccc.govt.nz/haveyoursay)