

Report

Akaroa Wastewater Scheme Upgrading -Resource Consents Application and Assessment of Effects on the Environment -Volume 2 Appendices

Prepared for Christchurch City Council

Prepared by CH2M Beca Ltd

30 June 2014



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Appendix A

Existing Consent

Record Number: CRC133179 Record Type: New Consent Record Status: Issued - Active File Number: CRC133179 Previous Record(s): Next Record(s):

Permit Type: Coastal Permit Record Holder: Christchurch City Council

Location: Beach Road, Akaroa Harbour **Description:** To discharge treated effluent from the Akaroa wastewater treatment plant into coastal water.



Customer Services P. 03 353 9007 or 0800 324 636

PO Box 345 Christchurch 8140 P. 03 365 3828 F. 03 365 3194 E. ecinfo@ecan.govt.nz www.ecan.govt.nz

Key Dates:

Event	Date
Commencement Date	08 Oct 2013
Given Effect To	08 Oct 2013
Lapses	08 Oct 2018
Expires	08 Oct 2020

Workflow (Only shows if workflow has open tasks):

Task Name	Task Status	Task Status Date
Record Lodgement	Completed - Ready for s88	18 Dec 2012
Complete s88 Check	Completed - Accept Application	19 Dec 2012
Audit Application	Completed	28 Jan 2013
Complete Recommendation	Completed - No Reviews Reqd	30 Jan 2013
Make Notification Decision	Completed- Public Notification	30 Jan 2013
Manage Submission Period	Completed	13 Mar 2013
Prepare Officers Report	Completed	11 Apr 2013
Decide Decision Maker	Completed - Hearing Reqd	13 Mar 2013
Decide on Direct Referral	Completed - No Request	13 Mar 2013
Prepare for Hearing	Completed - Hearing Commenced	30 May 2013
Hold Hearing	Completed - Decision Received	30 May 2013
Record Notified Final Decision	Completed	30 May 2013
Notify and Issue Final Decision	Completed - Notfd,Dcld,s88	30 May 2013
Prepare Notification	Completed	01 Feb 2013
Advise Applicant of Notification	Completed - Ready to Notify	01 Feb 2013
Finalise Application	Completed	26 Nov 2013
Manage Objection Period	Completed - Granted	26 Nov 2013
Receive Objection/Appeal	Completed - Appeal Received	02 Jul 2013
Organise Appeal	Completed	26 Nov 2013
Track Env Court Hearing	Completed	26 Nov 2013
Complete Objection	Completed	26 Nov 2013
Manage Objection Period	Completed - Obj/Appeal Recvd	02 Jul 2013
Organise Pre Hearing or Mediation	Completed	13 Mar 2013
Organise Hearing Charges	Completed	11 Apr 2013
Organise Hearing	Completed	30 May 2013
Complete Hearing Organisation	Completed	30 May 2013

Conditions:

No	Text
1	The discharge shall be only treated wastewater from the Akaroa Wastewater
	Treatment Plant (WWTP), located at Redhouse Bay, Akaroa Harbour at or about map
	reference (NZMG) NZMS 260: N37: 0569-0984; (NZTM) Topo 50: BY25:9568-4825,

	as shown on Plan CRC133179A	, which forms part of this conse	ent.
2	Treated wastewater from the Ak discharged into Akaroa Harbour or about map reference (NZMG) BY25:9558-4831, as shown on F	aroa Wastewater Treatment Pla via an existing 100 metre long NZMS 260: N37: 0558-0991; (Plan CRC133179A.	ant shall be submerged outfall at NZTM) Topo 50:
3	Warning notices, which can be r and maintained at the following l	ead from a distance of five met locations:	res, shall be erected
	a. On the shoreline 400 me the outfall, andb. Beside Beach Road adja	tres either side of the point on t cent to the rocks that lead out t	he shoreline nearest o Green Point.
	The warning notices shall advise and the potential risk of swimmir location.	e the public of the existence of ang in the area or eating shellfish	a wastewater outfall collected in that
	Treated Wastewater Quantity		
4	 a. The volume of wastewate Plant shall be continuous b. The readings from the flo shall be used to calculate treatment plant. These of determine compliance with 	er discharged from the Akaroa ' sly recorded using a flow meter. ow meter shall be recorded in lit e the daily volume of wastewate laily volumes shall be recorded th Condition (5).	Wastewater Treatment res per second and er discharged from the and used to
5	The volume of treated wastewated ay, except during rainfall events consecutive days.	er discharged shall not exceed s of a total of 50 millimetres or i	750 cubic metres per nore over three
	Note: For the purposes of this co Akaroa EWS weather station op	ondition, the rainfall shall be tha erated by NIWA (Agent number	t measured at the $r = 36593$).
	Treated Wastewater Quality		
6	Treated wastewater shall be san Akaroa Harbour via the outfall. T frequencies specified, and analy Table 1: Treated wastewater qua	npled after treatment and prior The samples shall be grab samp rsed for the contaminants listed ality monitoring – contaminants	to discharge into bles collected at the in Table 1: and sampling
	frequency Weekly (From 1 Dec to 28 Feb) Monthly (from 1 Mar to 3) Nov) Annually
	faecal coliforms enterococci	faecal coliforms enterococci	lead copper
	total suspended solids (TSS) TSS	chromiur	n
	biochemical BOD	5	cadmium
	Dissolved reactive phosphorus (DRP)	DRP	zinc
	ammonia	ammonia	

	Nitrogen oxides (NOx)NOxTotal phosphorus (TP)TPTotal nitrogen (TN)TNtemperaturetemperature
7	Sampling shall be undertaken in accordance with the sampling schedule in Conditions (6), (12) and (16). The schedule shall seek to incorporate sampling during times with variable environmental parameters listed in Condition (20) (b) to (d) This schedule is to be agreed with the Canterbury Regional Council's RMA Compliance and Enforcement Manager within one month of the commencement of this consent.
8	The median concentration of faecal coliforms in the treated wastewater shall not exceed 1000 colony forming units per 100 millilitres.
9	The consent holder shall use the best practicable option to ensure the median concentrations of Biological Oxygen Demand Five days (BOD ₅) and Total Suspended Solids (TSS) in the treated wastewater do not exceed 30 grams per cubic metre.
10	For the purposes of Conditions (8) and (9) the median shall be calculated from the results of any five consecutive treated wastewater samples analysed.
	Contact Recreation and Shellfish Gathering
11	The receiving water shall be sampled and analysed for faecal coliforms and enterococci at the following locations, as shown on Plan CRC133179B, which forms part of this consent:
	a. At the shoreline nearest the outfall;b. 400 metres along the shoreline in a southerly direction from Site (a); andc. 400 metres along the shoreline in a northerly direction from Site (a).
12	Receiving water sampling and analysis for faecal coliforms and enterococci concentrations shall occur at least weekly between 1 December and 28 February each year and at least monthly for faecal coliforms between 1 March and 30 November each year. Receiving water sampling shall occur within six hours of treated wastewater sampling.
13	In the event that the analysis of receiving water samples collected at each site beyond the 250 metre mixing zone in accordance with Conditions (11) and (12) indicates:
	 a. A concentration of faecal coliforms that exceeds a rolling median of 14 faecal coliforms per 100 millilitres from the previous five samples collected in the period 1 December to 28 February each year, the consent holder shall notify the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, within one month of detecting the exceedence; b. That the concentration of the faecal coliforms in more than ten percent of total samples collected between 1 December and 28 February each year exceeds 43 faecal coliforms per 100 millilitres, the consent holder shall notify the Canterbury Regional Council, Attention: RMA Compliance and Enforcement

	Manager, within one month of detecting the exceedance.
	Advice Note: Assessment against this trigger value shall be on an individual site basis.
14	The notification required under Condition (13) shall include the information required to be collected in Condition (20) and shall identify whether the exceedance is likely to have resulted from wastewater discharged from the Akaroa Wastewater Treatment Plant and if so, shall detail what measures the consent holder has implemented or will implement to mitigate any adverse environmental effects as a result of the exceedance, and to prevent a reoccurrence. <i>Advice note: The investigations required under this condition shall be to determine whether the WWTP was operating abnormally during the period of sampling. The measures identified in accordance with this condition will be those required to return the WWTP to normal operation in the event that abnormal operation is identified.</i>
	Aquatic Ecosystems
15	 Grab samples of the receiving water shall be collected and analysed for temperature, Total Nitrogen (TN), Dissolved Inorganic Nitrogen (DIN, calculated as NOx + ammonia), Total Phosphorus (TP), chlorophyll-a and Dissolved Reactive Phosphorus (DRP) at the following locations as shown on Plan CRC133179C, which forms part of this consent: a. 250 metres due north of the outfall; b. 250 metres due west of the outfall; c. 250 metres due south of the outfall; d. A control site located at or about map reference (NZMG) NZMS 260: N36:0592-1117; (NZTM) Topo 50: BY25:959-4958, located in French Bay; and e. A control site located at or about map reference (NZMG) NZMS 260: N36:0472-1056; (NZTM) Topo 50: BY25:9471-4897, [potential site of long term outfall].
16	The receiving water sampling and analysis carried out in accordance with Condition (15) shall occur once every three weeks between 1 December and 28 February each year such that a total of four samples are taken over the summer period. Receiving water sampling shall occur within six hours of treated wastewater sampling.
17	For individual sampling events (as detailed in Condition (16)), if the analysis of receiving water samples collected in accordance with Conditions (15) (a) to (c) indicates trigger values of:
	 a. Dissolved inorganic nitrogen (DIN) (combined total of NOx and ammonia) that exceeds a median of 0.062 milligrams per litre (mg/L); b. Dissolved reactive phosphorus (DRP) that exceeds a median of 0.018 mg/L; and c. Ammonia that exceeds a maximum of 0.910 mg/L:
	the consent holder shall identify whether the Akaroa Wastewater Treatment Plant is operating abnormally and if so, shall record what measures the consent holder has implemented or will implement to return the Akaroa Wastewater Treatment Plant to normal operation, and to prevent a reoccurrence.
	Advice Note 1: For the avoidance of doubt, the median shall be determined from the three samples taken on each individual sampling occasion as specified in Condition

	(16) at the locations identified in Condition (15) (a) to (c). The medians shall be calculated for each sampling occasion between 1 December and 28 February.).
	Advice Note 2: The investigations required under this condition shall be to determine whether the WWTP was operating abnormally during the period of sampling. The measures identified in accordance with this condition will be those required to return the WWTP to normal operation in the event that abnormal operation is identified.
	Advice Note 3: The values for Condition (17)(a) and (17)(b) are derived for the Upper Harbour and (17)(c) is an ANZECC guideline value. It is acknowledged that exceedence of a trigger value does not constitute a non-compliance, however it does trigger the requirement for further investigation as detailed above in this condition.
18	Within one month of the end of the monitoring period required by Condition (16), the consent holder shall notify the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager if the trigger values specified in Condition (17) were exceeded.
	This notification shall include the information required to be collected in Condition (20) and shall identify whether the exceedence is likely to have resulted from wastewater discharged from the Akaroa Wastewater Treatment Plant and if so, shall detail what measures the consent holder has implemented or will implement to mitigate any adverse environmental effects as a result of the exceedence, and to prevent a reoccurrence.
	Analysis and Reporting
19	All wastewater and receiving environment samples shall:
	 a. Be collected by a suitably qualified or experienced person; and b. Be analysed at a laboratory accredited for the analyses to ISO guide 25, either by International Accreditation New Zealand (IANZ), or by an organisation with a mutual agreement with IANZ.
20	At the time the wastewater and receiving environment samples are collected, the following parameters shall be recorded;
20	 At the time the wastewater and receiving environment samples are collected, the following parameters shall be recorded; a. time and date of sampling and time delay between wastewater and receiving environment samples collection; b. the precipitation over the three consecutive days prior to sampling;
20	 At the time the wastewater and receiving environment samples are collected, the following parameters shall be recorded; a. time and date of sampling and time delay between wastewater and receiving environment samples collection; b. the precipitation over the three consecutive days prior to sampling; c. the tidal state in the receiving environment at the time of sampling in the receiving environment; and d. wind direction and strength.
20	 At the time the wastewater and receiving environment samples are collected, the following parameters shall be recorded; a. time and date of sampling and time delay between wastewater and receiving environment samples collection; b. the precipitation over the three consecutive days prior to sampling; c. the tidal state in the receiving environment at the time of sampling in the receiving environment; and d. wind direction and strength.

	 Results of the monitoring undertaken in the previous year from 1 July to 30 June:
	 b. An analysis of monitoring results against limits and trigger values specified in Conditions (8) (0) (12) and (17) of this consent;
	 c. A comparison of monitoring results for control sites and sites on the edge of the mining results for control sites and sites (45) to (47)
	d. An analysis of the extent of correlation between the receiving water monitoring
	results and treated wastewater monitoring results, as required in Conditions (6) (11) (12) (15) and (16). This shall include an assessment of the
	information collected for Condition (20), its impact on the results and any
	changes to the sampling regime as a result of this analysis that have been agreed with Canterbury Regional Council;
	e. Comparison of monitoring results as required in Conditions (6), (11), (12), (15) and (16), with historical data:
	f. Comparison of the monitoring results required in Conditions (6), (11), (12),
	g. An interpretation of the results in relation to the effects of the discharge on the
	environment; h. Identification of any measures taken to remedy any exceedences:
	i. Details of all changes or upgrades to the treatment plant that may affect the
	j. Summary of any inflow and/or infiltration investigations or works undertaken in
	the reporting period.
23	Copies of all monitoring results and reports relating to the discharge from the Akaroa
20	Wastewater Treatment Plant shall be made available to the community via the Akaroa
	Service Centre and the Christchurch City Council website.
24	The consent holder shall submit to the Canterbury Regional Council, within six
	months of the grant of this consent, a management plan that details;
	a. measures that will be taken to ensure compliance with the consent limits
	Condition (8) and (9) and receiving environment microbiological parameters
	specified in Condition (13); and; b. Contingency measures in response to mechanical or electrical failures.
25	This consent shall be exercised in accordance with the most recent management
	plan.
	Long-term Options
26	The consent holder shall achieve the following milestones within the term of this
	consent.
	 a. Lodge all applications for the approvals under the Resource Management Act 1991 required to commission the new Akaroa Wastewater Treatment Plant no
	later than 30 June 2014; b. Award contracts for the construction of the new Wastewater Treatment Plant
	within eight calendar months of the commencement of the resource consents
	sought under clause (a) of this condition; c. Require contractors to commence construction on the site of the new
	Wastewater Treatment Plant within nine months of awarding the contracts under clause (b) of this condition:
	d. To have a fully operational new Wastewater Treatment Plant within 36 months

	of awarding the contracts under clause (b) of this condition.
27	The discharge from Akaroa WWTP at or about map reference (NZMG) NZMS 260: N37: 0558- 0991; (NZTM) Topo 50: BY25:9558-4831, shall cease no more than seven years following the commencement of Coastal Permit CRC133179. The consent holder shall submit an annual progress report to the Canterbury Regional Council by the 31 August each year detailing progress made towards meeting the deadline for cessation of the discharge and the clauses of Condition (26).
	Administration
28	The Canterbury Regional Council may, on any of the last five working days of May or November each year, serve notice of its intention to review the conditions of this consent for the purposes of:
	 a. dealing with any adverse effects on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; b. requiring the adoption of the best practicable option to remove or reduce any
	adverse effects on the environment; requiring the consent holder to conduct monitoring instead of, or in addition to, that required by the consent; and
	plan.

Appendix B

Akaroa Harbour Modelling Report (NIWA, 2014a) Appendix C

Drawings









Drawing Plotted: 11 Apr 2014 3:54 p.m.



BEACH RD. BEACH RD. FOR INFORMATION NOT FOR CONSTRUCTION PRELIMINARY NOT FOR CONSTRUCTION PROPOSED RETICULATION REVERSAL (SHEET 2 OF 9)



Drawing Plotted: 11 Apr 2014 3:54 p.m.



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FOR INFORMATION NOT FOR CONSTRUCTION PRELIMINARY NOT FOR CONSTRUCTION PROPOSED RETICULATION REVERSAL CIVIL (SHEET 3 OF 9) 6517986-CE-004











RISING MAIN AND OUTFALL PIPES WILL BE CONSTRUCTED AS PART OF THE AKAROA WATER UPGRADE PROJECT ALONG THE OLD COACH ROAD. REFER TO WATER UPGRADE DRAWING FOR CONTINUATION.

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PROPOSED RETICULATION REVERSAL (SHEET 8 OF 9)

IF IN DOUBT AS

WWW.Ch2n





Printed On: 20/06/2014 3:39 p.m.





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Approved

Date

06/13

Amendments

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OUTFALL LONGITUDINAL SECTION AND DETAILS

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Appendix D

Preliminary Site Investigation (Contamination) Akaroa Wastewater Terminal Pump Station (CH2M Beca, 2014)



Report

Preliminary Site Investigation (Contamination), Akaroa Wastewater Terminal Pump Station

Prepared for Christchurch City Council

Prepared by CH2M Beca Ltd

30 June 2014

Revision History

Revision №	Prepared By	Description	Date
1	Aaron Hodges	Draft for CCC review	19/6/14
2	Genevieve Smith	Final	30/6/14
3			
4			
5			

Document Acceptance

Action	Name	Signed	Date
Prepared by	Genevieve Smith	aldud	30/6/14
Reviewed by	Phillip Ware	Mallo More	30/6/14
Approved by	Garry Macdonald	Andel	30/6/14
on behalf of	CH2M Beca Ltd		

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Executive Summary

CH2M Beca Ltd (CH2M Beca) was commissioned by Christchurch City Council (CCC) to undertake a contamination assessment to determine the potential for soil contamination within an area of land proposed to be disturbed as part of works in the Jubilee Park property boundaries, which has the legal description Lot 1 DP 79110. This review has been completed to support the Akaroa Wastewater Treatment Upgrade project, which involves the installation of a terminal wastewater pump station and wastewater pipeline within the boundary of Jubilee Park, Akaroa.

Assessment included a review of historical photographs, the Environment Canterbury Listed Landuse Register, discharge consents on and near the property, the property file held by CCC, local geology and hydrogeology, and other historical information made available during the investigation. Soil testing was also completed around the proposed location for the Terminal Pump Station only.

Review of all current and historical information has identified that the formation of the land which makes up the area via a combination of traditional reclamation using unknown but potentially benign materials, and areas of landfill may have resulted in soil contamination. The historical use of the property has been for landfill from the pre 1890s to 1978, and the reclamation of adjoining areas of the property with unidentified fill in the late 1800s. 'Waste disposal to land' is an activity listed on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL).

The results of soil testing from the area around the proposed pump station location have not identified any contaminants above the adopted human health criteria for Recreational landuse. However, concentrations of arsenic and zinc in two samples exceeded environmental criteria. Hydrocarbons were also detected within samples. Heavy metal concentrations above background concentrations were also identified.

These results confirm that the property on which the proposed works are to occur is a 'piece of land' under the NES. As a Detailed Site Investigation (DSI) has not been completed for this piece of land, this means a resource consent for a **Discretionary Activity** is required under Regulation 11 of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES). This will require a Contaminated Soils Management Plan (CSMP) for the proposed works.

This assessment for the Akaroa Wastewater Terminal Pump Station project has not sought to address the potential wider contamination risks of the historical landfill on the foreshore of Childrens Bay on public health and the environment.



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1 Introduction

CH2M Beca Ltd (CH2M Beca) has been commissioned by Christchurch City Council (CCC) to undertake a contamination assessment to assess the potential for soil contamination in the vicinity of a proposed wastewater pump station and associated pipeline to be installed in Jubilee Park, Akaroa. This is part of the Akaroa Wastewater Treatment Plant Upgrade project.

The purpose of the Akaroa Wastewater Treatment Plant Upgrade project is to upgrade the wastewater reticulation system, and construct a new treatment process plant and harbour outfall for Akaroa.

1.1 Purpose and Scope

The purpose of this assessment was to assess the potential for soil contamination in areas in which soil will be disturbed for the installation of the Terminal Pump Station and the associated pipelines within Jubilee Park, Akaroa. This assessment included a review of:

- Historical photographs from Google Earth, NZ Aerial Mapping, and other sources
- The Environment Canterbury (ECan) Listed Land Use Register (LLUR) for any sites around the pump station or pipeline route which have been identified as on the Hazardous Activities and Industries List (HAIL)
- The property file held by CCC
- Local geology and hydrogeology
- Discharge resource consents held by ECan for Jubilee Park or within 100m of its boundary
- Historical information relating to the presence and extent of the historical landfill in and around Jubilee Park
- Information relating to the extent, timing, and composition of materials used to reclaim land along the Akaroa coastline
- Other relevant information made available during the timeframe of this investigation.

Limited soil sampling has also been completed at the location of the proposed pump station, where geotechnical investigations encountered landfill waste in excavations. No sampling has been conducted along the route of the pipeline through Jubilee Park. This assessment does not therefore constitute a complete Detailed Site Investigation.

The assessment has been undertaken and reported in general accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines No. 1 – Reporting on Contaminated Sites in New Zealand (2011) and MfE Contaminated Land Management Guidelines No. 5 – Site Investigation and Analysis (2011).


2 Site Details

2.1 Location and Area

The pump station will be located in the boat/trailer park area within Jubilee Park, Akaroa. The legal description for the site is Lot 1 DP 79110, which has an approximate area of 37,916m². The relative location of the site is shown in **Figure 2-1**, and the approximate location of the pump station is shown in **Figure 2-2**. The site is currently sealed by asphalt and is used as a boat storage yard for the Akaroa boat ramp.



Figure 2-1: Location of Akaroa within the broader region (Source: Environment Canterbury GIS)





Figure 2-2: Map showing approximate location of the Terminal Pump Station and associated pipelines within Jubilee Park. (Source: Google Earth Pro – Image © DigitalGlobe)



3 Environmental Setting

3.1 Current Site Use and Activity

The proposed site for the Terminal Pump Station is in the boat storage area of Jubilee Park, Akaroa.

3.2 Surrounding Land Use

The site is located approximately 50m from the harbour edge to the west, and is immediately adjacent to Grehan Stream to the south. Further to the south is a mini golf course, the Akaroa Recreation Grounds and the boat ramp. To the east are the tennis courts, the Akaroa Grand Hotel, and the greater Akaroa residential area. To the north of the site is further carparking, a secure boat storage compound, and Mill Stream, beyond which is Woodills Road and a number of residential properties.

3.3 Receiving Environments

The proposed Terminal Pump Station location is situated between the Grehan and Mill Streams. The site is located nearest to the Grehan Stream, which is approximately 20m to the south, while the Mill Stream is about 70m to the north. These streams flow westward into Childrens Bay, which is also less than 50m from the proposed site for the pump station. Childrens Bay is part of the greater Akaroa Harbour. The Grehan Stream provides a water supply to the Akaroa community, although the extraction point is upstream of the area of proposed works.

3.4 Geology and Hydrogeology

A preliminary geotechnical assessment for the proposed pump station location was completed by CH2M Beca on 25 February 2014 (Preliminary Site Investigation (Contamination), Akaroa Wastewater Terminal Pump Station, CH2M Beca, 2014). A summary of the ground layers expected to be found on the site is given in Table 3.1.

Soil Description	Top of layer (m bgl)	Thickness (m)
Asphalt over engineered fill in the first 0.2m bgl. Below this is primarily silt with a small layer of gravel	0.0	1.2
Primarily silt soils interspersed with refuse and organic matter	1.2	1.4
Gravel soils with organics and refuse	2.6	0.1
Alluvial gravel deposits	2.7	0.1

Table 3.1 Terminal Pump Station Site Ground Model (TP201)

The nearest groundwater bores are wells N36/0057 and N36/0053. N36/0053 is located approximately 230m to the east and upstream of the pump station. The bore's activity status is not used. N36/0057 is located around 200m to the south of the pump station. However, the works involving pipeline installation are likely to come within 20m of this bore. The bore was established in 1970 and has a depth of 60m and a reference level of 6.36m RL.



3.5 Proposed Works

The proposed works within the property boundaries will include the construction of a Terminal Pump Station, including screening and grit removal, within the Akaroa Boat Park, and installation of a pipeline through the carpark, road and across a corner of the recreation grounds.

The actual method of construction is yet to be determined however, minimum volumes of soil disturbance are estimated here. Construction of the pipeline is expected to involve the excavation of between 250-300m³ of material, with materials used as backfill where possible, however some materials may require off-site disposal. The construction of the pump station would involve the disturbance of a minimum of 65m³ of material. Some off-site disposal of landfill materials may be required from the pump station area.

As the groundwater level is high given the proximity to the harbour, it is possible that some dewatering of excavations may be necessary depending on the final design selected.



4 Information Search

4.1 Certificate of Title (CT)

The historical CT for the site shows that the property was created by the Banks Peninsula District Council for the purpose of reclamation and public recreation. An easement to convey water was created for the property on 16 November 1923. No additional information was provided. The CT for the property can be found in **Appendix A.**

4.2 Environment Canterbury

4.2.1 Listed Land Use Register (LLUR)

A request was made to Environment Canterbury on 3 April 2014 regarding the presence of any Listed Land Use Register (LLUR) entries such as hazardous storage or activities onsite. The information provided by Environment Canterbury covered the entire property with the legal description Lot 1 Deposited Plan 79110. The Council's full response can be found in **Appendix B**. The Council has indicated that the property intersects with a site on the LLUR, specifically the Old Akaroa Landfill. The LLUR report provided by the Council indicates that this landfill operated from pre-1900 up to 1978, during which it was used to dispose of general household waste. The Council was not aware of any investigations which have been completed for the landfill site.

4.2.2 Discharge Consents

The Environment Canterbury GIS database was searched to identify whether there were any resource consents for discharges to land or water recorded on the property or within 100m of the site. There were no discharge consents located on or within 100m of the property.

4.3 Christchurch City Council

4.3.1 Property File

The physical and electronic property files for the site were viewed at CCC on 14 April 2014. While the landfill beneath Jubilee Park is mentioned in a few documents, no additional information on its extent or content was found within the property file. The review of the property file showed that most of the property has been used as a recreation ground for most of its history.

Consent applications in the early 2000s showed a proposal to convert the asphalted area north of Grehan Stream into a boat storage area. The initial application was to include boat storage sheds. However, the property file included submissions from the township showing strong opposition to this proposal, and during the site visit, no boat sheds were present in the area. A consent also shows that a skate ramp was also constructed between 2003-5 south of Grehan Stream. Further, resource consent was granted on a number of occasions to erect a Marquee on the Recreation Ground for various events. A proposal was also made in the early 1990s to convert a section of the Recreation Ground into a helicopter landing pad. However, this does not appear to have been completed.

No additional evidence of HAIL activities having occurred in the area of the pump station and pipeline was apparent in the property file.



4.4 Supplementary Information Sources

A review of the Akaroa Mail newspaper, consultation with the Akaroa Museum, and the Historical Flooding Research and Mapping Project report indicate that coastal reclamation has been completed along much of the Akaroa coastline, particularly in the areas behind the Grand Hotel and where the Recreation Ground is now located. Articles in the Akaroa Mail (available online) indicate that the earliest reclamation occurred in 1886-87, when the area of the current Recreation Ground was reclaimed¹. Additional reports suggest reclamation north of the Grehan Stream occurred from 1925 onwards, although it is possible that reclamation started earlier than this. Ms Patsy Turner of the Akaroa Museum indicated that land reclamation was primarily achieved through expansion of the Akaroa Rubbish Dump into the sea.

A search of the historical records of the Akaroa Mail newspaper (copies available online) found numerous references to rubbish dumps. These references stated that in 1920 there was a rubbish dump "behind the Recreation Grounds" and a second rubbish dumping area "behind the Akaroa Grand Hotel". Reports on the state of the dump behind the Recreation Grounds indicate it was not well managed, with a health inspector declaring it "unsanitary, a hotbed for typhoid fever"². The inspector approved the burial of rubbish in the foreshore behind the Grand Hotel. Further reference to the rubbish dump behind the Recreational Grounds was made in 1938 regarding erosion of the sea walls and potential loss of land reclaimed by expansion of the rubbish dump.

4.5 Historical Photographs

Historical photographs for the site have been collected from a range of sources. NZ Aerial mapping provided historical aerial photographs for 1941, 1966, 1975 and 1984. Google Earth also provided a historical aerial photograph for 2002. Additional photographs have been sourced from the Akaroa Museum for the 1890s and 1980s. A photograph from 1867 was also sourced from a Historical Flooding Research and Mapping Project³. These photographs are available in **Appendix C**. These photographs were reviewed to identify any changes in land use on the site and potential areas of HAIL activity.

The following observations were made from the photographs:

- 1867: The oldest photograph found showing the majority of the Akaroa coastline was from 1867. The photograph is taken from the hills to the north of the town. It shows the Akaroa Grand Hotel in the foreground, along with the Mill and Grehan Streams. In the photograph the area presently known as the Recreation Ground has not been reclaimed. Most of the area west of the Grand Hotel was not included in the photograph. However, the coast west of the Grand Hotel appears to run parallel with the present Rue Lavaud.
- 1890s: This photograph shows the area where the foreshore has been reclaimed up to approximately the
 point where the current Recreation Ground field now ends. There is a straight rock wall along the coastal
 edge of the Recreation Ground. The photograph also shows that the coast north of the Grehan Stream
 appears to have been partially reclaimed. However, the coastline in this section of reclamation has not
 been reinforced.

^a Akaroa Harbour Settlement Study Areas, Historical Flooding Research and Mapping Project, February 2008.



¹ Akaroa Mail and Banks Peninsula Advertiser, Volume LV, Issue 5641, 18 December 1931, Page 1. Available online.

² Akaroa Mail and Banks Peninsula Advertiser, Volume LXXXV, Issue 3962, 30 July 1920, Page 3. Available online.

- **1941:** This aerial photograph shows the continued reclamation of the coastline. This has occurred predominantly around the mouth of and to the north of the Grehan Stream.
- 1966: There are two areas of exposed soils, one to the west of the Recreation Ground, and another adjoining Woodills Road east of the Grand Hotel. These areas of soil show continued land reclamation, although it is not discernible as to what materials are being used for the reclamation.
- 1975: This aerial photograph shows a large area of materials deposition on the coast adjacent to the Recreation Ground, in the location of the current Akaroa boat ramp. There is an additional small area of materials deposition immediately south of Mill Stream, but north of the present day tennis courts. The area in between does not appear to have been reclaimed, but is a shallow intertidal area.
- 1980s: This photograph was taken from the hills north of Akaroa, and shows the earthworking activity located west of the Recreation Grounds. At this point in time the earthworked area extends across the Grehan Stream, and material has been used to reclaim more land to the west of the Akaroa Grand Hotel. While the small material deposition site from the 1975 aerial photograph is not captured by this image, it appears that the two areas have merged.
- 1984: This aerial photograph shows the current Akaroa boat ramp and boat storage yard under construction. This construction is occurring on land that was previously used for materials deposition observed in previous historical photographs.
- **2002:** Construction of the boat ramp and boat storage yard has been completed, and no further reclamation appears to have been undertaken.

4.6 Summary of Information Search

This investigation has completed a review of all current and historical information which could be identified for the property. The primary historical activity of concern identified by this review was the use of parts of the property as a landfill from the pre1890s to 1978. In addition, the majority of the property is situated on reclaimed land, with an unknown portion of reclamation achieved from landfilling. The fill used to reclaim the remaining area of land has not been identified. The aerial photograph in **Figure 4-1** shows the potential location of landfill materials and the areas of the property which were potentially reclaimed with unidentified fill.





Figure 4-1: Approximate areas of landfilling and land reclamation



5 Site Investigation Scope and Rationale

5.1 Summary of Potential Issues of Environmental Concern

The primary issue of concern is the use of large parts of the property as a landfill from pre 1890s up to 1978. In addition, the majority of the property is situated over reclaimed land, of which at least some reclamation was achieved through landfilling. The source of fill material for the remainder of the reclamation is not known.

5.2 Soil Investigation

5.2.1 Objectives

Landfill materials were discovered during a CH2M Beca geotechnical investigation at the proposed Terminal Pump Station location. Samples of materials were collected at 2 test pit locations and sent for laboratory analysis.

The area of the pump station is small (130m²) and so 2 sampling points within this area was considered sufficient to assess contamination levels associated with the landfill materials.

Given the site history and the extensive landfilling having occurred across a large area, it is considered likely that any works in this area for the pump station or associated piping will intersect landfill materials.

It is acknowledged that landfill materials are variable in nature. No further investigation of materials along the associated pipeline path has been undertaken, but a conservative approach will be adopted relating to the management of earthworks, with all materials being considered contaminated.

No groundwater sampling or landfill gas monitoring has been undertaken at this time.

5.2.2 Methodology and Soil Sampling

The investigation was undertaken between 23 and 28 January 2014. The investigation comprised the excavation of three test pits. Test pits were excavated using a 15 tonne tracked excavator. Three samples were collected from location TP201 at depths 0.5m, 1.5m and 2.0m. A further two samples were collected from location TP202 at 0.5m and 2.3m bgl. A map of the test pit sampling locations is presented in **Appendix D**.

Soil samples were collected directly by hand from excavated materials placed at the side of the test pit of from the centre of the excavator bucket. A clean pair of nitrile gloves was worn for each sample to prevent cross-contamination. Samples were placed in plastic or glass jars as appropriate and chilled.

Field sampling and relevant sampling management procedures were undertaken in general accordance with the Contaminated Land Management Guidelines No.5 – Site Investigation and Analysis (MfE, 2011).

All chemical laboratory analyses were undertaken by R J Hill Laboratories Ltd (Hill Laboratories). A copy of the Hill Laboratories report is included in **Appendix E**.

All samples submitted to Hill Laboratories were accompanied by Chain of Custody forms which detailed the required handling and testing instructions. These are included in **Appendix F.**



5.2.3 NES Permitted Activity Provisions

Given activities on the Hazardous Activities and Industries List (HAIL) have been undertaken on this site, the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) applies with respect to activities including soil sampling. Where undertaken in accordance with Regulation 8(2) the soil sampling for investigation of contaminated land is a permitted activity. In accordance with Regulation 8(2), measures were in place to minimise human exposure to contaminants before, during and after the sampling program and the test pits were immediately restored to an erosion resistant state upon completion of the sampling program. No soil was removed from the site.



6 Assessment Criteria

6.1 Assessment of Soil Quality and Human Health Risk

The risk to human health has been assessed in accordance with the NES. The NES applies to land which currently has, or has historically had, an activity or industry undertaken on it that is included in the HAIL. It includes a series of rules specifically related to soil sampling, soil disturbance, fuel systems removal, subdivision and land use change.

The NES provides a set of chemical-specific soil contaminant thresholds (or soil contaminant standards (SCSs)) that define an adequate level of protection for human health for a range of differing land uses in New Zealand. The results of the soil sampling have been assessed against the NES SCSs to give an indication of any health risks to current and future users of the site, and also to construction workers. The land use selected for this assessment is Recreational, as this will be the primary landuse for the area once construction has been completed.

It should be noted that the human health assessment carried out within this report is not intended to replace any contaminant specific occupational exposure assessment that may be deemed necessary as part of any Health and Safety Plan.

In addition to the NES, the Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (MfE, 1999), commonly referred to as the Oil Industry Guidelines, and the Regional Screening Levels (US Environmental Protection Agency, 2013) have been used to assess specific contaminants of concern in relation to human health risk. **Table 6.1** provides the references of these documents.

Table 6.1: Hierarchy for Assessment of Human Health Risk from Soils

Refer	ence Document and Hierarchy
1	National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011
2	Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (MfE, 1999).
3	Regional Screening Levels, US Environmental Protection Agency (USEPA, 2012)

6.2 Assessment of Environmental Risk

Environmental risk assessment criteria for Residential/Parkland landuse have been selected from the Canadian Soil Quality Guidelines for the protection of environmental and Human Health (CCME, 1999). This guideline considers the impact of direct exposure to contaminated soil as well as effects resulting from ingestion or indirect exposure via use of contaminated groundwater or migration to nearby surface water bodies. These criteria have been selected for metal contaminants only.

The risk to groundwater from hydrocarbons has been assessed using the Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (MfE, 1999).



At present there are two regional plans effective for Canterbury: the operative Natural Resources Regional Plan (NRRP) and the Proposed Land and Water Regional Plan (LWRP), currently in its decisions phase. Both plans' rules address a number of similar issues, with the LWRP taking precedence. **Table 6.2** summarises the NRRP and LWRP rules that apply to this site.

Activity	Rule NRRP and Likely Status	Rule pLWRP and Likely Status
The use of land for a site investigation to assess concentrations of hazardous substances that may be present in the soil is a permitted activity provided that the site investigation is undertaken win accordance with the MfE guidelines.	WQL 46: Permitted	5.185: Permitted
Temporary discharges to water or to land in circumstances where a contaminant may enter water are permitted activities, provided the following conditions are met:		5.119: cannot comply as discharge likely to contain contaminants.
 The discharge is only of sediment and water originating from within the bed of the lake or river; 		Defaults to 5.121 Discretionary Activity
2. The discharge is not undertaken in an inanga or salmon spawning site listed in Schedule 17; and		
3. The discharge is not for more than eight hours in any 24- hour period, and not more than 40 hours in total in any calendar month.		
Discharge ofsite dewatering water into a river, lake or artificial watercourse, or onto land which may result in water or a contaminant entering a river, lake or artificial watercourse is a permitted activity providing conditions are met.	WQL2: cannot comply as discharge likely to contain hazardous substances. Defaults to WQL48 Discretionary Activity or Non- complying Activity.	

Table 6.2 - Proposed Land and Water Regional Plan Rules Relating to Soil Contamination for This Site

Where the likely consent status differs between the NRRP and the LWRP, the more restrictive status will apply.

No assessment has been made of any rules that may be applicable to the on-going passive discharge of potential contaminants from the wider landfill area. The assessment of applicable rules is restricted to those that apply to the proposed works only.



7 Results

7.1 Fieldwork Observations

A summary of the soil logs taken during sampling is provided in **Appendix G.** Surface soils consisted primarily of engineered fill, which primarily consisted of gravel and silt. Below this was a layer of non-engineered fill between 0.2m and 2.8m bgl. Refuse consisting of plastic bags, metal fragments, decomposing organic matter, glass, clothes, tin cans and other household waste was encountered in both test pits below a depth of 0.3m bgl.

7.2 Soil Analytical Results

Contaminant concentrations have been compared to the assessment criteria identified in Section 0 for a Commercial/Industrial land use. A copy of the summary spread sheet of soil results has been provided in **Appendix H.** Laboratory chain of custody forms are included in **Appendix F**. Hill Laboratory reports are included in **Appendix E**.

The results showed that the concentration of contaminants in soil samples did not exceed the human health criteria for Recreational land use.

However, the environmental criteria were exceeded in two samples:

- Arsenic in sample collected at 1.6m bgl at location TP201
- Zinc in sample collected at 2.3m bgl at location TP202

Elevated levels of TPH were detected in TP201 in samples of 0.5m and 1.6m depth. The majority of the detected TPH were in the C15 – C36 carbon chain band, with relatively low levels in the C10 – C14 band, and no concentrations recorded in the C7 – C9 band. These levels were below the human health criteria for Recreational land use and environmental criteria for Residential/Parkland.

PAHs were also found in small concentrations above the detection limits in TP201. However, the BaP equivalent concentrations calculated were all below the human health criteria for Recreational land use. Naphthalene was not detected in any of the samples, however the limit of detection was higher than the environmental assessment criterion.

Results were compared to typical background soil concentrations for the Canterbury region. Concentrations of heavy metals exceeded typical background levels in all samples. Concentrations of mercury and copper exceeded background concentrations in all samples, while chromium and nickel were the only heavy metals that were not observed above background levels. Concentrations of heavy metals varied between test pits and depth.



8 Site Characterisation and Risk Assessment

8.1 Risk Assessment from Soil Contamination

8.1.1 General

The soil sampling undertaken across this site has been limited in extent to the area directly beneath the proposed Terminal Pump Station. Additional soil disturbance has also been proposed on the wider property for the installation of wastewater pipelines. Soil has not been sampled within these areas. Due to the heterogenic nature of landfill materials, the sampling undertaken to date may not provide a representative indication of wider contamination on the property. As such, there remains a risk that works on the property could encounter levels of contamination greater than what has been observed in samples taken to date. Potential contaminants of interest include heavy metals, Polycyclic Aromatic Hydrocarbons (PAHs), and Total Petroleum Hydrocarbons (TPHs).

8.1.2 Metals

The elevated levels of arsenic and zinc found in TP201 and TP202 were above the environmental criteria established by the CCME (1999) for Residential/Parkland land uses. When soils are exposed these contaminants may pose a risk to nearby surface and groundwater, in particular during heavy rainfalls where excavations may become water logged. The concentrations of heavy metals observed in the soils have been identified as unlikely to pose a human health risk to construction workers or future users of the site.

8.1.3 Polycyclic Aromatic Hydrocarbons

PAHs were identified which were above their respective detection limits. However, assessment of these contaminants against their respective human health criteria indicates they pose minimal risk to human health and the environment.

Naphthalene was not detected in any of the samples, however the limit of detection was higher than the environmental assessment criterion. Whilst PAHs were detected they were only present in low concentrations. It may be possible that napthalene is present in low concentrations. Further sampling would confirm this.

8.1.4 Total Petroleum Hydrocarbons

TPHs were identified in relatively high levels in TP201, although these concentrations were below the selected human health and environmental criteria for the site.

8.2 Risk Assessment from Dewatering

No assessment has been made in relation to the potential effects of on-going passive discharge of potential contaminants from the wider landfill area.

Depending on the final design specified for the construction of the Terminal Pump Station, dewatering of excavations may be required. No water quality data has been collected as part of this assessment. If dewatering is required, it is proposed to discharge this to the Akaroa reticulated wastewater system.



8.3 Conceptual Site Model

The Conceptual Site Model (CSM) (see Table 8.4) has been developed to describe the relationship between sources of contamination on site, the human and environmental receptors that may be exposed to those contaminants in the context of recreational use of the site, and the pathways by which those receptors may be exposed.

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lane	0.4.	Conceptual	Sile	INDUEI

Sc	ource	Receptor	Pathway	Pathway Complete?
•	Hydrocarbons from landfill materials in shallow and deep soils. Heavy metals from landfill	Site workers undertaking ground disturbance works or activities in unsealed area of site or excavating beneath concrete seal in other areas.	Exposure of maintenance/ construction workers to contaminants in soils may occur during site redevelopment – dermal contact, ingestion or inhalation of dust.	Complete pathway – however concentrations of contaminants measured at pump station site were below human health criteria.
	materials in shallow surface soils or dissolved in shallow groundwater Other	General public	Public access to site restricted during construction. After construction majority of site will be sealed. A small section of the pipeline passes through the Recreation Grounds, which will not be sealed after construction.	Complete pathway – concentrations of contaminants measured at pump station site were below human health criteria.
 Other contaminants from landfill materials that have not been identified by sampling. 		Exposure of general public to dust blown offsite containing contaminants – inhalation/ingestion/ dermal contact with dust.		
	Shallow groundwater resources for public use	Leaching of contaminants which are in direct contact with groundwater and tidal flushing. Shallow groundwater in the area is unlikely to be abstracted for public use. Two public water supply bores have been identified upstream of the site.	Incomplete – No groundwater abstraction wells identified downstream of the site.	
		Surface water	Leaching of contaminants which are in direct contact with groundwater and tidal flushing. Discharge of shallow groundwater into adjacent streams and harbour. Direct migration of contamination into adjacent streams and harbour from	Complete pathway

8.4 Additional Risks

Landfill gas monitoring was not conducted at the time of soil sampling at the pump station. Given the age of the landfill, including the cessation of filling activities in 1978, it is considered likely that the landfill gas generation potential of the buried materials has considerably decreased over this period. However this



remains a risk, and landfill gas monitoring should be undertaken either before works commence and during construction works.

Excavations on the property could also potentially encounter contaminated groundwater. Depending on the depth of excavations and the volume of groundwater encountered, this may result in dewatering activities being completed on the site. This report has not included an assessment on the potential risk posed by dewatering of potentially contaminated groundwater. Disposal of groundwater to surface water or land poses additional risk and would require further investigation should dewatering be required on the site. If dewatering is required, it is proposed to discharge this to the Akaroa wastewater reticulated wastewater system.

8.5 Limitations of Site Characterisation

Characterisation of subsurface conditions is dependent on the number of sample locations, methods of sampling and the uniformity of subsurface conditions. There is the possibility that contamination present on the site has not been described.

Whilst contaminant concentrations may be estimated at chosen sample locations, conditions at any location removed from the specific points of sampling can only be inferred on the basis of geological and hydrogeological conditions and the nature and the extent of identified contamination. Subsurface conditions can vary, resulting in uneven distribution of contaminants across a site which cannot be defined by these investigations. In addition, with time, the site conditions and environmental guidelines could change so that the reported assessments and conclusions are no longer valid.

The conclusions of this report are made on the basis that the site conditions revealed by the investigation are representative of the actual conditions across the site at the time of sampling.



9 Discussion

9.1 Contamination Summary

Soil testing completed within the approximate area of the Terminal Pump Station found concentrations of arsenic and zinc exceeding environmental criteria. These test pits were located within the former landfill area, and confirm that some soil contamination is present within the area of works on this property. In addition, heavy metals and hydrocarbon concentrations were all found above the background concentrations at location TP201, while only heavy metals concentration were above background at location TP202.

9.2 Consents

9.2.1 National Environmental Standard

The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES) applies to land that is covered by the NES as per clause 5(7):

"Land covered:

- (7) The piece of land is a piece of land that is described by 1 of the following:
 - (a) an activity or industry described in the HAIL is being undertaken on it;
 - (b) an activity or industry described in the HAIL has been undertaken on it;
 - (c) it is more likely than not that an activity or industry described in the HAIL is being or has been undertaken on it."

It is considered that the areas of land identified as a historical landfill are classified in section G3 of the HAIL, and are therefore 'pieces of land' under the NES.

Furthermore, it is considered 'more likely than not' that an activity described in the HAIL has been undertaken on the land reclaimed with unidentified fill, as practices in the area suggest there is a high probability of landfill material having been used. Therefore, this area is also a 'piece of land' under the NES.

Regulation 8(3) of the NES sets Permitted Activity criteria for works involving soil disturbance on a piece of land. Criteria 3 (c) and (d) set thresholds for the volume of soil allowed to be disturbed and/or removed from the piece of land. Calculations to determine whether the NES applies to soil disturbance on the property are presented in **Table 9.1** below.

Under the NES, soil disturbance of up to $25m^3$ per $500m^2$ of a piece of land and disposal of up to $5m^3$ per $500m^2$ is allowed as a Permitted Activity.

Our assessment of the permitted activity soil disturbance allowances has been made using an interpretation of the NES that CH2M Beca has discussed with CCC Senior Environmental Health Officer Isobel Stout previously. It is our understanding that CCC has obtained a legal opinion with regards to the interpretation of regulation 8(3) and intend to apply this interpretation. CH2M Beca understands that other local authorities in New Zealand (e.g. Auckland Council) interpret this element of the NES differently. Until either the Environment Court makes a declaration, or appropriate case law is established, we intend to follow the method we have already discussed with CCC with respect to activities within the CCC Region.

The interpretation consistent with CCC guidance in relation to what constitutes the area of a 'piece of land' has been determined the area of works that intersects a HAIL site. The disturbance allowances are



interpreted to apply for each $500m^2$ 'piece of land' or part thereof but not in a pro rata manner. The actual area of the works within the landfilling and reclamation is 750 m².

Table 9.1: Calculations to determine whether the NES applies to works

Parameter	Property Lot 1 DP 79110
Area of piece of land	750m ²
Allowable volume of soil disturbance (25m ³ per 500m ² of piece of land)	50m ³
Volume of soil allowed to be removed (5m ³ per 500m ² of piece of land)	10m ³
Minimum soil disturbance required	$65m^{3}$ (pump station)+ 250 to 300m ³ (pipes) = $365m^{3}$
Minimum volume of soil requiring disposal	Unknown – assumed to be greater than 15m ³

These calculations show that the total volume of material to be disturbed and to be disposed of exceeds the Permitted Activity criteria specified in Regulation 8(3) of the NES. In the absence of a complete Detailed Site Investigation (DSI) for the pieces of land, the proposed works will therefore require consent under Regulation 11 of the NES for a **Discretionary Activity**.

9.2.2 Regional Plan Rules

The use of the land to investigate concentrations of contaminants in soil is a permitted activity providing the MfE Contaminated Land Management Guidelines are followed.

Should dewatering be required where water is discharged to land or water, it is likely that consent would be required. However, it is proposed to discharge any water from dewatering activities to the Akaroa reticulated wastewater system, so no consent will be required.

9.3 Further Work

This assessment for the Akaroa Wastewater Terminal Pump Station project has not sought to address the potential wider contamination risks of the historical landfill on the foreshore of Childrens Bay on public health and the environment. It is our understanding that no data currently exists on the landfill, except that provided in this report.



10 Conclusions

The historical review for the site has identified the prior use of the property for landfilling and reclamation activities. Waste disposal to land is an activity identified on the HAIL, and as such, the property is considered a 'piece of land' under the NES.

Subsurface investigations completed in the vicinity of the proposed pump station have shown that contaminants in the soils do not exceed the human health criteria for Recreational landuse. However, test results in TP201 show levels of heavy metals and hydrocarbons above background levels. Furthermore, concentrations of arsenic in TP201 and zinc in TP202 exceed the environmental criteria for Recreational landuse. During sampling a wide variety of refuse was observed in the soils, including metal, wood, organic materials and other household waste.

The results of the investigation suggest that the key risks from the site are to workers during construction, the public after completion of works, and from potential discharges of contaminants to groundwater and surface waters. The variable nature of landfills means that there may be unidentified contamination risks present at the site.

Landfill gas monitoring was not conducted at the time of soil sampling at the pump station. Whilst it is considered likely that the landfill gas generation potential of the buried materials has considerably decreased over time, landfill gas monitoring should be undertaken before works commence and during construction works.

If dewatering is required, it is proposed to discharge this to the Akaroa reticulated wastewater system.

As the proposed works will be occurring on a piece of land for which a Detailed Site Investigation (DSI) does not exist, consent for a **Discretionary Activity** will be required under the NES. A Contaminated Soils Management Plan (CSMP) will need to be prepared to manage the works which will occur on the property. The CSMP will detail procedures to be used by those undergoing the work on site to reduce the risk of their exposure to contaminated soils and/or groundwater, and also to protect the general public. The CSMP will also detail controls to be applied to minimise the effect on environmental receptors.

This assessment has not sought to address the potential wider contamination risks of the historical landfill on public health and the environment. No assessment has been made in this report as to the potential effects of on-going passive discharge of potentially contaminated groundwater from the wider landfill site.



11 Limitations

This report has been prepared by CH2M Beca Ltd (CH2M Beca) solely for Christchurch City Council (Client). CH2M Beca has been requested by the Client to provide a contamination assessment for works at Jubilee Park, Akaroa. This report is prepared solely for the purpose of the assessment of potential soil contamination in relation to proposed earthworks at the site (Scope). The contents of this report may not be used by the client for any purpose other than in accordance with the stated Scope.

This report is prepared solely for the Client. CH2M Beca accepts no liability to any other person for their use of or reliance on this report, and any such use or reliance will be solely at their own risk.

This report contains information provided by third parties including: the Christchurch City Council, Environment Canterbury, the Akaroa Museum, and NZ Aerial Mapping. This report contains information obtained by inspection, sampling, testing or other means of investigation. Unless specifically stated otherwise in this report, CH2M Beca has relied on the accuracy, completeness, currency and sufficiency of all information provided to it by, or on behalf of, the Client or any third party, including the information listed above, and has not independently verified the information provided. CH2M Beca accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the information provided.

The contents of this report are based upon our understanding and interpretation of current legislation and guidelines ("Standards") as consulting professionals, and should not be construed as legal opinions or advice. Unless special arrangements are made, this report will not be updated to take account of subsequent changes to any such Standards.

This report should be read in full, having regard to all stated assumptions, limitations and disclaimers.



Appendix A

Certificate of Title



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Search Copy



Survey Office Plan 18642

Reclamation and Public Recreation

		Ř.W. Muir Registrar-General of Land
Identifier Land Registration Date Issued	District CB45A/1127 Canterbury 07 August 1998	
Prior References CB256/17	GN A348371.1	
Estate Area Legal Description	Fee Simple 4.4150 hectares more or less Lot 2 Deposited Plan 2868, Lot 1	
	Deposited Plan 79110 and Section 2	

Purpose

Proprietors Banks Peninsula District Council

Interests

155435 Transfer creating the following easements in gross - 16.11.1923 at 11.00 am

Type Convey water

Easement Area Servient Tenement Lot 2 Deposited Plan marked Lots 3 & 4 2868, Lot 1 Deposited DP 6864 Plan 79110 and Section 2 Survey Office Plan 18642 - herein

Grantee Southpower Limited

Statutory Restriction







Appendix B

ECan LLUR Statement



Customer Services P. 03 353 9007 or 0800 324 636

PO Box 345 Christchurch 8140 P. 03 365 3828 F. 03 365 3194 E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry in regards to our Listed Land Use Register (LLUR) which holds information about sites that have been used, or are currently used for activities which have the potential to have caused contamination.

The LLUR statement provided indicates the location of the land parcel(s) you enquired about and provides information regarding any LLUR sites within a radius specified in the statement of this land.

Please note that if a property is not currently entered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

If your enquiry relates to a farm property, please note that many current and past activities undertaken on farms may not be listed on the LLUR. Activities such as the storage, formulation and disposal of pesticides, offal pits, foot rot troughs, animal dips and underground or above ground fuel tanks have the potential to cause contamination.

Please contact and Environment Canterbury Contaminated Sites Officer if you wish to discuss the contents of the LLUR statement, or if you require additional information. For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Statement from the Listed Land Use Register



PO Box 345, Christchurch General enquiries: 03 365 3828 Fax: 03 365 3194 Email: ecinfo@ecan.govt.nz

Customer services: 03 353 9007 or: 0800 EC INFO (0800 324 636) Website: www.ecan.govt.nz

Date: Land Parcel

	3 April 2014	
els:	• Lot 1 DP 79110	Valuation No(s):
		2396114200,2396114200A,2396114200B,
		2396114200C,2396114200D,2396114200E,
		2396114200F



Summary of sites:

Site ID	Site Name	Location	HAIL Activity(s)	Category
287	Old Akaroa Landfill	Childrens Bay, Akaroa	G3 - Landfill sites	Not Investigated

Please note that the above table represents a summary of sites intersecting the area of enquiry only.

Information held about the sites on the Listed Land Use Register

Site 287: Old Akaroa	Landfill (Int	ersects enquiry	y area.)	
Site Address:	Childrens B	Childrens Bay, Akaroa		
Legal Description:	Lot 1 DP 79	Lot 1 DP 79110; Lot 2 DP 2868; Section 2 SO 18642		
Site Category:	Not Investig	Not Investigated		
Definition:	Verified HAIL has not been investigated.			
Land uses (from HAIL):	Period From	Period To	HAIL land use	
	pre1900	1978	Landfill sites	

Notes

5 Jul 2005 Site approximately 3ha. General household waste.

Investigations

There are no investigations associated with this site.

For further information from Environment Canterbury, contact the Contaminated Sites Officer and refer to enquiry number 34234.

Disclaimer:

The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECan 2009).

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Listed Land Use Register

Site categories and definitions

Following verification of a Hazardous Activities and Industries List (HAIL) site with the property owner, Environment Canterbury assigns the site a category on the Listed Land Use Register.

If analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

A site whose past or present use has been reported and verified as one that appears on the Hazardous Activities and Industries List (HAIL); and,

The site has not been subjected to investigation including, but not limited to, sampling and analysis of site related soil, water and/or ambient air, and assessment of the associated analytical data.

This category is for sites for which it is known that an activity or use as defined in the HAIL has taken place on the site, but there is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm that there are no hazardous substances above local background concentrations. Local background concentrations are those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed, in terms of locations sampled and analytes tested, to characterise the site.

Below guideline values for <land use>:

The site has been investigated. The investigation sample results show that there are hazardous substances present at the site, but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.

Managed for <land use>:

The site has been investigated. Investigations show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- i) the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- ii) the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Investigations have been conducted that:

- i) demonstrate that there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- ii) do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- i) have significant adverse effects on the environment; or
- ii) are reasonably likely to have significant adverse effects on the environment.

Contaminated (for <land use>):

The site has been investigated. Contaminated land means that has a hazardous substance in or on it that:

- (a) has significant adverse effects on the environment; or
- (b) is reasonably likely to have significant adverse effects on the environment.

(s2 RMA 1991)

Please contact Environment Canterbury for further information: (03) 353 9007 or toll free on 0800 EC INFO (32 4636) or email ecinfo@ecan.govt.nz



Appendix C

Historical Photographs

was neither newsworthy or memorable, but just part of the normal experience of Akaroa.

The following early photograph is included to show north Akaroa before any land reclamation took place.

Figure 12 Akaroa circa 1867 showing the sea occupying the area now reclaimed as the Recreation Ground



Photograph from Akaroa Museum collection catalogue number 1103

Recent work to improve drainage of the Recreation Ground means that it no longer ponds in normal rain conditions, but the whole area including Rue Brittan and the corner of Rue Brittan and Rue Jolie still floods if the nearby Grehan stream breaks its banks. High tides exacerbate the problem of drainage from the reclaimed land, which has been extended several times over the years, with new drains connecting to the old drains and consequently getting too low at the outflow points

8.8.2 Inadequacy of drainage in Rue Brittan and sea outflows

The outstanding problem in the area now seems to be the inadequacy of the storm water pipes in Rue Brittan, which must cope with a large watershed from L'Aube hill as well as any overflow if the Grehan stream bursts its banks. The following photographs show these problem areas as explained by Lou Walker, who has been a builder in Akaroa all his life, and has owned, lived and worked at the properties opposite the Recreation Ground for many years. These properties now house the Ce La Vie restaurant and the Ca Bouge clothing store.



Numb	er 24.
Size o	f Original 24×18 MM.
Condi	tion of Original BABLY TORN. TFADED
Inform	nation on back of original
AA	LAROA. LOORING South .
S	LOWING POUND IN THE
P	ADERORIUM
T	JRS GROUND.
Histor	ical Notes







1:3000




1:25000

Appendix D

Test Pit Locations



Appendix E

Hills Laboratory Results



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205 Hamilton 3240, New Zealand Web www.hill-labs.co.nz

+64 7 858 2000 Tel Fax +64 7 858 2001 Email mail@hill-labs.co.nz

Page 1 of 3

NALYSIS REPOR T

Client:	Beca Limited	Lab No:	1228330	SPv1
Contact:	G Smith	Date Registered:	28-Jan-2014	
	C/- Beca Limited	Date Reported:	11-Feb-2014	
	PO Box 6345	Quote No:	59254	
	Wellesley Street	Order No:	14:018	
	AUCKLAND 1141	Client Reference:	6517986-14:018	
		Submitted By:	C Adams	

Sample Type: Soil						
Sample Name:		14:018 TP105 1.0m 24-Jan-2014	14:018 TP201 0.5m 23-Jan-2014	14:018 TP201 1.6m 23-Jan-2014	14:018 TP201 2.0m 23-Jan-2014	
		11:40 am	4:14 pm	4:25 pm	4:33 pm	
	Lab Number:	1228330.1	1228330.2	1228330.3	1228330.4	
Individual Lests			1			
Dry Matter	g/100g as rcvd	87	79	76	49	-
Heavy metals, screen As,Cd,C	Cr,Cu,Ni,Pb,Zn,Hg					
Total Recoverable Arsenic	rsenic mg/kg dry wt 3 3 12 8				-	
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.57	0.40	0.35	-
Total Recoverable Chromium	mg/kg dry wt	12	15	16	18	-
Total Recoverable Copper	mg/kg dry wt	24	33	52	20	-
Total Recoverable Lead	mg/kg dry wt	16.4	128	161	57	-
Total Recoverable Mercury	mg/kg dry wt	0.11	< 0.10	< 0.10	0.14	-
Total Recoverable Nickel	mg/kg dry wt	8	10	13	10	-
Total Recoverable Zinc	mg/kg dry wt	49	137	240	220	-
Haloethers in SVOC Soil Sam	ples by GC-MS					
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 1.4	< 3	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 1.4	< 3	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 1.4	< 3	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 1.4	< 3	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 1.4	< 3	-
Nitrogen containing compound	ds in SVOC Soil S	amples by GC-MS				
3,3'-Dichlorobenzidine	mg/kg dry wt	-	-	<7	< 11	-
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 3	< 5	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 3	< 5	-
Nitrobenzene	mg/kg dry wt	-	-	< 1.4	< 3	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 3	< 5	-
N-Nitrosodiphenylamine	mg/kg dry wt	-	-	< 3	< 5	-
Organochlorine Pesticides in S	SVOC Soil Sample	s by GC-MS			· · · ·	
Aldrin	mg/kg dry wt	-	-	< 1.4	< 3	-
alpha-BHC	mg/kg dry wt	-	-	< 1.4	< 3	-
beta-BHC	mg/kg dry wt	-	-	< 1.4	< 3	-
delta-BHC	mg/kg dry wt	-	-	< 1.4	< 3	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 1.4	< 3	-
4,4'-DDD	mg/kg dry wt	-	-	< 1.4	< 3	-
4,4'-DDE	mg/kg dry wt	-	-	< 1.4	< 3	-
4,4'-DDT	mg/kg dry wt	-	-	< 3	< 5	-
Dieldrin	mg/kg dry wt	-	-	< 1.4	< 3	-
Endosulfan I	mg/kg dry wt	-	-	< 3	< 5	-
Endosulfan II	mg/kg dry wt	-	-	< 3	< 5	-
Endosulfan sulphate	ma/ka dry wt	-	-	< 3	< 5	-



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which

laboratory are not accredited.

Sample Type: Soil						
Sample Name:		14:018 TP105	14:018 TP201	14:018 TP201	14:018 TP201	
		1.0m 24-Jan-2014	0.5m 23-Jan-2014	1.6m 23-Jan-2014	2.0m 23-Jan-2014	
	l ah Number:	1228330.1	1228330.2	1228330.3	1228330.4	
Organochlorine Pesticides in SV	OC Soil Sample	s by GC-MS				
Endrin	ma/ka drv wt	-	-	< 3	< 5	-
Endrin ketone	ma/ka drv wt	-	-	< 3	< 5	-
Heptachlor	mg/kg dry wt	-	-	< 1.4	< 3	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 1.4	< 3	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 1.4	< 3	-
Polycyclic Aromatic Hydrocarbor	ns in SVOC Soil	Samples by GC-MS	6			
Acenaphthene	mg/kg dry wt	-	-	< 0.7	< 1.1	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.7	< 1.1	-
Anthracene	mg/kg dry wt	-	-	< 0.7	< 1.1	-
Benzo[a]anthracene	mg/kg dry wt	-	-	0.8	< 1.1	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 1.4	< 3	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 1.4	< 3	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 1.4	< 3	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 1.4	< 3	-
2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.7	< 1.1	-
Chrysene	mg/kg dry wt	-	-	< 0.7	< 1.1	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 1.4	< 3	-
Fluoranthene	mg/kg dry wt	-	-	1.3	< 1.1	-
Fluorene	mg/kg dry wt	-	-	< 0.7	< 1.1	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 1.4	< 3	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.7	< 1.1	-
Naphthalene	mg/kg dry wt	-	-	< 0.7	< 1.1	-
Phenanthrene	mg/kg dry wt	-	-	0.7	< 1.1	-
Pyrene	mg/kg dry wt	-	-	1.6	< 1.1	-
Phenols in SVOC Soil Samples	by GC-MS					
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	< 5	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.4	< 3	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.4	< 3	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	< 3	-
3 & 4-Methylphenol (m- + p- cresol)	mg/kg dry wt	-	-	< 3	< 5	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.4	< 3	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	< 5	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	< 50	-
Phenol	mg/kg dry wt	-	-	< 3	< 5	-
2,4,5- I richlorophenol	mg/kg dry wt	-	-	< 3	< 5	-
2,4,6- I richlorophenol	mg/kg dry wt	-	-	< 3	< 5	-
Plasticisers in SVOC Soil Samp	les by GC-MS			0	•	
Bis(2-ethylnexyl)phthalate	mg/kg dry wt	-	-	< 6	< 9	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 3	< 5	-
Di(2-ethylnexyl)adipate	mg/kg dry wt	-	-	< 1.4	< 3	-
Dietnyiphthalate	mg/kg dry wt	-	-	< 3	< 5	-
Dimethylphthalate	mg/kg dry wt	-	-	< 3	< 5	-
	mg/kg dry wt	-	-	< 3	< 5	-
Other Helegeneted compounds i			-	< 5	< 3	-
				- 0	- F	
	mg/kg dry Wt	-	-	< 3	< 0	-
	mg/kg dry wt	-	-	< 3	< 0	-
	mg/kg dry wt	-	-	< 3	< 0	-
Hevechlorocyclopentodiono	mg/kg dry wt	-		~ 7	< 0 - 11	
Hexachloroethane	mg/kg dry wt	-		- 3	~ 5	-
1.2.4-Trichlorobenzono	mg/kg dry wt	-		< J - 1 /	- 2	
1,2,4-111011010DE112010	ing/kg ury wi	-	-	S 1.4	< 0	-

Sample Type: Soil						
Sample Name		14:018 TP105 1.0m 24-Jan-2014	14:018 TP201 0.5m 23-Jan-2014	14:018 TP201 1.6m 23-Jan-2014	14:018 TP201 2.0m 23-Jan-2014	
		11:40 am	4:14 pm	4:25 pm	4:33 pm	
	Lab Number:	1228330.1	1228330.2	1228330.3	1228330.4	
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 14	< 30	-
Carbazole	mg/kg dry wt	-	-	< 1.4	< 3	-
Dibenzofuran	mg/kg dry wt	-	-	< 1.4	< 3	-
Isophorone	mg/kg dry wt	-	-	< 1.4	< 3	-
Total Petroleum Hydrocarbons ir	n Soil					
C7 - C9	mg/kg dry wt	< 8	< 8	< 9	< 14	-
C10 - C14	mg/kg dry wt	< 20	106	116	< 30	-
C15 - C36	mg/kg dry wt	< 40	4,000	5,600	< 60	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	4,200	5,700	< 100	-

Analyst's Comments

Appendix No.1 - Total Petroleum Hydrocarbon Chromatograms

Appendix No.2 - Total Petroleum Hydrocarbon Chromatograms

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-4
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-4
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	3-4
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	-	1-4
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-4
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-4

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Martin Cowell - BSc Client Services Manager - Environmental Division







R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205 Hamilton 3240, New Zealand Web

+64 7 858 2000 Tel +64 7 858 2001 Fax Email mail@hill-labs.co.nz www.hill-labs.co.nz

Page 1 of 3

NALYSIS REPORT

Client:	Beca Limited	Lab No:	1230175 s	SPv1
Contact:	G Smith	Date Registered:	31-Jan-2014	
	C/- Beca Limited	Date Reported:	12-Feb-2014	
	PO Box 6345	Quote No:	59254	
	Wellesley Street	Order No:	14:018	
	AUCKLAND 1141	Client Reference:	6517986-14:018	
		Submitted By:	C Adams	

Sample Type: Soil						
Sample Name:		14:018 TP 202 2.3m 28-Jan-2014	14:018 TP 202 0.5m 28-Jan-2014			
	9:15 am	8:50 am				
	Lab Number:	1230175.4	1230175.5			
Individual Tests						i
Dry Matter	g/100g as rcvd	58	84	-	-	-
Heavy metals, screen As,Cd,C	r,Cu,Ni,Pb,Zn,Hg					
Total Recoverable Arsenic	mg/kg dry wt	7	8	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	1.18	0.22	-	-	-
Total Recoverable Chromium	mg/kg dry wt	17	13	-	-	-
Total Recoverable Copper	mg/kg dry wt	20	21	-	-	-
Total Recoverable Lead	mg/kg dry wt	81	59	-	-	-
Total Recoverable Mercury	mg/kg dry wt	0.14	0.42	-	-	-
Total Recoverable Nickel	mg/kg dry wt	11	8	-	-	-
Total Recoverable Zinc	mg/kg dry wt	410	140	-	-	-
Haloethers in SVOC Soil Samp	oles by GC-MS					
Bis(2-chloroethoxy) methane	mg/kg dry wt	< 1.9	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	< 1.9	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	< 1.9	-	-	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	< 1.9	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	< 1.9	-	-	-	-
Nitrogen containing compounds	s in SVOC Soil S	amples by GC-MS				I
3,3'-Dichlorobenzidine	mg/kg dry wt	< 10	-	-	-	-
2,4-Dinitrotoluene	mg/kg dry wt	< 4	-	-	-	-
2,6-Dinitrotoluene	mg/kg dry wt	< 4	-	-	-	-
Nitrobenzene	mg/kg dry wt	< 1.9	-	-	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	< 4	-	-	-	-
N-Nitrosodiphenylamine	mg/kg dry wt	< 4	-	-	-	-
Organochlorine Pesticides in S	VOC Soil Sample	s by GC-MS				
Aldrin	mg/kg dry wt	< 1.9	-	-	-	-
alpha-BHC	mg/kg dry wt	< 1.9	-	-	-	-
beta-BHC	mg/kg dry wt	< 1.9	-	-	-	-
delta-BHC	mg/kg dry wt	< 1.9	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 1.9	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 1.9	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 1.9	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 4	-	-	-	-
Dieldrin	mg/kg dry wt	< 1.9	-	-	-	-
Endosulfan I	mg/kg dry wt	< 4	-	-	-	-
Endosulfan II	mg/kg dry wt	< 4	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 4	-	-	-	-



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which

laboratory are not accredited.

Sample Type: Soil						
Sample Name:		14:018 TP 202	14:018 TP 202			
		2.3m 28-Jan-2014	0.5m 28-Jan-2014			
	ab Number:	9.15 am 1230175 4	1230175 5			
Organochlorine Pesticides in SV0	DC Soil Sample	s by GC-MS	1200110.0			
Endrin	ma/ka drv wt	< 4	-	-	-	-
Endrin ketone	ma/ka dry wt	< 4	_	-	-	-
Heptachlor	ma/ka dry wt	< 1.9	-	-	_	-
Heptachlor epoxide	ma/ka drv wt	< 1.9	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 1.9	-	-	-	-
Polvcvclic Aromatic Hvdrocarbon	s in SVOC Soil	Samples by GC-MS				
Acenaphthene	ma/ka drv wt	< 1.0	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 1.0	-	-	-	-
Anthracene	mg/kg dry wt	< 1.0	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 1.0	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 1.9	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]	mg/kg dry wt	< 1.9	-	-	-	-
Tuoranthene Benzola hilpervlene	ma/ka dry wt	~ 1 9				
Benzo[k]fluoranthene	mg/kg dry wt	< 1.9	_			
2-Chloronaphthalene	mg/kg dry wt	< 1.0	_	_		
Chrysene	ma/ka dry wt	< 1.0	_	-	-	-
Dibenzola hlanthracene	ma/ka dry wt	< 1.9	-	-	-	-
Fluoranthene	ma/ka drv wt	< 1.0	-	-		-
Fluorene	ma/ka drv wt	< 1.0	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 1.9	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 1.0	-	-	-	-
Naphthalene	mg/kg dry wt	< 1.0	-	-	-	-
Phenanthrene	mg/kg dry wt	< 1.0	-	-	-	-
Pyrene	mg/kg dry wt	< 1.0	-	-	-	-
Phenols in SVOC Soil Samples b	by GC-MS					
4-Chloro-3-methylphenol	mg/kg dry wt	< 5	-	-	-	-
2-Chlorophenol	mg/kg dry wt	< 1.9	-	-	-	-
2,4-Dichlorophenol	mg/kg dry wt	< 1.9	-	-	-	-
2,4-Dimethylphenol	mg/kg dry wt	< 3	-	-	-	-
3 & 4-Methylphenol (m- + p-	mg/kg dry wt	< 4	-	-	-	-
cresol)						
2-Methylphenol (o-Cresol)	mg/kg dry wt	< 1.9	-	-	-	-
2-Nitrophenol	mg/kg dry wt	< 5	-	-	-	-
Pentachiorophenoi (PCP)	mg/kg dry wt	< 40	-	-	-	-
	mg/kg dry wi	< 4	-	-	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	< 4				
2,4,0-1110100011010		<4	-	-	-	-
Ris(2-ethylboxyl)phtholata		0 ب				
But doors doot to	mg/kg dry wt	< 0	-	-	-	-
	mg/kg dry wt	< 1 0				
	mg/kg dry wt	< 1.9	_			
	mg/kg dry wt	< 4	_			
Di-n-butylphthalate	mg/kg dry wt	< 4		-		-
Di-n-octylphthalate	ma/ka drv wt	< 4	_	_	_	_
Other Halogenated compounds in	n SVOC Soil Sa	mples by GC-MS				
1,2-Dichlorobenzene	mg/ka drv wt	< 4	_	-	_	-
1,3-Dichlorobenzene	mg/ka drv wt	< 4	_	_	_	-
1,4-Dichlorobenzene	mg/kg drv wt	< 4	-	-	-	-
Hexachlorobutadiene	mg/kg drv wt	< 4	_	-	-	-
Hexachlorocyclopentadiene	mg/kg dry wt	< 10	-	-	-	-
Hexachloroethane	mg/kg dry wt	< 4	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	< 1.9	-	-	-	-

Sample Type: Soil						
Sa	mple Name:	ame: 14:018 TP 202 14:018 TP 202 2.3m 28-Jan-2014 0.5m 28-Jan-2014				
L	_ab Number:	1230175.4	1230175.5			
Other compounds in SVOC Soil	Other compounds in SVOC Soil Samples by GC-MS					
Benzyl alcohol	mg/kg dry wt	< 19	-	-	-	-
Carbazole	mg/kg dry wt	< 1.9	-	-	-	-
Dibenzofuran	mg/kg dry wt	< 1.9	-	-	-	-
Isophorone	mg/kg dry wt	< 1.9	-	-	-	-
Total Petroleum Hydrocarbons in	i Soil					
C7 - C9	mg/kg dry wt	< 11	< 8	-	-	-
C10 - C14	mg/kg dry wt	< 30	< 20	-	-	-
C15 - C36	mg/kg dry wt	< 50	< 40	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 80	< 70	-	-	-

Analyst's Comments

Appendix No.1 - Total Petroleum Hydrocarbon Chromatograms

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	4-5
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	4-5
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GPC cleanup (if required), GC-MS FS analysis. Tested on as received sample	-	4
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	-	4-5
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	4-5
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	4-5

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech) Client Services Manager - Environmental Division



Appendix F

Hills Laboratory COC forms



Private Bag 3205



Clie	nt			Hamilton 3240, New Zeals	and Web www.hill-labs.co.nz
Name	Beca Ltd	76225			
Addre	PO Box 6345, AUCKLAND)		Office use only J	ob No:
				REPORT OF THE	PERMINATION
Phone	≥ 09 300 9000	Fax 09 300 9	300	Sent to	Date & Time:
Client	Reference 6517	986 - 14:018	Hill Laboratories	Name:	
Quote	No 59254 Ord	er Number 14:0	Please tick if you require COC to be faxed back	Signature:	
Prim	ary Contact Genevieve Smit	h		Received at	Date & Time
Subr	mitted By Kate Ward			Hill Laboratories	Name
Char	rge To Beca Ltd	76225		- _	Signature:
Resu	Ilts To 🛛 Mail Client	🗌 Mail Subr	nitter	Condition	ChilledFrozen
ڪ لک	Email Results <u>envirolab@beca</u>	.com	·····	_ Sample Analysis deta	alls checked
Pleas Cond 2013	se carry out work in accordance v litions of Engagement for Ongoin . our reference NZ1-7323055.	vith our Subcons g Services, dated	ultant d 24 April		Normal a charge applies, please contact the lab first)
Sam	ple Types				
Water	s E Effluent G GW Ground Water L SW Surface Water S TW Trade Waste	Geothermal Leachate Saline	Pot1	Potable Water (LAS/EU) Audit Monitoring Check Monitoring	Pot2Potable Water (NZDWS)Pot3Potable Water (other)PoolSwimming/Spa Pool
Other	0 0 0ii M	Sediment Miscellaneous	SL FS	Sludge ES Eisb/shellfish/biota	PL Plant RM Richards Material
		Samole	Sample		
No.	Sample Name	Date & Time	Type	Tests Required	
1	14:018 Spoil 2	28/01/2014 12:16p.m.	Soil	Hold Cold	·····
2	14:018 Spoil 1	28/01/2014 12:05p.m.	Soil	Hold Cold	
3	14:018 Spoil 3	28/01/2014 12:28p.m.	Soil	Hold Cold	
4	14:018 TP 202 2.3m SO	28/01/2014 09:15am	Soil	MSHMHgs, TPHOI, SSf	f, SVOCsc
5	14:018 TP 202 0.5mm	28/01/2014 09:15am	Soil	MSHMHgs, TPHOI, SSf	· 2
6					
7					
8				<u> </u>	····
9					negatives a
10		······			
	L		l	I	

KB Item: 23775 Version: 1 Continued on next page



R J Hill Laboratories
Limited
1 Clyde Street
Private Bag 3205

Tel +64 7 858 2000 Fax +64 7 858 2001 Emai mail@hill-labs.c o.nz

Page 1 of 1

L

Job Information Summary

Client:	Beca Limited	Lab No:	1231698
Contact:	G Smith	Date Registered:	04-Feb-2014 10:56:30 am
	C/- Beca Limited	Priority:	Normal
	PO Box 6345	Quote No:	59254
	Wellesley Street	Order No:	14:018
	AUCKLAND 1141	Client Reference:	6517986-14:018
		Add. Client Ref:	
		Submitted By:	C Adams
		Charge To:	Beca Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
4	14:018 TP 202 2.3m 28-Jan-2014	SOIL General,	SAR	Soluble Salts (Field)
	9:15 am	Outdoor		
5	14:018 TP 202 0.5m 28-Jan-2014	SOIL General,	SAR	Soluble Salts (Field)
	8:50 am	Outdoor		

SUMM R F Μ Н S Α Ε \mathbf{O} \bigcirc D)

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil								
Test	Method Description	Default Detection Limit	Sample No					
Sample Registration	Samples were registered according to instructions received.	-	4-5					
Soil Prep (Dry & Grind)	Air dried at 35 - 40°C overnight (residual moisture typically 4%) and crushed to pass through a 2mm screen.	-	4-5					
Soluble Salts (Field)	1:5 soil:water extraction followed by potentiometric determination of conductivity. Calculated by EC (mS/cm) x 0.35.	0.05 %	4-5					

Appendix G

Test Pit Logs



5

TEST PIT No: TP201

TEST PIT LOG

SHEET 1 of 1

ROJECT:	TION:	Aka Aka	aroa	Waste Water Upgrade JOB	NUMBER: NT: Chri:	6517 stchu	986 Irch	6 City (Counc	il	
IRCUIT: OORDIN/	ATES:	NZTI N 5, E 1,	M 150,2 597,4	TEST PIT LOCATION: Boat ramp car park 251.5 m R L: 13.8 m 69.9 m DATUM: MSL	(21				a ,	2
DEPTH (m) WATER LEVEL	GRAPHIC LOG	SS	NOISTURE	SOIL / ROCK DESCRIPTION		SEOLOGICAL UNIT	Scala	sv	7 (kPa)	SAMPLES	
0.5	***** Øx0 (x x x x x x x x x x x x x x x	2 × GN × ML × ×	I D	Asphalt Densely packed sandy fine to coarse GRAVEL, some silt; grey; dry; non plastic. Grave subangular to subrounded basalt. Sand: fine to coarse. [ENGINEERED FILL] Very stiff SILT, some sand, minor gravel, trace clay; grey mottled brown; dry to moist; I plasticity. Gravel: subangular to rounded basalt, greywacke.	al: ow			97/39 54/26	134/5 <mark>4</mark> 75/36	m	1
1.0	x x x x x x x x x x x x x x x x x x x x	× GP × ML × ×	MM	 Sandy fine to medium GRAVEL, trace silt; grey; moist; non plastic. Gravel: subrounded basalt. Stiff to very stiff SILT, minor fine sand, trace fine to medium gravel; grey mottled orange low plasticity. Gravel: subrounded basalt. 	t to			41/ <mark>1</mark> 6 103/54	57/22 142/75	B D	1
.5	× × × × × × × × × × × × × × × × × × ×	× ML × × × ×	M	'Firm to stiff SILT, minor refuse, minor fine sand, minor fine to medium gravel, trace org dark grey, moist, low plasticity. Refuse: metal fragments, plastic bags. Gravel: subangu rounded basalt, greywacke. Organics: wood fragments.	ganics; ular to	Non-engineered Fill				٥	
.0 23/1/14 16:15 0	× × × × × × × × × × × × × × × × × × ×	× OL × × ×	S S	Very soft to soft' SILT, some refuse, some organics, minor fine to coarse sand; black; wet; non plastic. Refuse: household waste including black plastic bags filled with decor matter, plastic, glass, clothes, metal pieces, tin cans. Organics: decomposed matter. S decomposing odour. From 2.1m: saturated	moist to mposing Strong					٥	1.00
3.0	80x00	2 _× GN 2 _× GN	I S	Loosely packed fine to medium sandy medium to coarse GRAVEL, some silt, minor col boulders, trace organics, trace refuse; dark grey; saturated; non plastic. Gravel, cobbl boulders: subrounded basalt. Organics: decomposing timber. Refuse: plastic bags. (Di Alluvial Deposits) Loosely packed fine to medium sandy medium to coarse GRAVEL, some silt, minor co boulders; grey; saturated; non plastic. Gravel, cobbles and boulders: subrounded basa [ALLUVIAL DEPOSITS]	bbles and sturbed bbles and it.		-			;;	35
.5				END OF LOG @ 2.8 m							3
i.0											đ
.5											
TE EXCAN GGED BY	/ATED:	23/1/ LG 1211	/14	CONTRACTOR: Mora Earthmoving COMMENTS: EQUIPMENT: Komatsu PC138US Groundwater encountered a from GPS.	it 2.1m bgl, fas	st inflov	w. Co	ordinate	s and gr	ound le	ave
	ATION	010						12	Destation		



TEST PIT No: TP202

TEST PIT LOG

SHEET 1 of 1

PROJECT:	Akaroa Waste Water Upgrade	JOB NUMBER: 6517986
SITE LOCATION:	Akaroa	CLIENT: Christchurch City Council
CIRCUIT: COORDINATES:	NZTM TEST PIT LOCATION: N 5,150,251.6 m RL: E 1,597,476.3 m DATU	Boat ramp car park 13.8 m M: MSL
DEPTH (m) WATER LEVEL GRAPHIC LOG	SOIL / ROCK DESCRIPTION	Same See Scool Church See Scool Church See Scool Church Scool Church S
-0.5	GM D Asphalt Densely packed fine to medium sandy fine to coarse GRAVEL, [ENGINEERED FILL] ML D Stiff to very stiff SILT, minor clay, minor fine to coarse gravel, tra organics; dark grey; dry to moist; low plasticity. Gravel: subangu fragments. Refuse: plastic bags, metal fragments. Organics: wo x	some silt; grey; dry; non plastic. ace fine sand, trace refuse, trace plar to rounded basalt, brick od fragments. 115/38 159/53 106/32 147/44 13. 102/32 141/44 13.
-1.5	x x x x x OL x OL x x x x x x x x x x x x x x x x x x x x x x x x x x	to coarse sand; black; moist to c bags filled with decomposing decomposed matter. Strong
-2.5 × × × × × × × × × × × × × × × × × × ×	M X X <td>r cobbles and boulders, trace les and boulders: subrounded isturbed Alluvial Deposits) r cobbles and boulders; grey; alt. [ALLUVIAL DEPOSITS]</td>	r cobbles and boulders, trace les and boulders: subrounded isturbed Alluvial Deposits) r cobbles and boulders; grey; alt. [ALLUVIAL DEPOSITS]
-3.5 -4.0	END OF LOG @ 3.1 m	10
-4.5	28/1/14 CONTRACTOR: Mora Earthmoving COM	
.OGGED BY: SHEAR VANE No:	LG EQUIPMENT: Kornatsu PC138US from 1211 METHOD: Machine excavated	ndwater encountered at 1.9 m bgl, fast inflow. Coordinates and ground level GPS.
OR EXPLANATION O	F SYMBOLS AND ABBREVIATIONS SEE KEY SHEET	Revision A

A4 Scale 1:25

Appendix H

Soil Testing Summary Sheet

			SOIL AN	ALYSIS RESUL	TS: AKAROA PUMP ST	ATION				
Sample Date	23/01/14	23/01/14	23/01/14	28/01/14	28/01/14					
Sample Envirolab Reference	14:018	14:018	14:018	14:018	14:018		Assessment Criteria			
Test Pit Number	TP201 S1	TP201 S2	TP201 S3	TP 202 S1	TP 202 S2					
Sample Depth	0.5m	1.6m	2.0m	0.5m	2.3m	Background				
Laboratory Number	1228330.2	1228330.3	1228330.4	1230175.4	1230175.5	concentrations ²				
Soil Type	Silt/Sand/Gr avel	SILT some sand/gravel	SILT, organic matter	SILT	SILT		Environmental Human Health A		h Assessment	
Soil Type used in the Assessment ¹	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt					
Heavy metal (mg/kg dry weight)			-	-						
Arsenic	3	<u>12</u>	8	8	<u>7</u>	7	12	(d)	80	(a)
Cadmium	<u>0.57</u>	0.4	<u>0.35</u>	<u>0.22</u>	<u>1.18</u>	0.14	10	(d)	400) (a)
Chromium	15	16	18	13	17	25.9	64	(d)	2,70	0 (a)
Copper	<u>33</u>	<u>52</u>	<u>20</u>	<u>21</u>	<u>20</u>	16.3	63	(d)	>10,0	00 (a)
Lead	<u>128</u>	<u>161</u>	<u>57</u>	<u>59</u>	<u>81</u>	30.3	140) (d)	880) (a)
Mercury	<u><0.1</u>	<u><0.1</u>	<u>0.14</u>	<u>0.42</u>	<u>0.14</u>	0.07	6.6	(d)	1,80	0 (a)
Nickel	10	13	10	8	11	16.4	50	(d)	1,50	0 (b)
Zinc	137	240	220	140	410	83.5	200) (d)	23,00	00 (b)
Polycyclic Aromatic Hydrocarbons (mg/k	g dry weight)	•					<1m	1m - 4m		
Acenaphthene	-	<0.7	<1.1	-	<1	-		_	3,40	0 (b)
Acenaphthylene	-	<0.7	<1.1	-	<1	-		-		-
Anthracene	-	<0.7	<1.1	-	<1	-		-	17,00	00 (b)
Benzo[a]anthracene	-	0.8	<1.1	-	<1	-		_		-
Benzo[a]pyrene (BAP)	-	<1.4	<3	-	<1.9	-	5.7 (e)	NA (e)		-
Benzo[b]fluoranthene + Benzo[j]fluoranth	-	<1.4	<3	-	<1.9	-		_		-
Benzo[g,h,i]perylene	-	<1.4	<3	-	<1.9	-		-		
Benzo[k]fluoranthene	-	<1.4	<3	-	<1.9	-		_	-	
2-Chloronaphthalene	-	<0.7	<1.1	-	<1	-		-	-	
Chrysene	-	<0.7	<1.1	-	<1	-		-	-	
Dibenzo[a,h]anthracene	-	<1.4	<3	-	<1.9	-		-	-	
Fluoranthene	-	1.3	<1.1	-	<1	-		-		
Fluorene	-	<0.7	<1.1	-	<1	-		-	2,30	0 (b)
Indeno(1,2,3-c,d)pyrene	-	<1.4	<3	-	<1.9	-		-		
2-Methylnaphthalene	-	<0.7	<1.1	-	<1	-		-	230	(b)
Naphthalene	-	<0.7	<1.1	-	<1	-	0.28 (e)	0.62 (e)	4 (b)
Phenanthrene	-	0.7	<1.1	-	<1	-		_		
Pyrene	-	1.6	<1.1	-	<1	-	7.9 (e)	NA (e)	1,70	0 (b)
BAP Equivalent	-	<1.71	<3.52	-	<2.25	-	5.7 (e)	NA (e)	40	(a)
Total Petroleum Hydrocarbons (mg/kg di	ry weight)						<1m	1m - 4m	<1m	1m - 4m
C7 - C9	<8	<9	<14	<8	<11	-	5200 (e)	NA (e)	120 (c)	120 (c)
C10 - C14	106	116	<30	<20	<30	-	9200 (e)	NA (e)	470 (c)	560 (c)
C15 - C36	4,000	5,600	<60	<40	<50	-	NA (e)	NA (e)	NA (c)	NA (c)
Total hydrocarbons (C7 - C36)	4,200	5,700	<100	<70	<80	-				· · · · · · · · · · · · · · · · · · ·
Other compounds (mg/kg dry weight)										
All other compounds	-	Below D	Detection	-	Below Detection	-		-		

Annotations:

¹ The Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Ministry for the Environment (MfE), 1999 (Revised 2011) provides a series of guideline values based on specific soil types. The soil type encountered onsite is described in the testpit logs and can vary from the specific types described in the guidelines. To undertake the assessment the guideline soil type which matches most closely the soils encountered at that location and depth has been selected.

² Regional background concentrations from background concentrations of selected trace elements in Canterbury soils Level 2 background levels. For Intergrade soils. Report # R07/1/2, Environment Canterbury.

(a) Resource Management (National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. Values applicable to Recreational Landuse have been used.

(b) US EPA Regional Screening Levels (2012) for Residential Landuse (Residential has been used as a conservative estimate of the threshold for Recreational landuse).

(c) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, MfE, 1999 (Revised 2011). Module 4, Tier 1 Soil Screening Criteria (All Pathways). Values applicable to sandy silt soil types for surface soils (<1m) and soils 1-4m bgl and Residential landuse have been used as a conservative estimate of Recreational Landuse.

(d) Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, CCME 1999. Values applicable to 'Residential/Parkland' land use have been used.

(e) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, MfE, 1999 (Revised 2011). Module 4, Soil Acceptance criteria for protection of groundwater quality. Values applicable to sandy silt soil types for surface soils (<1m) and soils 1-4m bgl, with groundwater depth of 2m have been used.

NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than likely to be encountered on site (i.e. 20,000 mg/kg for TPH).

Underlined text indicates result exceeds Environment Canterbury background concentrations.

Bold indicates result exceeds environmental criteria

Grey shading indicates result exceeds human health criteria



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Appendix E

Certificates of Title



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



Search Copy

Identifier	CB45A/1127		
Land Registration District	Canterbury		
Date Issued	07 August 1998		

Prior References CB256/17	GN A348371.1
Estate	Fee Simple
Area	4.4150 hectares more or less
Legal Description	Lot 2 Deposited Plan 2868, Lot 1 Deposited Plan 79110 and Section 2 Survey Office Plan 18642
Purpose	Reclamation and Public Recreation
Proprietors Banks Peninsula Di	strict Council

Interests

155435 Transfer creating the following easements in gross - 16.11.1923 at 11.00 am

TypeSerConvey waterLot286Plan2 St186

Servient TenementEasement AreaLot 2 Deposited Planmarked Lots 3 & 42868, Lot 1 DepositedDP 6864Plan 79110 and Section2 Survey Office Plan18642 - herein

Grantee Gouthpower Limited

Statutory Restriction









COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



Search Copy

Identifier	604498
Land Registration District	Canterbury
Date Issued	10 April 2013

Prior References CB23F/771		
Estate	Fee Simple	
Area	6929 square metres more or less	
Legal Description	Lot 3 Deposited Plan 459704	
Purpose	for the purpose of a waste water treatment plant	
Proprietors		
Christchurch City C	Council	

Interests





ä

Appendix F

RCEP – Water Quality Classification



Water Quality Standards for Class Coastal SG Water

- (1) The median faecal coliform concentration of not less than five samples taken within any consecutive 30 day period, shall not exceed 14 colony-forming units per 100 ml, and no more than 10% of samples taken within any consecutive 30 day period shall exceed 43 colony-forming units per 100 ml as a result of any discharge of a contaminant or water. Samples shall not be taken on the same or consecutive days.
- (2) The concentration of dissolved oxygen shall not be reduced to less than 80% of saturation concentration as a result of any discharge of a contaminant or water.
- (3) Bacterial or fungal slime growth shall not be visible to the naked eye as plumose growths or mats as a result of any discharge of a contaminant or water.
- (4) The natural temperature of the water shall not be changed by more then 30 Celsius, and shall not exceed 250 Celsius at any time, as a result of any discharge of a contaminant or water.
- (5) The BOD5 of the receiving water measured after filtration through a GF/C filter shall not exceed 2 g per cubic metre as a result of any discharge of a contaminant or water.
- (6) Concentrations of the dissolved fractions of the following metals, measured after filtering a sample through an acid-washed 0.45 micron filter, shall not exceed the concentrations set out below as the result of any discharge of a **co**ntaminant or water:

Arsenic	50 mg per cubic metre
Cadmium	2 mg per cubic metre
Chromium	50 mg per cubic metre
Copper	5 mg per cubic metre
Lead	5 mg per cubic metre
Nickel	15 mg per cubic metre
Zinc	50 mg per cubic metre

Appendix G

Baseline Benthic Ecological Survey for a Proposed Wastewater Treatment Plant Outfall in Akaroa (Cawthron, 2014) Appendix H

Draft Construction Environmental Management Plan
Report

Akaroa Wastewater Project - Construction Environmental Management Plan - DRAFT

Prepared for Christchurch City Council (Client)

By CH2M Beca Limited

30 June 2014



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Revision History

Revision Nº	Prepared By	Description	Date
1	Alex Ross	Draft for CCC review	24/06/2014
2	Alex Ross	Final draft for consent application	30/6/2014

Document Acceptance

Document A	Acceptance		
Action	Name	Signed	Date
Prepared by	Alex Ross	Henry	30/06/2014
Reviewed by	Graeme Jenner	Henn	30/06/2014
Approved by	Garry Macdonald	Gundance	30/06/2014
on behalf of	CH2M Beca Limited	·	·



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1 Introduction

1.1 Overview

The Akaroa Wastewater Project encompasses a new trunk wastewater scheme for Akaroa, including a new wastewater treatment plant on Old Coach Road, a new harbour outfall, pipelines to and from the treatment plant, upgrades to the trunk pipeline and pump stations to reverse the flow through town, and a new Terminal Pump Station (see Figure 1.1).

1.2 Scope of this Document

This draft Construction Environmental Management Plan (CEMP) has been prepared on behalf of Christchurch City Council (CCC) in support of resource consent applications for the construction of new trunk mains, Terminal Pump Station, wastewater treatment plant and outfall.

1.3 Purpose of this Document

The draft CEMP is a high level document outlining overarching planning and mitigation strategies to be undertaken by the Contractor so as to ensure the Project is delivered successfully.

This draft CEMP outlines the construction activities proposed, the effects of these activities, and the measures to be taken to mitigate any adverse environmental effects resulting from these activities.

This CEMP also provides minimum requirements for the additional construction management documents to be prepared by the Contractor, including:

- Environmental Management Plan (EMP)
- Site Management Plan (SMP)
- Traffic Management Plan (TMP).

A separate Contaminated Soils Management Plan (CSMP) has been prepared for the Terminal Pump Station site in support of the land use consent application. The requirements of this plan will need to be included in the Contractor's EMP.

Section 8 of this document provides further details of what each of the above individual plans should cover.

A Construction Health and Safety Plan will also be prepared by the Contractor(s) before any work commences on site. Health and Safety issues are not covered by this draft CEMP.

1.4 Related Documents

Further information regarding the site and the proposed work is contained in the following documents:

- Akaroa Wastewater Preliminary Design Report, CH2M Beca, 2014
- Akaroa Wastewater Treatment Plant Geotechnical Assessment Report, CH2M Beca, 2014
- Akaroa Wastewater Scheme Upgrading Resource Consents Application and Assessment of Effects on the Environment, CH2M Beca, 2014.





Figure 1.1 – Proposed Layout of Akaroa Wastewater Project



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1.5 Proposed Management Plan Consent Conditions

Consent conditions have been proposed in respect of the lodgement, content, amendment and location of the Contractor's Environmental Management Plan prepared, as follows:

- The Consent Holder's Contractor shall provide the Compliance Manager, Christchurch City Council with a Contractor's Environmental Management Plan for each stage of the project, at least ten working days prior to the intended date of commencement of works authorised by this consent.
- The submitted Contractor's Environmental Management Plan shall define the actions to be taken to ensure compliance with all conditions of these consents, or in response to any incident that may impact adversely on the environment. The Plan and any revisions shall include the best practicable options for achieving compliance with the conditions of this consent.
- All work shall be carried out in accordance with the Contractor's Environmental Management Plan, except that the Contractor may, at any time during the period of this consent, submit to the Manager, Regulatory Department, Christchurch City Council, amendments to the Plan for approval, provided these amendments improve the efficiency and/or quality of the construction works, or avoid, remedy or mitigate an adverse effect.
- Copies of this consent and the Contractor's Environmental Management Plan shall be kept in the Contractor's office on site at all times during each stage of works, and is to be made readily available. All workers and contractors on the sites shall be familiar with the conditions of this consent as it affects their particular area of operation.
- Finally agreed consent conditions will need to be included in the Contractor's Environmental Management Plan.



2 Summary of Preliminary Design

2.1 Overview of Existing Network

The existing Akaroa wastewater network consists of three gravity catchments serviced by three pump stations connected in series - Reserve Pump Station, Fire Station Pump Station and Glen Pump Station (Figure 2.1). The Glen Pump Station, which is the last in the series, pumps all Akaroa's wastewater flows to the existing treatment plant south of the town. Following treatment, wastewater is disposed to the harbour through a short harbour outfall.

2.2 Overview of Proposed Upgraded Scheme

The key features of the proposed upgraded scheme are:

- Reversal of the wastewater flow along Beach Road, with the Glen Pump Station pumping to the Fire Station Pump Station, which will pump to a new Terminal Pump Station. The Reserve Pump Station will also pump to the Terminal Pump Station, which will pump wastewater up to the new Akaroa Wastewater Treatment Plant on Old Coach Road. This will involve replacing pumps in the Glen and Fire Station Pump Station, and new pressure pipelines.
- The Terminal Pump Station will be located in the Akaroa Boat Park, and will include fine screens and grit removal, to protect the progressive cavity pumps. Flow from the Terminal Pump Station will be pumped up Old Coach Road in a new pipeline.
- A new biological nitrogen removal (BNR) membrane treatment plant on the corner of Old Coach Road near the intersection of Long Bay Road, which will provide secondary and tertiary treatment, producing a significantly better wastewater quality than the current treatment plant. The treatment process will likely be the Modified Ludsak-Ettinger (MLE) process, although other alternatives proposed by tenderers would be considered. The MLE process includes an anoxic zone followed by an aerobic zone. Solids separation and disinfection will be provided by membrane filtration.
- Treated wastewater flows will discharge to mid-Akaroa Harbour via a new outfall pipeline approximately 2.5km long constructed from Childrens Bay. The outfall will be connected to the treatment plant via a new gravity main installed on Old Coach Road.
- Peak wet weather wastewater flows in Akaroa above 14L/s, in excess of the capacity of the balance tank, will bypass the biological treatment process. The bypass flows will be screened and UV disinfected before being combined with the fully treated wastewater and discharged via the harbour outfall.

An overview of the proposed scheme is shown in Figure 1.1. The reversal of the reticulation network is illustrated on Drawings 6517986-CE-001 to 6517986-CE-010, which are appended to the AEE.





Figure 2.1 – Existing Wastewater Network



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2.3 Pump Stations and Trunk Pipeline Design

The following upgrades will be required to the pump stations and pressure mains to allow reversal of flow through the existing reticulation network to the new Terminal Pump Station near the north end of Akaroa.

2.3.1 Single Dwelling and Landfill Leachate

- The existing pressure main between the Glen Pump Station and the existing wastewater treatment plant will be decommissioned.
- An E/One pressure sewer pump station will be installed to collect flows from a single dwelling at 281 Beach Road and the Akaroa Landfill leachate drain.
- A DN63mm polyethylene pressure main will be slip-lined through the existing (abandoned) DN200mm diameter asbestos cement pressure main pipe, to convey flows from the pressure sewer pump station to the Glen Pump Station.

2.3.2 Glen Pump Station

- The two Glen Pump Station pumps are oversized for the future design flow of 14L/s and will be replaced by smaller pumps operating as duty/standby. The wet well will remain unaltered. There will be local excavation works required to connect to the new pressure main.
- A new DN160mm polyethylene (PE) pressure main will be installed by slip-lining through the existing 200mm diameter AC pressure pipeline between the Glen Pump Station and the Fire Station Pump Station.
- CCC has confirmed that the direct gravity connections to the existing pressure main can be connected to the upgraded system.
- A temporary solution (most likely using tanks and sucker trucks) will be required to manage the flow from these gravity connections while slip-lining is carried out.

2.3.3 Fire Station Pump Station

- The existing pump station has issues with high pump starts and odour issues.
- The theoretical design flow (38L/s) is lower than existing, due to reversal of flows through the
 reticulation network. Based on the reduced flows, pump starts are likely to be within acceptable
 limits and therefore the existing wet well can be retained.
- Both pumps are likely to be replaced, however design flows are to be confirmed.
- To address odour issues, the existing biofilter will be replaced with a larger biofilter on the same site, with approximate dimensions of 2.5m x 2.5m.
- A DN225mm PE pressure main is proposed between the Fire Station Pump Station and the Terminal Pump Station. Between the Fire Station and Reserve Pump Station, the new pressure main could be pipe-burst through the existing 200mm and 150mm diameter AC pressure pipeline. The last section from the Reserve Pump Station to the Terminal Pump Station will need to be trenched or drilled.

2.3.4 Reserve Pump Station

- This pump station will be servicing the same catchment; therefore it is unlikely that any upgrade works will be required.
- The pump outlets will be connected to the proposed DN200mm PE pressure main to convey flows from the Reserve Pump Station to the new Terminal Pump Station.



2.4 Terminal Pump Station Design

The new Terminal Pump Station will pump all the wastewater from Akaroa up to the treatment plant via a single pressure main along Old Coach Road.

The pump station will be a building containing screens and grit traps, a wet well, three progressive cavity pumps and electrical equipment. An external containerised generator will be provided outside the building so the pump station can operate when normal power supply is interrupted. A biofilter will be provided for odour management.

Drawings 6517986-ME-20 and 6517986-ME-21 (appended to the AEE) show the proposed location and general arrangement for the Terminal Pump Station.

2.5 Terminal Pump Station Pressure Pipeline

The pressure main connecting the Terminal Pump Station with the wastewater treatment plant will follow Old Coach Road. The alignment will be shared with the treatment plant outfall pipe, and the raw and treated water pipelines presently being constructed by CCC under a separate project.

The lower 400m of pressure main will be DN280 PE100 SDR9 (PN20). The upper 650m of pressure main will be DN280 PE100 SDR11 (PN16).

The pressure main will discharge into a balance tank at the treatment plant with a static head of approximately 118m.

2.6 Wastewater Treatment Plant Design

2.6.1 Overview

The following preliminary design has been developed to enable a consent envelope to be defined for a wastewater treatment plant at the top of Old Coach Road. The proposed procurement method for the treatment plant is a design and build contract, and as such the final design is likely to be in general accordance with, but different to that presented here.

Council has committed to a "best wastewater quality available" approach for wastewater treatment. To achieve this, a year-round biological nitrogen removal (BNR) process with membrane filtration for solids separation and disinfection for the treatment plant has been selected.

2.6.2 Process Description

Figures 2.2 and 2.3 illustrate the process for wastewater treatment at the proposed new Akaroa Wastewater Treatment Plant. Screening and grit removal (primary treatment) will be provided at the Terminal Pump Station.

All flow to the treatment plant will be received in a 250m³ flow balance tank. Normal flows (up to 14L/s) will receive full treatment using the BNR process with membrane filtration. Once the capacity of the balance tank is reached, additional flows above 14L/s will bypass the main treatment process, receiving UV disinfection, before combining with the treated wastewater from the main process.

Modified Ludzak-Ettinger (MLE) reactors are a conventional process for BNR. The MLE process is an anoxic, followed by aerobic, system with a high level of recycle from the aerobic zone to the anoxic zone to provide sufficient nitrate and nitrite for nitrogen removal by de-nitrification. This recycle is combined with Return Activated Sludge (RAS) from the membranes to provide sufficient



microorganisms (otherwise known as Mixed Liquor Suspended Solids (MLSS)) to treat the wastewater. To avoid biological inhibition, both carbon (acetic acid) and alkalinity (bicarbonate) will be added to the wastewater as it enters the MLE reactors. Alternative treatment processes which produce the same effluent quality will also be considered.

Wastewater from the MLE reactors (or other treatment process) will then be treated using membrane filtration, to remove suspended solids and pathogens. The membranes are most likely to be low pressure hollow fibre membranes located in a separate membrane building.

Waste Activated Sludge (WAS) will be periodically removed from the membrane tanks and thickened using a gravity belt thickener, and stored in an enclosed tank. It is expected that sludge from the tank would be removed weekly and tankered to the Christchurch Wastewater Treatment Plant for processing into biosolids.

Mechanical equipment (blowers and most pumps) will be sized for duty/standby operation. This means the process can continue following the failure of individual items of mechanical equipment. The gravity belt thickener and thickened WAS pumping will be specified duty only, as they are only required 1 to 2 hours per day, and the process could continue for several days without these units in operation.



Figure 2.2 - Process Flow Diagram for Akaroa Wastewater Treatment Plant



2.6.3 Treatment Process Options

For the purposes of the consenting process, the following BNR processes remain as viable treatment alternatives for the design build contractor:

- Modified Ludzak-Ettinger Reactors (MLE)
- Sequence Batch Reactors (SBR)
- Oxidation Ditch
- Mixed Bed Biofilm Reactor (MBBR)
- Integrated Fixed Film Activated Sludge (IFAS)
- Biological Trickling Filter (BTF).



Figure 2.3 – Wastewater Flow Paths Through Akaroa Wastewater Treatment Plant

2.7 Outfall Design

2.7.1 Overview

The outfall pipeline will carry treated wastewater from the treatment plant to the discharge point in Akaroa Harbour. In periods of sustained wet weather, when the wastewater inflow exceeds the capacity of the treatment plant and balance tank, the outfall pipe will carry screened and UV disinfected diluted wastewater to the discharge location.

The pipe material is proposed to be polyethylene (PE) with a total length of the pipeline between the treatment plant and the discharge location of 3,725m.

The proposed outfall alignment and discharge location is shown on Drawing GIS-6517986-05 (appended to the AEE).

2.7.2 Land Pipeline Alignment

The land pipeline runs from the wastewater treatment plant down Old Coach Road, across State Highway 75 and along Childrens Bay Road to the north end of Childrens Bay (refer Figure 2.4). This is the preferred location for the pipeline to leave the shoreline, as it reduces construction phase disruption to beach and boat users, avoids the well-established vegetation and boardwalks in Childrens Bay and avoids the rock headland further north.



2.7.3 Harbour Outfall Alignment

The harbour outfall is proposed to run from Childrens Bay to a "mid-harbour outfall" location shown in Figure 2.5. The pipeline has been designed with 1m cover to the pipe beneath the seabed to reduce the risk of it being snagged by anchors and to provide protection from tsunami conditions. The pipeline depth at the inshore end increases to 2.6m so that the proposed de-aeration structure is always submerged even at low tide.

Even though the design has considered boat anchorage, the completed outfall and diffuser location will require restricted anchorage designations, and diffuser components will be designed with a degree of protection from errant anchor placement and drag.



Figure 2.4 – Alignment of Harbour Outfall in Childrens Bay





Figure 2.5 - Proposed Akaroa WWTP and 2.5km harbour outfall (existing Akaroa WWTP and existing outfall also shown).

2.7.4 De-aeration Chamber Design

The harbour outfall pipeline will be laid relatively flat and air may accumulate at local high points. This can cause issues with buoyancy, increased local losses and potentially air locking in the pipeline. Therefore a de-aeration chamber is proposed at the shoreline to allow air entrained in the flow to escape before it enters the harbour outfall.

The preliminary design for the de-aeration chamber is an enlarged section of pipeline, 10m long and 600mm diameter, laid on as steeper positive gradient as practicable. This will reduce the flow velocity sufficiently and allow entrained air to escape through three off-takes on the soffit of the chamber leading to air release valves on the edge of Childrens Bay Road. The chamber will be buried below low tide so that it is permanently submerged.

2.7.5 Diffuser Design

The recommended diffuser design comprises three risers at 5m centres, each discharging to two horizontally opposed ports 0.3-0.5m above the seabed. The diffuser will be buried at 9.5m depth to Mean Sea Level, with riser units to bring the flow up from the pipe ports to a tee head discharge above the seabed. The risers and discharge heads will be contained within protective structures designed to protect the risers and heads from entanglement with anchor cables and fishing lines and to withstand propeller wash from cruise ships.

The soft nature of the seabed means that either screw or friction piles can be used to support the diffuser and protection structures.



3 Description of Existing Environment

3.1 General Setting

Akaroa Township is located on a wide bay on the eastern side of Akaroa Harbour, Banks Peninsula. The permanent population is approximately 600 people, with a significant increase in visitor numbers over the summer. The proposed works will occur along the wastewater network between Beach Road, to the new treatment plant at Old Coach Road, a distance of approximately 3.4km (refer Figure 1.1). The new pipeline will be laid through both the commercial and residential areas of Akaroa, along existing roads and through reserves. There will be several stream crossings via existing bridge structures.

3.2 Geology, Soils and Groundwater

3.2.1 Pipeline Routes

Geotechnical investigations have not been carried out along the proposed pipeline routes. Based on published geological information, ground conditions at the site are expected to comprise engineering and/or un-engineered fill associated with roads, overlying colluvium and loess. Locally, the Akaroa Volcanic Group bedrock may be encountered relatively close to, or at, ground level. The Akaroa Volcanic Group is likely to be variable in terms of strength and weathering, varying between competent basalt to highly weathered breccia and pyroclastic material. Groundwater is likely to be shallow (in the order of up to 2m below ground level).

The key preliminary potential geotechnical hazards are:

- Variable ground conditions, including shallow rock head, the depth of which may vary significantly across the site
- Soils with low or variable strength and stiffness
- Potential for moisture sensitive and highly erodible loess soils
- High groundwater table.

Geotechnical investigations may be carried out during the detailed design process, once the installation methods are confirmed.

3.2.2 Terminal Pump Station Site

Borehole investigations have been undertaken at the proposed site for the new Terminal Pump Station. The Akaroa Wastewater Preliminary Design Report (CH2M Beca Ltd, 2014) states that the pump station is to be located on level ground adjacent to a stream and the Akaroa Harbour shore. The site is understood to have previously been occupied by a stream channel, then used as an uncontrolled landfill, upon which hard fill has been placed to create the level platform for the existing boat park. Groundwater is likely to be 1.8m below ground level, based on available information. The water level in the adjacent stream is understood to be tidally influenced, so some hydraulic connectivity between the groundwater level and the tide levels may be expected. Boreholes at the site showed 2m of non-engineered fill from the historic landfill, overlying gravels, silts, sands and colluvium.

Wastewater Treatment Plant Site

A geotechnical field investigation was carried out at the treatment plant site. The findings of the field investigation are presented in the Akaroa Wastewater Treatment Plant – Geotechnical Assessment



Report (CH2M Beca, 2014). The field investigation identified up to 8.3m of loess overlying completely to highly weathered basalt, breccia and tuff of the Akaroa Volcanic Group. Non-engineered fill up to 1.1m thick was identified along the Old Coach Road verge, predominantly comprising silt with variable gravel, sand, clay and organic content. Groundwater monitoring standpipes installed during the investigation identified groundwater between 8.0 - 9.8m below ground level. However, it is possible that groundwater levels may temporarily rise during or immediately after high rainfall events and would be expected to vary on a seasonal and annual basis.

Geotechnical hazards identified at the site may include:

- Presence of moisture sensitive and highly erodible loess soils
- Slope instability
- Presence of non-engineered fill along Old Coach Road
- Variable thickness of loess and strength of the Akaroa Volcanic Group across the site.

3.2.3 Outfall Pipeline Route

Geotechnical investigations and a bathymetric survey have been carried out along the proposed outfall pipeline route. The seabed away from the shoreline is loess-derived silt typically found in the Akaroa Harbour. There is a rock outcrop where the outfall reaches the shore. The bathymetric survey identified that the seabed is featureless with no apparent seabed obstructions.

3.3 Climate

The climate of Akaroa is temperate and varies slightly to that of nearby Christchurch, where the closest NZ Meteorological Service station is located. Mean annual rainfall between 1969 and 1998 was 635mm.

NIWA (2014) investigated wind direction and speed as part of the development of the harbour hydrodynamic model. Winds within the Akaroa Harbour basin are strongly influenced by the local topography of the surrounding hills and valleys. Winds offshore in the Harbour mainly exhibit a north-south direction down the axis of the Harbour. Winds from the east or west quarters are diminished by the sheltering effect of the surrounding terrain, but also include local effects from air drainage down adjacent valley systems. Most of the stronger storms are associated with southerlies and tend to be more frequent in winter. Wind speeds of up to 14m/s have been recorded.

3.4 Surface Water and Coastal Water

The following are the surface water receiving environments that may be affected by the proposed Akaroa Wastewater Project.

- Akaroa Harbour
- Urban streams:
 - Aylmers Stream
 - Walnut Stream
 - Balguerie Stream
 - Grehan Stream
 - Mill Stream



3.4.1 Akaroa Harbour

The Akaroa Harbour is almost 17km long with a maximum area of 44km², of which 2km² is exposed at low tide. The total catchment area around the harbour is almost 200km² and includes pasture, dairy farms, small townships and holiday subdivisions (NIWA, 2014).

The coastline making up the inner shores of the Akaroa Harbour consists of alternating sandy/muddy bays interspersed between rocky headlands, many of which have shore platforms (Taylor, 2003 in MWH, 2006). Water depths range from 30m just beyond the heads to 15m at the curve, and then steadily shallower to the intertidal mudflats in the inner embayments (Bolton-Ritchie, 2005).

The coastal marine area, which extends from the mean high water spring (MHWS) to the seabed, has high natural and cultural values. The harbour is ranked as nationally important (Department of Conservation, 1990) on the grounds that it:

- Is an important habitat for Hector's dolphin
- Is an important habitat for the yellow-eyed penguin
- Has high recreational use
- Is a tourist attraction.

The Akaroa Harbour is also internationally important as it is part of the Banks Peninsula Marine Mammal Sanctuary.

Akaroa Harbour and the coastal margins affected by the project fall within the takiwā (territory) of Ōnuku Rūnanga. It is also understood that Wairewa Rūnanga share kaitiakitanga (guardianship) responsibilities for Akaroa Harbour. Akaroa Harbour is significant to the Rūnanga in respect of wahi tapu and waahi taonga and the collection of mahinga kai and kai moana (citation from Ōnuku Rūnanga representative, cited in MWH, 2012).

3.4.2 Urban Streams

The proposed pipeline route crosses a number of streams which drain the hillsides above Glen Bay, French Bay and Childrens Bay in the Akaroa Harbour. The affected streams are:

- Aylmers Stream
- Walnut Stream
- Balguerie Stream
- Grehan Stream.

Aerial photographs show that these streams are mostly short (<4km in length from headwaters to the ocean), with steep catchments consisting of a mixture of native forest, pasture and residential areas. In the lower reaches of each stream, water quality is likely to be affected by runoff from roads and urban activities. Waterways on Banks Peninsula are typically rain-fed, are subject to rapid flow recession, and some may be seasonally dry (Environment Canterbury, 2012). Banks Peninsula waterways also typically have long periods of low flow, low base flows and infrequent large floods of short duration, with higher flows occurring in winter when precipitation is higher (Environment Canterbury, 2012). The affected streams exit to the beaches of Glen Bay, French Bay and Childrens Bay.



3.5 HAIL Sites

The proposed Terminal Pump Station site in Jubilee Park is a potentially contaminated site, based on the historic use of the land for an uncontrolled landfill, an activity listed on the Ministry for the Environment's Hazardous Industries and Activities List (HAIL). A preliminary site investigation has been carried out for the site. The site investigation included a desktop study and soil testing around the proposed pump station location. The desktop study confirmed the land was used as a landfill for general household waste from Akaroa from pre-1890s to 1978. Soil testing identified the following key contaminants of concern:

- Arsenic
- Zinc
- Total petroleum hydrocarbons (TPH).

None of the contaminants exceeded the criteria for protection of human health for recreational land use. However, both arsenic and zinc were measured at concentrations above the criteria for environmental discharges. Concentrations of heavy metals exceeded typical background levels in all samples.

Results of the preliminary site investigation are summarised in the report Preliminary Site Investigation (Contamination), Akaroa Wastewater Terminal Pump Station (CH2M Beca, 2014).

Groundwater was not sampled during the preliminary site investigation. Based on the landfill materials known to be present on site, there is the potential for groundwater to have become contaminated. The extent of groundwater contamination at the site is expected to be minor due to the limited extent of the landfill materials, and the regular flushing of groundwater by the tide.



4 Description of Construction Activities

4.1 Description of Work and Target Construction Programme

4.1.1 Overview

It is anticipated that construction work will commence in April 2017 and will be carried out in a number of phases over a 2 year period. Figure 4.1 illustrates the proposed construction works to complete the project. The Wastewater Treatment Plant, Terminal Pump Station and Outfall Pipeline can all be constructed simultaneously. They must be completed, alongside supporting infrastructural elements, prior to the upgrade of the reticulation network.



Figure 4.1 – Schematic of construction works

A summary of the programme is provided in Table 4.1.

Table 4.1 - Description	of the Work and	Target Constru	ction	Program	nme
	•••••••••••••••••••••••••••••••••••••••		· · · · · ·		

Stage	Description of Work	Year	
1a	WWTP	2017/18	
	 Establish on site. 		
	 Site clearance, earthworks and construction of retaining structures 		
	 Install supporting underground infrastructure 		
	Install WWTP		
	 Site works and landscaping 		
	 Mechanical and electrical fit out 		
	 Testing and commissioning. 		
1b	Terminal Pump Station	2017/18	
	 Establish on site 		
	 Installation of piled foundations 		
	 Excavation for wet well, including disposal of contaminated ground to the 		
	appropriate disposal site		
	 Construction of wet well, sub-structure and ground floor slab 		
	 Construction of building superstructure 		



Stage	Description of Work	Year
	 Site works and landscaping 	
	 Mechanical and electrical fit out 	
	 Testing and commissioning. 	
1c	Outfall Pipeline	2017/18
	 Establish on site, including assembly area set up and mobilisation 	
	 Excavation and installation of de-aeration chamber, including construction of temporary plant access bund 	
	 Installation of the inshore end of pipeline and connection to the de- aeration chamber 	
	 Beyond low water trench excavation and pipe string installation 	
	 Installation of the diffuser section, as a separate component, and connection to the outfall pipeline. 	
2	Trunk Main and other pump stations	2018/19
	 Install and commission pressure pipeline from the Reserve Pump Station to the Terminal Pump Station 	
	 Install the new pressure main from the Fire Station to the Terminal Pump Station 	
	 Install a temporary system to manage the direct connections along Beach Road and direct Fire Station Pump Station flows to the Terminal Pump Station 	
	 Install and commission the new pressure main between the Glen and Fire Pump Stations 	
	 Install and commission the new E/One pump station and pressure main from 281 Beach Road to the Glen Pump Station 	
	 Decommission the existing Akaroa Wastewater Treatment Plant and the pipeline from 281 Beach Road to the existing treatment plant. 	

4.1.2 Staging of Reticulation Network Upgrades

An outline construction staging to reverse the existing reticulation network while maintaining services to the local community is described below.

It is envisaged that construction will be carried out in stages, starting from the Reserve PS and finishing at the single dwelling located at 281 Beach Road. A schematic for the proposed staging of the works is illustrated in Figure 4.2.





Figure 4.2 – Proposed staging of works for reticulation network

4.2 Typical Construction Sequence

Prior to the commencement of construction, the Contractor will be required to produce a comprehensive methodology detailing how the Wastewater Treatment Plant, Terminal Pump Station, outfall pipe and reticulation network upgrading works will be constructed. While the Contractor will be responsible for selecting the appropriate equipment and resources, it is expected that the construction equipment will consist of excavators, cranes, rollers, trucks, front-end loaders, sheet-piling hammers and other (heavy) equipment.

The possible construction sequence for a typical section of pipeline or a pump station is:

- 1 Preparation of set-down areas and temporary Contractor works areas, including fencing, signage, and facilities for the Contractor as necessary.
- 2 Installation of groundwater control, storm water control and sediment control works
- 3 Site clearance, service potholing, 'Dial before you dig' and/or ground penetrating radar (GPR) survey.
- 4 Temporary works (if any), especially over-pumping for rising mains that are being replaced along the same alignment.
- 5 Installation of sheet piling or trench shoring as required.
- 6 Excavation of trench.
- 7 Construction of structures, pipelines and pump stations including relocation of services where required.
- 8 Pressure tests, water tightness testing and proving.
- 9 Mechanical and electrical works at treatment plant and pump stations
- 10 Change over to new pipeline/pump station.
- 11 Making connections including service connections to gravity sewers.
- 12 Commissioning.
- 13 Removal or decommissioning of existing treatment plant, pipeline or pump station (where this has not already been completed during installation).
- 14 Reinstatement of the site, including removal of larger sediment control measures that will prohibit site reinstatement.
- 15 Reinstatement of road or grassed surface.
- 16 Removal of sediment control measures.



5 Mitigation of Effects of Construction Activities

5.1 Overview - Potential Effects of Construction Activities

The final methodology for mitigation of the effects of construction activities and adherence to any performance standards will be determined through detailed design and by the Contractor.

The most significant potential effects of the construction activities are:

5.1.1 Disruption to road users, particularly during peak seasonal use periods

The Contractor's construction methodology and programme will determine how these potential effects are mitigated. The construction contract documents will restrict Contactor activities in certain parts of the project during critical periods. Traffic management plans will be prepared by the Contractor and submitted to CCC or NZTA.

5.1.2 Noise, vibration, dust and managing dewatering

The Contractor will need to submit an Environmental Management Plan, detailing mitigation measures for the potential temporary effects of noise, vibration, dust, discharges from dewatering and erosion and sediment control.

5.1.3 Storage of materials and stockpiling soil and hard fill

The Contractor will be required to prepare a Site Management Plan, either as a separate plan or as part of the Contractor's Environmental Management Plan (CEMP), relating to access, storage of materials and security, detailing site-specific mitigation measure for these effects.

Council will provide temporary construction management areas clear of roadways for the Contractor's use.

5.2 Communication with Potentially Affected Parties

During construction, the Contractor will be required to regularly notify the public in areas of impending construction activities and communicate with residents about the project. The exact requirements for notification and communication will be included in the contract documents, and may include:

- Letters to affected residents prior to construction commencing
- A phone number and/or website to receive public comments, complaints and concerns throughout the project
- A regular community newsletter detailing the upcoming work, likely disruption and mitigation and overall work progress.

Procedures for communicating with potentially affected parties will be included in the Contractor's Environmental Management Plan.

5.3 Managing Construction in Roads

The construction of pipelines, the new Terminal Pump Station and WWTP will require the movement of quantities of material, vehicles and equipment to and from the temporary construction management areas and the construction sites. The Contractor will be required to submit Traffic Management Plans (TMPs) for NZTA and CCC approval that will likely cover all project works, not just those sections that require resource consent. These plans will be followed to minimise the



disruption to road users as far as practicable. The plans will, amongst other things, show how the works will be carried out to minimise local traffic and private access issues. Of particular note will be the programming of works along key roads to meet seasonal (i.e. holiday) demands.

During construction, the Contractor will be required to regularly update and notify the public of areas of impending construction activities and communicate with residents about the project.

5.4 Temporary Construction Management Areas and Access Roads

During the Akaroa Wastewater Project, it is anticipated that temporary construction management areas will be required for:

- Office site(s), materials storage and fabrication including assembly of the outfall pipeline
- Pump station construction
- Temporary re-routing of gravity connections to sewer pipelines.

The Contractor will be responsible for obtaining any permits required for temporary construction management areas and access roads.

5.5 Noise and Vibration

The construction and installation of pipelines, pump stations, and the WWTP is likely to cause intermittent, localised noise and vibration effects from the use of heavy machinery and pile driving.

It is considered that the potential effects of noise and vibration can be managed by:

- Appropriate muffling of site machinery
- Complying with the provisions of NZS 6803:1999 Acoustic Construction Noise in respect of Hours/days of work and acceptable noise levels
- Assessment of likelihood of damage to neighbouring structures from sheet piling and pile driving, including need for pre-construction condition assessments
- Maintaining an appropriate complaints procedure.

The Contractor will include procedures for managing the effects of noise in their Environmental Management Plan and Site Management Plans.

5.6 Dust

The proposed upgrading work involves earthworks and stockpiles which have the potential to generate small quantities of dust. Dust can become a nuisance, particularly during dry windy conditions when underlying soils are exposed. It is considered that the potential effects of dust can be managed by:

- Removing excess soil material from the site as soon as practicable after it is excavated
- Making water trucks available for wetting or stabilising any temporary stockpiles of soil and other exposed surfaces
- Keeping exposed areas to a practical minimum and sealing these areas as soon as practicable
- Maintaining an appropriate complaints procedure.

The Contractor will include procedures for managing dust as part of their Environmental Management Plan.



5.7 Groundwater Dewatering

Groundwater dewatering is the removal or drainage of water from around and within a construction site (e.g. pump station or pipeline trench). Different techniques are used to dewater depending on the permeability of the soil and depth to the water table.

Groundwater is usually discharged to the municipal stormwater system or into a local water body or onto land (where site conditions allow). Treatment will typically be required before groundwater is discharged to surface water.

Table 5.1 summarises methods that may be used for treating and disposing of dewatered flows.

Site	Environmental Issues	Treatment Options	Discharge Options
Pipeline route	 Temporary effects on water quality (mainly visual) and aquatic ecology Sedimentation Tanks Flocculants/coagulants Filter devices (socks, turkey nests) Loose rock and geotextile-lined drains and pits 	 effects vality val) and logy Sedimentation Tanks Flocculants/coagulants Filter devices (socks, turkey nests) Loose rock and geotextile-lined drains and pits 	 Via reticulated stormwater to waterways or coastal marine area (CMA) Direct discharge to streams Direct discharge to CMA
Terminal Pump Station			geotextile-lined drains and pits
WWTP site	1		 Via reticulated stormwater to waterways or CMA

Table 5.1 – Groundwater Dewatering Treatment and Discharge Options

If groundwater dewatering is required at the proposed Terminal Pump Station site or for construction work in Jubilee Park (e.g. trenching for pipelines), it will be discharged to CCC's reticulated wastewater system, as this is a former landfill site and the groundwater may be contaminated.

5.8 Erosion and Sediment Control

The proposed works are expected to require up to 2,000m³ of excavations in total, although this figure will be confirmed during detailed design. Excavations will be required for the Terminal Pump Station site, de-aeration chamber and WWTP site, and for trenched pipe installation. Excess material or material which is unsuitable for fill will need to be stockpiled and removed to landfill. Where contaminated soils are present, specific procedures will be required, as outlined in the Contaminated Soils Management Plan. The Contractor's Environmental Management Plan must describe how excavations and stockpiles will be managed, to prevent adverse effects associated with dust and discharge of sediment to waterways.

The following guidance and procedures could apply to the erosion and sediment control planning:

- Erosion and sediment control drawings will be prepared by the Contractor in accordance with the Environment Canterbury Erosion and Sediment Control Guideline (2007) or equivalent guideline acceptable to CCC Regulatory Department.
- The Contractor shall include a description in its Management Plans of how erosion, and sediment management controls will be designed, maintained and monitored in accordance with established best practice.
- The Contractor shall install erosion and sediment controls before the site is stripped or exposed.



It is considered that run-off can be managed by:

- Excluding stormwater runoff from outside the work area from entering the work or storage site wherever possible using clean water diversions, such as bunds or cut off drains so water is diverted around the work site. This will reduce the volume of dirty water to be managed.
- Keeping disturbance and exposed areas to a practical minimum and stabilising and/or sealing these areas as soon as practicable.
- Minimising stockpiles where practical and where required, locating these on flat areas as far as
 practicable from waterways.
- Using appropriate sediment control strategies e.g. silt fences and diversions around stockpiles.

It is also important that no clean water diversions, or discharges cause downstream erosion, alter the natural course of its receiving water body or cause flooding on private land.

5.9 Services

Some existing services may have to be relocated as result of potential conflicts with the pipeline or pump station construction. These will be identified as part of the detailed design. Depending on the scale and nature and level of risk, a separate Existing Services Management Plan (ESMP) may be prepared as part of the Contractor's management plan documents.

5.10 Construction Waste Management

Where practicable, construction wastes would be separated for recycling purposes. Disposal of waste would be undertaken according to the following requirements in the sub-sections below. These procedures should be included in the Contractor's Environmental Management Plan which will be developed in consultation with the CCC's Target Sustainability Programme Manager.

5.10.1 Solid Waste

Covered rubbish bins would be provided and the refuse regularly disposed off-site to an approved facility. Waste bins for the collection of non-construction related wastes would be covered to minimise wind-blown debris. If necessary, bins would have locking catches to prevent lids lifting during high winds. No burning of any such waste would be permitted.

5.10.2 Human Waste

Regularly serviced portable toilet facilities would be provided. Portable units would not be located within 5m of a watercourse or external site boundaries. Portable toilets would be staked to the ground to avoid toppling in high winds.

5.10.3 Cleanfill

Any clean fill that cannot be reused on site would be removed, as soon as practicable, to an approved cleanfill site.

5.10.4 Contaminated Soils

Excavated material from HAIL sites or areas where potentially contaminated soils are discovered, that cannot be appropriately reinstated, will have to be removed. If potentially contaminated soils contain more than 5% organic material or any refuse (other than inert material such as china or bricks) it will need to be tested prior to disposal to any clean fill or disposed of to the regional landfill.



5.11 Hazardous Substances

Hazardous substance needed for the construction will only be held in small quantities on site. The storage of small quantities of dangerous or hazardous substances shall comply with the Dangerous Goods Regulations (HSNO Act, 1996) and any other relevant legislation. This includes obtaining the relevant licences. Material Safety Data Sheets (MSDS) will be held on site for all hazardous goods on site. All hazardous goods will be locked away the end of each working day.

Best practice measures include:

- Bulk fuel storage (i.e. petrol, diesel, oil), if required on site, would be limited to suitable locations and would need to be sited at least 10m from a waterway. The fuel/oil storage area will have an impervious bunded area with a volume of 120% of the largest container, unless the tank was double skinned. All dispensing units will have drip trays and drip containers in place at all times. Fuel storage tanks will need to be secured.
- A Spill Management Procedure and an Emergency Response Plan which would be developed as part of the Contractor's Environmental Management Plan.
- A general spill containment kit will be available at all times when machinery is present and to service each operating unit.
- Refuelling may occur on site (more than 10m from a waterway) provided the tanker carries an emergency spill kit and the auto switch-off is fully operational. Specific re-fuelling procedures would be included in the Contractor's Environmental Management Plan.
- Sealed waste bins which would be provided for the collection of oil rags, oil filters, etc. Waste drums would be transported offsite to an appropriate receiving facility.
- The storage of hazardous substances, which would comply with the requirements of the Hazardous Substances and New Organisms Act (HSNO Act, 1996) and the requirements of the Canterbury Natural Resources Regional Plan.

The Contractor will need to include procedures for use and storage of hazardous substances, and actions to be taken in the event of a spill, in their Environmental Management Plan.

5.12 Safety and Security

The Contractor will be responsible for safety and security of the site in accordance with the Health & Safety in Employment Act (1992). The Contractor would be required to prepare a Health & Safety Plan before construction begins. Typical security and safety measures include:

- Regular hazard identification/reporting
- Formal control of any entry to the site with standard check-in/safety briefing procedures for workers and visitors
- Restriction on public access to the site with warning/directional signs posted for information
- Site inductions, safety audits and "tool box" meetings
- Appropriate protective clothing and equipment for workers and visitors.

5.13 Archaeological Protocols

As a minimum, the Contractor needs to comply with the Accidental Discovery Protocol outlined in Part 1, Section 20 of CCC's Civil Engineering Construction Standard Specification (CCC, 2014). The Contractor should include this requirement in their Environmental Management Plan.



5.14 Contaminated Land/Soils Protocols

A Contaminated Soils Management Plan has been prepared for the Terminal Pump Station site, which has been identified as a HAIL site. The requirements of this plan will need to be incorporated into the Contractor's plans.

It is unclear at this stage of the project whether groundwater de-watering will be required at the Terminal Pump Station site. If groundwater dewatering is required at the proposed Terminal Pump Station site, it will be discharged to CCC's reticulated wastewater system.



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6 Project Specific Consent/Permit Register

CCC is making application for consents in respect of the construction of the Akaroa WWTP Upgrade. These consents relate to the construction and operation of the pipelines, pump stations, wastewater treatment plant and outfall. The final list of resource consents obtained for the Akaroa WWTP Upgrade will be provided to the Contractor once available.



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7 Project Organisation and Complaints Management

7.1 General

CCC as the Consent Holder will have overall responsibility for ensuring compliance of site activities with the conditions of the resource consents and approvals.

Individual Contractors will be contractually responsible for compliance with conditions of resource consents and designations which will include the management of potential environmental effects such as noise and vibration, dust and sediment discharge. The Contractor's EMP shall comply with minimum requirements, which have been indicatively detailed in Section 8 of this document.

The responsibilities of each of the parties involved in the upgrading work are described below.

7.2 Christchurch City Council

CCC's responsibilities through the construction period will be administered by the Engineer to the Contract, on behalf of CCC. The contract documents will define the extents of duties on each party.

7.3 Contractor

The responsibilities of individual contractors with respect to environmental management will be described in each contract. As a minimum, the Contractor:

- Will be responsible for mitigating the effects of discharge of sediment, dust, noise and vibrations from the sites it operates.
- Will be responsible for managing the activities on its sites to comply with the conditions of contract, the requirements of the Contractor's Environmental Management Plan, resource consents, designations and other statutory obligations.
- Shall prepare and submit a Contractor's Environmental Management Plan to CCC (or its agent) for review.
- Shall nominate a person or persons who will be responsible for day-to-day environmental management and who can be contacted in the event of non-compliance with consent conditions or the receipt of public complaints.
- Shall have available sufficient personnel, materials and equipment in good working order to control discharges and emissions from its work sites and any other adverse environmental effects.
- Shall plan, produce methodologies and execute the work so that wastewater overflows do not occur and all properties connected to the wastewater scheme have continuous service.
- Shall take into account weather forecasts when planning work activities in order to reduce the potential for the generation of dust, erosion and to control sediment. The most appropriate prevention methods shall be determined and implemented prior to an activity commencing.
- Is required to educate all site staff in environmental management procedures and best practices and shall post relevant signage on work sites. Environmental issues such as sediment discharge and dust generation shall be discussed at all toolbox meetings.



7.4 Complaints Procedure

A proposed procedure for handling any complaints is outlined below. The finalised procedure will be included within the Contractor's Environmental Management Plan:

- A register of complaints will be kept by the Contractor which will be a separate file containing the following information where it has been supplied by the complainant:
 - Name and address
 - Contact telephone number
 - Nature and description of the complaint
 - Location of the complainant, recorded on a plan
 - Date and time of the complaint, plus any other details relevant to the complaint, for example: the prevailing wind direction for a dust complaint
 - How the complaint was resolved or followed up.
- The Contractor will be responsible for investigating and resolving complaints.
- All complaints shall be addressed in a timely manner.
- All complaints will be discussed at weekly toolbox meetings.
- Complaints identified as relevant to the construction activities shall be notified to the Manager Regulatory Department of CCC within 24 hours of their receipt.
- The complaints register is to be kept up to date and be available to the Engineer to the Contract, Engineer's Representative and CCC.



8 Other Management Plans

8.1 Overview

The Contractor will prepare other Management Plans for the project which will identify how the Contractor will manage construction, in respect of best practices, applicable consent conditions and regulations. The Contractor will be required to submit these plans for approval to the Engineer to the Contract and to the CCC Project Manager. The Regulatory Department of CCC will then be provided the relevant approved documents before work begins on site. Compliance with the plan will be regularly monitored during construction by the engineer to the contract and CCC environmental monitoring officers for compliance with consent and designation conditions.

While this section outlines minimum requirements for the content of the Contractor's overarching Management Plan(s) for the project, it is not intended to prescribe the number of other management plans or their structures. This will ultimately be determined by the individual contractors for each stage of work.

8.2 Environmental Management Plan

The Contractor's EMP content will likely include, but not be limited to the following:

- Description of works
- Staging of works
- Programme of works
- Key contacts/environmental roles and responsibilities
- Communication protocol, including key contact details
- Staff induction/training/audits on site environmental management issues
- Resource Consents/Permits and Approvals Register
- Details of construction monitoring required to satisfy the consents, responsibility and reporting
- Proposed management of:
 - Erosion and sediment discharges
 - Contaminated land
 - Noise/vibration
 - Dust
 - Site dewatering
 - Hazardous substance storage
 - Spills
 - Construction/general wastes
 - Discovery of cultural artefacts, taonga and koiwi.

8.3 Site Management Plan

A Site Management Plan (SMP) will be prepared by the Contractor, as a separate plan or as part of the EMP, regarding the operation of the proposed temporary construction management areas and construction sites. The SMP should include information on at least the following:

General site management



- Access
- Layout
- Security
- Health and safety
- Facilities
- Operating hours
- Utilities
- Storage
- Potential site hazards
- Contingency plans
- Emergency response procedures
- Decommissioning and reinstatement.

The SMP content will need to be written to cover all the temporary construction management areas, and construction sites in each contract. The Contractor may choose to prepare separate SMP content for each site.

8.4 Traffic Management Plan

The Contractor will be required to submit Traffic Management Plans for works in public roads. Temporary Traffic Management Plans (TMP) will be prepared by the Contractor in accordance with the latest Code of Practice for Temporary Traffic Management (CoPTTM) and the Road Controlling Authorities Local Roads Supplement (2009, or latest update). These plans will need to be prepared by a suitably-qualified Site Traffic Management Supervisor (STMS) engaged by the Contractor in consultation with CCC and NZTA. The Contractor will also be required to consult with affected property owners during the preparation of each TMP.

The Contractor will be required to submit draft TMPs for review and approval by CCC/NZTA within 10 working days of commencement of construction. The TMP should be submitted using the online TMP form available at http://tmpforchch.co.nz/.

8.5 Contaminated Soils Management Plan

A Contaminated Soils Management Plan (CSMP) has been prepared to support a land use consent application for land disturbance at the Terminal Pump Station site. The requirements of this plan will need to be incorporated into the Contractor's plans. This CSMP includes:

- Pre excavation procedure
- Excavations procedures
- Post excavations procedures
- Imported materials
- Stockpile management
- Groundwater controls
- Contingency action plan for unexpected contamination and hazardous material discovery.



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Akaroa Wastewater Treatment Plant and Reticulation System – Odour Effects Assessment (CH2M Beca, 2014)



Report

Akaroa Wastewater Treatment Plant and Reticulation System - Odour Effects Assessment

Prepared for Christchurch City Council

Prepared by CH2M Beca Ltd

30 June 2014


Revision №	Prepared By	Description	Date
1	Prue Harwood	Final	11 June 2014
2	Prue Harwood	Revised Final	30 June 2014
3			
4			
5			

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Document Acceptance

Action	Name	Signed	Date
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Reviewed by	Graeme Jenner	Hum	30 June 2014
Approved by	Garry Macdonald	Gundance	30 June 2014
on behalf of	CH2M Beca Ltd		

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1 Introduction

1.1 Background

The Akaroa Wastewater Project encompasses a trunk pipeline and pump stations to reverse the flow through town, a new Terminal Pump Station with screening and grit removal, a new wastewater treatment plant (WWTP) on Old Coach Road and a new mid-harbour outfall.

The new pipelines, pump stations and WWTP, will discharge contaminants to air including odours, aerosols and the products of combustion some of which will require resource consent from Environment Canterbury (ECan). Table 1-1 lists the sources of the air discharges and summarises the status of the activity with respect to the rules included in Chapter 3 (Air) of the Natural Resources Regional Plan (NRRP).

Christchurch City Council (CCC) has commissioned CH2M Beca Ltd to prepare an assessment of the effects on the environment (AEE) to support applications for resource consents that are required for the construction and operation of the wastewater project. The purpose of this report is to provide a technical assessment of the effects of emissions to air from the proposed WWTP and the associated infrastructure.

1.2 Status of Activities

Table 1-1 summarises the sources of air contaminants from the proposal, the relevant rules in Chapter 3 of the NRRP that apply to the activities and their activity status.

Source	Nature of Discharge	Rule	Status
WWTP	Odour	AQL69	Discretionary
WWTP generator	Products of combustion	AQL25	Permitted
Terminal Pump Station plus screening and grit removal	Odour	AQL69	Discretionary
Terminal Pump Station generator	Products of combustion	AQL25	Permitted
Fire Station Pump Station	Odour	AQL33	Permitted
Reserve Pump Station	Odour	AQL33	Permitted
Glen Pump Station	Odour	AQL33	Permitted
Single dwelling pump station	Odour	AQL69	De minimis
Deaeration Chamber	Odour	AQL69	De minimis

Table 1-1 Status of Activities

The discharge to air from the single dwelling pressure sewer system at 281 Beach Road, south of the township, is considered to be de minimis as it will transfer the wastewater generated from a single dwelling and leachate from the landfill. Minor quantities of odour may be generated, but these will be largely contained within the pump housing. The effects of the air discharges from the single dwelling pump station are not considered further in this assessment.



The deaeration chamber at the commencement of the submarine outfall pipeline will have three air release valves though which air will be discharged. The air is unlikely to be odorous as the wastewater in the chamber will be treated to high standard with very low concentrations of organic material. Any discharge to air of odour from the chamber, which is located well away from residences, is likely to have effects that are de minimis. The effects of the air discharges from the deaeration chamber are not considered further in this assessment.

1.3 Scope of Report

This report is intended to accompany an application for consent for air discharges from the WWTP and associated infrastructure, and to support the overall AEE prepared for all of the resource consents applied for as part of the Akaroa Wastewater Project. In particular, this report includes:

- An assessment of the receiving environment in terms of potential influences on the environmental effects of emissions from the site
- A summary of the proposed processes that require consent
- A description of the nature of the discharges resulting from the activities which require consent
- An assessment of potential effects of the activities which require consent
- A consideration of the Canterbury Regional Policy Statement (RPS)
- A consideration of the Natural Resources Regional Plan (NRRP)
- A summary of conclusions and findings of the investigation.

The discharges to air from the standby generators and the Reserve and Glen Pump Stations are classified as permitted activities in the NRRP. Consequently, the effects of the discharges to air from these sources are not included in this assessment.



2 Environmental Setting

2.1 Introduction

Figure 2-1 shows the relative locations of the proposed WWTP and pumping stations and their locations within the Akaroa Township.



Figure 2-1 Photograph showing locations of WWTP, pump stations and outfall



2.2 WWTP

2.2.1 Site Location

The proposed site for the new WWTP and the surrounding areas are shown in Figure 2-2. The proposed WWTP site is located on Old Coach Road near the intersection of Christchurch Akaroa Road and Long Bay Road. The northern edge of the Akaroa Township is located approximately 600 m to the south of the proposed site. Takamatua settlement is located approximately 1km to the north of the site.

The grid reference of the site is approximately NZTM 597662E 5151143N. The legal description of the site is Lot 3 DP 459704. The WWTP site is zoned as Rural in the Banks Peninsula District Plan (BPDP) which became operational in October 2012.



Figure 2-2 Location of the Proposed WWTP

2.2.2 WWTP and Surrounding Environment

The area which immediately surrounds the WWTP is zoned Rural and is comprised of agricultural fields and low density rural housing and holiday accommodation. The nearest dwelling is a holiday cottage located approximately 250m to the south west of the WWTP. A number of other holiday cottages are also located nearby in the same grounds (Akaroa Cottages – Heritage Boutique Collection). Other holiday accommodation is sited approximately 420m to the south of the plant in the Akaroa Holiday Camp. The closest rural residences are located 300m to the north, 500m to the west, 500m to the southeast and 470m



to the south of the WWTP site. The location of nearby holiday accommodation and rural residential dwellings are shown in Figure 2-2.

Land zoned as 'Akaroa Hill Slopes' is located approximately 450m to the south of the proposed WWTP. These areas are intended to accommodate lower density housing whilst maintaining landscape values. Land zoned as Residential is located approximately 620m to the south of proposed plant site.

2.2.3 WWTP Topography

The proposed WWTP site is located on the hills to the north of the Akaroa Township. The site is located approximately 122m above sea level on the northern slope of a gully which follows a south westerly direction toward Childrens Bay to the north of Akaroa Township. The elevation of the land decreases in the direction of Childrens Bay. A ridge of higher ground is located immediately to the north of the site.



Figure 2-3 Topography of the area surrounding the proposed WWTP

2.2.4 WWTP Meteorology

Winds in the vicinity of the plant are expected to be influenced by the channelling effect of the surrounding hills. During cool evenings and low speed conditions drainage wind flows at the site would be expected to flow down the hills and follow the direction of the gully toward Children's Bay. Meteorological monitoring conducted at the site supports this assumption (refer Figure 2-6).

Meteorological monitoring has been conducted at the Akaroa EWS monitoring station since November 2008. The station is located approximately 1.9km to the south of the WWTP site close to French Bay at an elevation of 45m above sea level. A summary of the distribution of hourly average wind speed and wind



direction measured at the station for the five year period between January 2009 and December 2013 is shown in Figure 2-4.



Figure 2-4 Wind speed (m/s) and wind direction distribution measured at the Akaroa EWS meteorological station January 2009 to December 2013

Figure 2-4 shows a high proportion (approximately 52%) of speeds measured at the station are less than 1.5m/s. The highest proportion of these low wind speeds have been recorded during easterly winds. The predominant wind directions when wind speeds are above 1.5m/s occur from the south west and also from the north east. During these hours, wind flows are approximately parallel to the coast line along Glen Bay, French Bay and Childrens Bay. The average wind speed measured during the time period is 1.8m/s.

Figure 2-5 shows day time (8am to 6pm) and night-time (6pm to 8am) winds for the same time period. The figure clearly shows the influence of sea breezes during the day, as low speed winds from the north-west, and the influence of land breezes and drainage flow effects during the night, as low speed winds from north east through to the south. Wind speeds recorded during the day time are higher than those recorded during the night.

The wind roses indicate that the surrounding terrain and the monitoring station's location in relation to the coast have a significant effect on local wind flows.





Figure 2-5 Wind speed (m/s) and wind direction distribution measured at the Akaroa EWS meteorological station January 2009 to December 2013 during the day (8am -6pm) (top) and night (bottom)



CCC established a meteorological monitoring station at the WWTP site in October 2013. A summary of the distribution of hourly average wind speed and wind direction measured at the station between 2 October 2013 and 16 June 2014 is shown in Figure 2-6. The meteorological monitoring data shows a high proportion (approximately 48%) of wind speeds that are less than 1.5m/s and a high proportion of the low winds occur from the northeast. The predominant wind directions when wind speeds are above 1.5m/s occur from the south-southwest and also from the north east. The average wind speed measured at the proposed WWTP site is 2.3 m/s, which is higher than the average wind speed measured at the Akaroa climate station (1.8m/s), due to its more elevated and exposed location.

The observed flows suggest that drainage flows and land breezes have a significant influence on air flows during low wind speed conditions, such as those observed at the Akaroa EWS. The highest proportion of low wind speeds have been recorded during north easterly winds.



Figure 2-6 Christchurch City Council Weather Station wind data¹, 2 October 2013 to 19 June 2014. (wind speed measured in metres/second)

Figure 2-7 shows day time (8am to 6pm) and night-time (6pm to 8am) winds for the same time period. The figure clearly shows the influence of land breezes and drainage flow effects during the night, as low speed winds from the north through to the south. Wind speeds recorded during the day time are higher than those recorded during the night.

Worst case dispersion conditions for discharges from the WWTP are expected to occur during cool night time and early daytime conditions when winds speeds are low and the atmosphere is highly stable. The

¹ Data supplied by Christchurch City Council



meteorological monitoring data shows that during these conditions wind flows follow the direction of the gully to the south of the WWTP site and flow down towards Childrens Bay.



Figure 2-7 Christchurch City Council Weather Station) wind data², 2 October 2013 to 19 June 2014 during the day (8am - 6pm) (top) and night (bottom) (wind speed measured in metres/second)

² Data supplied by Christchurch City Council



2.3 Terminal Pump Station Site

2.3.1 Site Location and Topography

The Terminal Pump Station (including preliminary treatment) will be located in the southwest corner of the boat park located between State Highway 75, Rue Brittan, Jubilee Park and the harbour. The map reference for the site is approximately NZTM 597435E, 150265N. A biofilter treating odorous air from the Terminal Pump Station will be located adjacent to the Terminal Pump Station as shown in Figure 2-8.

The Terminal Pump Station site is on flat terrain immediately adjacent to the coast.



Figure 2-8 Aerial photo showing location of Terminal Pump Station, standby generator and biofilter

2.3.2 Terminal Pump Station Surrounding Environment

The proposed site for the Terminal Pump Station is located adjacent to a mini golf park and Jubilee Park. The site is zoned Recreation Reserve in the Banks Peninsula District Plan (BPDP) There are houses located approximately 100m to the east of the site and 180m to the north northeast and an historic residence approximately 150m to the southeast of the site. Approximately 40m to the southwest of the site, is a clubhouse and 50m to the east are tennis courts. An area zoned Town Centre is located approximately 100m to the south and east.



2.3.3 Terminal Pump Station Meteorology

The wind patterns at the proposed Terminal Pump Station site are expected to be very similar to those described above for the NIWA Akaroa climate station.

2.4 Background Air Quality

2.4.1 WWTP

The proposed site for the WWTP is in a rural area and is likely to experience the typical background odours found in farming areas.

2.4.2 Terminal Pump Station

The Terminal Pump Station is proposed to be located on the foreshore near to commercial, residential and recreational activities. The area is likely to experience a level of background odours that is typical of a builtup area without any nearby industrial sources. At times, there may be odours present that are associated with coastal areas, including the decomposition of organic matter such as seaweed.

2.4.3 Existing Pump Stations

The remaining pump stations are proposed to remain in their current locations. All are located close to the coast and adjacent to built-up areas. The background odours in all locations are expected to be typical of areas without any nearby industrial sources. At times, there may be odours present that are associated with coastal areas, including the decomposition of organic matter such as seaweed.



3 Description of Activities and Discharges to Air

3.1 Introduction

The proposed wastewater scheme is fully described in the Akaroa Wastewater Preliminary Design Report (CH2M Beca, 2014). The following sections summarise the features of particular relevance to odour generation and control for the WWTP and pump stations.

Wherever undiluted and untreated wastewater is stored or handled, there is the potential for odours to be released. The potential for odour to be created is primarily a function of the organic load in the wastewater (usually measured as biochemical oxygen demand or BOD₅). As the wastewater is progressively treated within a plant, the BOD is reduced and the odour potential of the wastewater is decreased.

In areas where raw sewage has a long retention time within the sewer network (greater than 6-8 hours), there is the potential for anaerobic conditions to develop within the sewer, which can give rise to offensive odours at the discharge point into the WWTP inlet works.

The handling of untreated sludge is also a potential source of odours.

3.2 WWTP

The WWTP will be designed to treat wastewater generated by a community of approximately 700 permanent residents and a holiday period population of up to 4,000 people. The design will also allow for the future connection of the Takamatua settlement. The WWTP will likely use a biological nitrogen removal process (BNR) with membrane filtration. Figure 3-1 shows the process flow diagram for the plant.





Figure 3-1 Process Flow Diagram for the Akaroa Wastewater Treatment Plant

Screened and de-gritted wastewater will be received from the Terminal Pump Station into a stirred balance tank. From there, the wastewater will flow through the anoxic and aerobic activated sludge reactors and then to the membrane filtration tanks before being discharged to the ocean outfall. Sludge produced in the filtration tanks will be thickened in a gravity belt thickener and stored in a stirred tank before being transported off-site in tankers.

To minimise the discharge of odours from the WWTP, the major odour-generating equipment will be fully enclosed including the balance tank, sludge processing equipment and sludge tanks. The odorous air from this equipment will be extracted and transferred to a bark biofilter for treatment. Forced ventilation will also be provided in the blower, laboratory and control room buildings. The ventilation air from these items will be discharged directly to atmosphere via vents which will discharge horizontally from the rear side of the building.

There will be a 160kVA diesel generator on site to provide standby electricity to the plant during power outages. The generator, which will be run for testing approximately once per fortnight, will have a flue that will extend vertically upwards from the generator. Figure 3-2 shows the proposed layout of the WWTP.





Figure 3-2 Proposed layout of WWTP

3.3 Terminal Pump Station

The Terminal Pump Station will receive untreated wastewater from the Reserve and Fire Station Pump Stations into a wet well. The wastewater will be passed through a milliscreen and a grit trap. The screenings will be dewatered in a screw press and collected in an enclosed bin. The grit will be washed, dewatered and collected in an enclosed bin. The screenings and grit will be removed from the plant and disposed of off-site.

Equipment such as the screens, grit handling equipment and the wet well will be covered and ventilated. The extracted odorous air will be transferred to a bark biofilter for treatment before being discharged to air at ground level. There will be a 160kVA standby diesel generator on site for use during power outages. The generator will have a discharge vent that will extend to the height of the ridgeline of the Terminal Pump Station building.

3.4 Remaining Network Pump Stations

At present, the existing drainage network consists of three gravity catchments serviced by three pump stations connected in series, which are the Reserve Pump Station, Fire Station Pump Station and Glen Pump Station. The proposed new arrangement is for the Glen Pump Station to pump to the Fire Station Pump Station and for the Fire Station and Reserve Pump Stations to both pump to the Terminal Pump Station, which pump up to the proposed treatment plant. A single dwelling pressure sewer system will be



installed to transfer wastewater from a single dwelling at 281 Beach Road and leachate from the Akaroa closed landfill to the Glen Pump Station.

The Fire Station Pump Station consists of a wet well and two pumps. No changes are proposed to the wet well, but the two pumps will be replaced with new ones of a comparable capacity to the existing pumps. Odours generated from the pump station are ducted to a small biofilter for treatment prior to be discharged to air at ground level. The biofilter will be enlarged as part of the proposed new scheme as there have been some odour problems associated with this pump station. The proposed changes to the pump station will result in a reduction in air discharges and odour effects.

As explained in Section 1.2, the discharge to air from the pump station at 281 Beach Road is considered to be de minimis and the discharges to air from the Reserve, Fire Station and Glen Pump Stations are permitted activities. Therefore, the discharges to air from these existing sources are not discussed further in this report.

3.5 Combustion Discharges

The two standby generators will generate the products of combustion. Rule AQL25 of the NRRP permits the discharges to air from standby diesel generators that have an energy rating of less than 300kW subject to conditions relating to the height of the flue. The flues on the generators will comply with the chimney height requirements of Rule AQL25 and hence the generators will not require consent for air discharges. The discharges to air from the generators are not discussed further.



4 Assessment of Effects

4.1 Introduction

In accordance with section 104 of the RMA, when considering an application for a resource consent, the Consent Authority must, subject to Part 2, have regard to any actual and potential effects on the environment of allowing the activity.

4.2 Assessment Method

The Ministry for the Environment (2003) Good Practice Guide for Assessing and Managing Odour in New Zealand (GPG Odour) provides guidance on methods for assessing the effects of odour discharges. For existing sources of odour, the GPG Odour recommends that Council experience with the site, community feedback and information on the process control and management systems at the site are the primary sources of information that should be used to assess the effects of the activity. Where modifications are planned, information on the known performance of control technology and experience with other sites can be used to assess the impacts of the proposed changes. Dispersion modelling can also be useful for undertaking a comparative assessment of the significance of the changes. For a new activity, the GPG recommends using dispersion modelling where reliable odour emissions data are available. Where reliable data is not available, the GPG recommends that past experience with the same type of activity in other locations is the best method of assessment.

For this assessment, experience with similar activities in other locations, evaluation of the proposed emission control systems, the sensitivity of the receiving environment and consideration of separation distances have been used to assess the potential effects of the discharges.

4.3 Sensitivities of the Receiving Environments

4.3.1 How Odour Causes Adverse Effects

The effects of any odour depend on a number of features of the odour exposure which are collectively known as the "FIDOL" factors:

- Frequency
 How often an individual is exposed to odour
- Intensity
 The strength of the odour
- Duration
 The length of a particular odour event
- Offensiveness/character The character relates to the "hedonic tone" of the odour, which may be pleasant, neutral or unpleasant
- Location
 The type of land use and nature of human activities in the vicinity of an odour source.

As part of the "location" factor, the sensitivity of the receiving environment must be taken into account.

Different combinations of these factors are significant when assessing adverse effects. Depending on the severity of an odour event, one single occurrence may be significantly adverse and this is known as an "acute" odour effect. However, in other situations, where there is a higher frequency of odorous events the threshold odour level would be lower. This longer term impact is known as a "chronic" odour effect.

Different locations have different sensitivities to odour and can be classified as having high, moderate or low sensitivity. The degree of sensitivity in any particular location to odour is based on characteristics of the land



use, including the time of day and the reason people are at the particular location (e.g. for work, home living or recreation). In a residential area an acceptable odour frequency is likely to be much lower than would be expected in a rural area.

4.3.2 Sensitivity to Odour in Rural Environments

People living in rural areas generally have a high tolerance for rural-type odours, which are acceptable to most rural people and fit the description of a rural odour in a rural area. However, some types of odour are quite different to the normally expected rural odours (due either to the strength, character and unpleasantness of the odour, or to the frequency and duration of the odour), and are much less acceptable.

4.3.3 Sensitivity to Odour in Residential Environments

People living in residential-zoned areas typically have a high sensitivity to both rural and non-rural odours, because of the following factors:

- People of high sensitivity to odours can be exposed.
- People can be present at all times of day and night, both indoors and outdoors.
- People tend to carry out activities at residences which are highly sensitive to non-rural odours, such as dining, entertaining, outdoor living, sleeping.
- Visitors to the area who are unfamiliar with an odour are more likely to be sensitive to odours they are not used to, and may raise awareness of a problem.
- People usually expect a high level of air quality including the absence of odours, and have a low tolerance of even typical rural odours.

Amenity conflicts between residential and rural zones, in terms of incompatible neighbouring land uses and odour presence, are recognised as an issue in many district and regional plans in New Zealand.

4.3.4 Sensitivity to Odour in Industrial Areas

People in these areas are more likely to tolerate some odour without finding it offensive or objectionable. In comparison to residential areas, industrial land use tends to be classified as low sensitivity.

4.4 Recommended Separation Distances

A number of Australian environmental protection authorities (EPA) and New Zealand agencies provide recommendations on separation distances between industrial land uses and sensitive locations in order to prevent land use conflicts occurring. Separation distances are not intended to replace the need for good pollution control but acknowledge that there may be unintended emissions at times which should be allowed for. Separation distances are intended to minimise the effects of these unintended emissions.



Table 4-1 summarises the recommended separation distances between sensitive land uses and the WWTP and Terminal Pump Station.



Agency	Recommended Buffer Distance	Comments	
Clean Air Society for Australia and New Zealand (2008) ¹	200 – 300m	WWTP	
South Australia EPA (2007) ²	200 – 300m	WWTP	
Victoria EPA (2013) ³	32m ⁴	WWTP	
West Australia (2005) ⁵	20 m	Pump station	

Table 4-1 Recommended Buffer Distances for WWTP and Pump Stations

Notes: 1. Odour Separation Distances Guidelines (Clean Air Society of Australia and New Zealand, 2008)

- 2. Guidelines for separation distances (EPA South Australia, 2007)
- 3. Recommended separation distances for industrial residual air emissions (EPA Victoria, 2013)
- 4. 10 x Population^{1/3} = 32m
- 5. Guidance for the Assessment of Environmental Factors, Separation Distances between Industrial and Sensitive Land Uses (EPA Western Australia, 2005).

4.5 WWTP and Associated Biofilter

The locality in which the WWTP is proposed to be located is rural and is considered to be moderately sensitive to odours. The closest sensitive receptors are some holiday cottages located approximately 250m to the southwest and downhill of the plant (refer to Figure 2-2). Northeasterly quarter winds occur for approximately 25% of the time. When winds are light, drainage flows may carry odours generated at the plant down towards the holiday cottages. However, given the small size of the proposed plant and the enclosure, ventilation and treatment of the majority of the equipment, any odours produced are unlikely to be noticeable within approximately 20m of the plant during normal operation.

Consequently, the nearest receptors are expected to be unaffected by odours from the plant during normal operation and any adverse effects on the environment due to odours are expected to be less than minor.

If the plant malfunctions or power is lost, there is a potential for objectionable odours to be produced which may travel further than normally expected. CCC will prepare an Operations and Maintenance (O&M) Manual for the plant which will include contingency plans that describe the procedures to be taken in the event of a plant failure. A diesel generator will be provided to supply back up power to the plant.

The WWTP is located 250m from the nearest sensitive development, which meets the recommended separation distances for sensitive locations noted in



Table 4-1. It is therefore expected that, even if a plant malfunction occurred during worst case meteorological conditions (i.e. light northeasterly winds), the effects on the nearest sensitive receptors are unlikely to be more than minor.

4.6 Terminal Pump Station and Associated Biofilter

The primary source of odour from the proposed scheme is expected to be the inlet works at the Terminal Pump Station where the untreated wastewater is received and screened prior to being pumped to the WWTP. To minimise the discharge of odours from the Terminal Pump Station, all of the individual odour-generating equipment will be covered, including the wet well, screens and grit handling equipment. The odorous air will be extracted from the equipment and transferred to a biofilter for treatment, which will be located adjacent to the Terminal Pump Station building. The Terminal Pump Station building itself will be maintained under negative pressure due to the ventilation of the processing equipment. The collected screenings and grit will be washed and stored in enclosed containers, which will be removed from site on an approximately weekly basis.

During normal operation, there is not expected to be any distinguishable odour within approximately 10m of the pump station as a result of the proposed enclosure and ventilation of the odour sources. Odours from well-designed and maintained biofilters are not offensive (usually slightly musty in character) and are usually only able to be noticed within approximately 5m of the filter.

The pump station building and biofilter will be located adjacent to the coast and Jubilee Park, which is a recreational area. The pump station and biofilter will be approximately 100m from the commercial area located between Rue Jolie and Rue Lavaud.

During daytime hours, when people are most likely to be present in the recreational and commercial areas in the vicinity of the pump station and biofilter, winds blow predominantly towards the land and will have the potential to blow any odours produced towards the nearby sensitive receptors. During the day, however, winds tend to be stronger resulting in better dispersion and dilution of odour plumes. Consequently any odours produced at the plant are likely to be well-dispersed and diluted prior to the plume reaching the residences. At night, winds are often light and blow predominantly towards the coast and away from sensitive areas.

If the biofilter or Terminal Pump Station are overloaded or malfunctioning the intensity of odours produced may increase. Consequently it will be important that the Terminal Pump Station extraction systems and biofilter are properly maintained and operated. CCC will include procedures in the O&M Manual which will include regular maintenance and monitoring of the Terminal Pump Station and biofilter.

The diesel generator will provide standby electricity supply during power failures. In the unlikely event of a malfunction at the plant that results in the extraction system failing, due to reasons other than power failure, odours should be largely contained within the building. However, such a situation could result in odours being noticeable in the adjacent recreational and commercial areas, which may be offensive if they are prolonged and occur when people are present. In order to mitigate this situation, CCC will include a contingency plan as part of the O&M Manual. The contingency plan will describe the procedures to be taken in the event of a plant failure to minimise the potential for objectionable odour effects.

In summary, it is expected that any odours discharged from the biofilter and Terminal Pump Station will be adequately avoided, remedied and mitigated and will have effects that are less than minor on the surrounding environment providing the Terminal Pump Station ventilation system and the biofilter are properly maintained and operated.



Akaroa Wastewater Treatment Plant and Reticulation System - Odour Effects Assessment



5 Proposed Monitoring

It is proposed that the monitoring of the operation of the WWTP and pump stations be detailed in an Operations and Maintenance Manual (O&M Manual) to be prepared by CCC prior to the WWTP becoming operational. The O&M Manual should include the following methods to be used to minimise the generation of odours:

- Housekeeping procedures at the WWTP and Terminal Pump Station
- Inspections and maintenance of all odour containment and ventilation systems
- Monitoring and maintenance of biofilters
- Contingency methods for plant malfunctions
- Complaints investigation, follow up and resolution procedures
- Testing and maintenance programme for standby generators
- Training procedures for operators regarding the methods to be used to control odours
- A requirement for annual review of the O&M Manual.



6 Regional Planning Matters

6.1 Regional Policy Statement

The Regional Policy Statement for Canterbury (RPS) provides an overview of resource management issues in the region and directs how the natural resources of Canterbury are to be managed. The policy statement is an umbrella statement that provides the framework for the Regional Plans. The RPS has been revised and the revised version became operative on 15 January 2013.

The primary objectives of the RPS with regard to ambient air quality are to maintain and enhance air quality and to avoid, remedy or mitigate any discharges which have adverse effects including odour. The discharges to air from the proposed WWTP will be adequately avoided, remedied and mitigated and are not expected to result in any adverse effects on air quality that are more than minor. The proposal is therefore considered to be consistent with the objectives of the RPS.

6.2 Natural Resources Regional Plan

6.2.1 Overview

Chapter 3 of the Natural Resources Regional Plan (NRRP) includes the objectives, policies and rules which are relevant to this application. Chapter 3 of the NRRP was made operative on 11 June 2011.

6.2.2 Objectives and Policies

The relevant objectives and policies of the NRRP are:

Objective AQL1 Objective for localised air quality. This objective aims to ensure that localised air discharges do not cause significant adverse effects.

The assessment of effects demonstrates that there should be no adverse effects on localised air quality that are more than minor.

Policy AQL5 Odour Nuisance. This policy aims to prevent discharges of odour from new activities causing offensive or objectionable effects. Where a new activity is unable to do this the policy requires the activity to be located as far away as possible from sensitive areas and activities. The policy requires existing activities to adopt the best practicable option to avoid remedy or mitigate offensive or objectionable effects of odour beyond the boundary of any site from which they originate.

Odours from the WWTP and pump stations are not expected to cause offensive or objectionable effects. They will be located well away from sensitive activities and the best practicable option for control is proposed.

The rules in the NRRP relevant to this application are summarised below.

Rule AQL63 Waste management processes established on or before June 2002 – permitted activity.

Rule AQL63 permits the discharges to air from waste management processes established prior to June 2002 providing the discharge does not involve hazardous substances, there is no increase in the scale, intensity, frequency or duration of the effects, and there are no noxious dangerous objectionable or offensive effect beyond the boundary of the property where the discharge originates.



This rule applies to the Reserve Pump Station, Fire Station Pump Station and the Glen Pump Station as they were lawfully established prior to June 2002 and there will not be any increase in the scale, intensity, frequency or duration of the effects of the air discharges resulting from this proposal. They are therefore classified as **permitted activities**.

Rule AQL 69 Waste management processes not permitted in Rules AQL63 to AQL67 – discretionary activity

Rule AQL69 classifies the discharges to air from waste management processes that do not comply with Rules AQL63 to AQL67 as permitted activities. The proposed WWTP and Terminal Pump Station will be covered by this rule. Consequently, the WWTP and Terminal Pump Station will require consent and are **discretionary activities**. As noted in Section 1.2, the discharges to air from the outfall pipeline deaeration chamber and the single dwelling pump station at 281 Beach Road are considered to be de minimis.

Rule AQL25 Internal combustion of diesel, petrol, gas 300kW or less outside of the Christchurch Clean Air Zones 1 and 2, Rangiora Clean Air Zones 1 and 2, Kaiapoi Clean Air Zones 1 and 2 and Ashburton Clean Air Zones 1 and 2 and not on production land which is zoned rural in an operative city or district plan – permitted activity.

Rule AQL25 classifies the discharges to air from the diesel generators proposed for standby duties at the WWTP and Terminal Pump Station as a permitted activity subject to a number of conditions which will be met by the generators. The generators will not be located on production land and will meet the chimney height requirements and size and duty restrictions. Consequently, the discharges to air from the two standby generators are **permitted activities**.



7 Alternatives

Section 105 of the RMA requires that an assessment of environmental effects includes a description of any alternative methods of discharge, including discharge into any other receiving environment. Various sites for the WWTP have been considered and the proposed site is considered to be the most suitable by CCC. Similarly various alternative treatment systems have been evaluated. The system described in this report is considered to be the best practicable option.



8 Proposed Conditions of Consent

It is recommended that the conditions of consent include the following requirements:

- No offensive or objectionable odours beyond the boundary of the WWTP and Terminal Pump Station
- The preparation and annual review of an O&M Manual
- Response and recording of complaints regarding odours.

The proposed conditions are as follows:

WWTP

- The discharge of contaminants to air shall only be odours associated with the operation of the Akaroa Wastewater Treatment Plant and associated infrastructure at or near map reference NZTM 597662E 5151143N as shown on Plan CRCxxxx, which forms part of this consent.
- 2. There shall be no discharge of odours as a result of the exercise of this consent that is offensive or objectionable to the extent that it causes an adverse effect beyond the boundary of the site on which the discharge occurs.
- 3. The consent holder shall prepare and implement an Odour Management Plan (OMP) for the wastewater treatment plant which shall be incorporated into the Akaroa Wastewater Treatment Plant Operation and Management Plan.
 - a. The OMP shall be provided to the Canterbury Regional Council at least twenty working days prior to the exercise of this consent.
 - b. The OMP shall be reviewed at least annually by the Consent Holder.
 - c. The OMP and any revisions shall include all measures necessary to achieve compliance with the conditions of this consent.
 - d. The OMP shall include but not be limited to:
 - i. A description of the odour sources on site.
 - ii. A description of the housekeeping procedures to be used at the plant.
 - iii. The methods used for controlling odour at each source.
 - iv. A description of the inspection and maintenance procedures for all odour containment and ventilation systems.
 - v. The optimum recommended operating parameters for the biofilter required by condition 5, including, but not limited to:
 - 1. Moisture content of the filter bed material.
 - 2. Pressure drop across the filter bed material.
 - 3. pH of the filter bed material.
 - vi. Contingency methods for plant malfunctions.
 - vii. Testing and maintenance procedures for the standby generator.



- viii. A description of the odour monitoring requirements.
- ix. A system of training for employees and contractors to make them aware of the requirements of the OMP.
- x. Identification of staff responsible for implementing and reviewing the OMP.
- xi. A method for recording and responding to complaints from the public.
- 4. The Consent Holder shall keep a record of any complaints relating to odours from the wastewater treatment plant, and shall include (when provided that information):
 - a. The location where the odour was detected by the complainant.
 - b. The date and time the odour was detected.
 - c. A description of the wind speed and wind direction when the odour was detected by the complainant.
 - d. The most likely cause of the odour detected.
 - e. Any corrective action undertaken by the Consent Holder to avoid, remedy or mitigate the odour detected by the complainant.

This record shall be provided to the Canterbury Regional Council on request.

- 5. The following equipment shall be fully enclosed with air extracted via a fan and ventilation system to atmosphere:
 - a. Blower, laboratory and control room building.
 - b. Sludge and membrane building.
- 6. The following equipment shall be fully enclosed with air extracted via a fan and ventilation system to a bark biofilter:
 - a. Balance tank.
 - b. Any sludge thickening or dewatering equipment.
 - c. Sludge storage tank.
- 7. The biofilter required by Condition 6 shall be designed, operated and maintained to ensure compliance with condition 2 at all times. This shall include but not be limited to:
 - a. Ensuring the inlet air is well dispersed throughout the filter bed.
 - b. Maintaining the biofilter bed in a friable condition with a pressure drop within the optimum recommended range.
 - c. Installing a manometer or other means of pressure measurement to provide a permanent indication of pressure drop across the biofilter bed.
 - d. Maintaining an appropriate moisture content in the biofilter bed.
 - e. Measuring and recording the moisture content of the biofilter bed material on a monthly basis.



- c. Maintaining the pH of the biofilter bed between the optimum recommended range.
- d. Measuring and recording the pH of the biofilter bed at least once every 3 months.
- 8. The fans as required by Conditions 5 and 6 shall be sized and operated to ensure that a negative pressure is maintained in the ventilation system at all times.
- 9. The lapsing date for the purposes of section 125 shall be xxxx.
- 10. The Canterbury Regional Council may annually, on the last working day of May or September, serve notice of its intention to review the conditions of this consent for the purposes of:
 - a. Dealing with any adverse effect on the environment which may arise from the exercise of this consent and which is appropriate to deal with at a later stage; or
 - b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment; or
 - c. Requiring the Consent Holder to carry out monitoring and reporting instead of, or in addition to, that required by the consent, or
 - d. Complying with a relevant rule in an operative regional plan; or
 - e. Taking into account any Act of Parliament, Regulation, National Policy Statement, Regional Policy Statement or relevant regional plan which relates to limiting, recording or mitigating the discharges to air authorised by this consent.

Terminal Pump Station

- The discharge of contaminants to air shall only be odours associated with the operation of the Terminal Pump Station and screening plant for the Akaroa Wastewater Treatment Plant and associated infrastructure at or near map reference NZTM 597435E, 150265N as shown on Plan CRCxxxx, which forms part of this consent.
- 2. There shall be no discharge of odours as a result of the exercise of this consent that is offensive or objectionable to the extent that it causes an adverse effect beyond the boundary of the site on which the discharge occurs.
- 3. The consent holder shall prepare and implement an Odour Management Plan (OMP) for the Terminal Pump Station which shall be incorporated into the Akaroa Wastewater Treatment Plant Operation and Management Plan.
 - a. The OMP shall be prepared and provided to the Canterbury Regional Council at least twenty working days prior to the exercise of this consent.
 - b. The OMP shall be reviewed at least annually by the Consent Holder.
 - c. The OMP and any revisions shall include all measures necessary to achieve compliance with the conditions of this consent.
 - d. The OMP shall include but not be limited to:
 - i. A description of the odour sources on site.
 - ii. A description of the housekeeping procedures to be used at the site.



- iii. The methods used for controlling odour at each source.
- iv. The optimum recommended operating parameters for the biofilter required by condition 5 including, but not limited to:
 - 1. Moisture content of the filter bed material.
 - 2. Pressure drop across the filter bed material.
 - 3. pH of the filter bed material.
- v. A description of the inspection and maintenance procedures for all odour containment and ventilation systems including the biofilter.
- vi. Contingency methods for plant malfunctions.
- vii. Testing and maintenance procedures for the standby generator.
- viii. A description of the odour monitoring requirements.
- ix. A system of training for employees and contractors to make them aware of the requirements of the OMP.
- x. Identification of staff responsible for implementing and reviewing the OMP.
- xi. A method for recording and responding to complaints from the public.
- 4. The Consent Holder shall keep a record of any complaints relating to odours from the Terminal Pump Station, and shall include (when provided that information):
 - a. The location where the odour was detected by the complainant.
 - b. The date and time the odour was detected.
 - c. A description of the wind speed and wind direction when the odour was detected by the complainant.
 - d. The most likely cause of the odour detected, and
 - e. Any corrective action undertaken by the Consent Holder to avoid, remedy or mitigate the odour detected by the complainant.

This record shall be provided to the Canterbury Regional Council on request.

- 5. The following equipment shall be fully enclosed with air extracted via a fan and ventilation system to a bark biofilter:
 - a. Wet well.
 - b. Screens.
 - c. Grit trap and bagging system.
- 6. The biofilter required by Condition 5 shall be designed, operated and maintained to ensure compliance with condition 2 at all times. This shall include but not be limited to:
 - a. Ensuring the inlet air is well dispersed throughout the filter bed.



- b. Maintaining the biofilter bed in a friable condition with a pressure drop within the optimum recommended range.
- c. Installing a manometer or other means of pressure measurement to provide a permanent indication of pressure drop across the biofilter bed.
- d. Maintaining an appropriate moisture content in the biofilter bed.
- e. Measuring and recording the moisture content of the biofilter bed material on a monthly basis.
- f. Maintaining the pH of the biofilter bed between the optimum recommended range.
- g. Measuring and recording the pH of the biofilter bed at least once every 3 months.
- 7. The lapsing date for the purposes of section 125 shall be xxxx.
- 8. The Canterbury Regional Council may annually, on the last working day of May or September, serve notice of its intention to review the conditions of this consent for the purposes of:
 - a. Dealing with any adverse effect on the environment which may arise from the exercise of this consent and which is appropriate to deal with at a later stage; or
 - b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment; or
 - c. Requiring the Consent Holder to carry out monitoring and reporting instead of, or in addition to, that required by the consent, or
 - d. Complying with a relevant rule in an operative regional plan; or
 - e. Taking into account any Act of Parliament, Regulation, National Policy Statement, Regional Policy Statement or relevant regional plan which relates to limiting, recording or mitigating the discharges to air authorised by this consent.



9 Conclusions

CCC proposes to upgrade the wastewater treatment and disposal system for Akaroa. A new WWTP, Terminal Pump Station and ocean outfall will be constructed. New main trunk pipework will be constructed to allow reversal of flows through the intermediate pump stations.

The WWTP and Terminal Pump Station will include odour ventilation and control systems which will adequately avoid, remedy and mitigate the discharge of odour from the proposed scheme. CCC will develop an O&M Manual which will include contingency plans for avoiding and mitigating any adverse effects in the event of a plant failure. Providing the WWTP and associated infrastructure is properly operated and maintained, the potential effects of the odour discharges are expected to be no more than minor.



References

CH2M Beca (2014). Akaroa Wastewater Preliminary Design Report.

Clean Air Society of Australia and New Zealand (2008). Odour Separation Distances Guidelines.

EPA Western Australia (2005). Guidance for the Assessment of Environmental Factors, Separation Distances between Industrial and Sensitive Land Uses.

EPA South Australia (2007). Guidelines for Separation Distances.

EPA Victoria (2013). Recommended Separation Distances for Industrial Residual Air Emissions.

Ministry for the Environment (2003). Good Practice Guide for Assessing and Managing Odour in New Zealand.



Appendix J

Contaminated Soils Management Plan – Akaroa Wastewater Terminal Pump Station



Report

Contaminated Soils Management Plan - Akaroa Wastewater Terminal Pump Station

Prepared for Christchurch City Council (Client)

Prepared by CH2M Beca Ltd

30 June 2014
Revision Nº	Prepared By	Description	Date
1	Curtis Blyth	Draft for CCC review	27/6/2014
2	Curtis Blyth	Final	30/6/2014
3			
4			
5			

Revision History

Document Acceptance

Action	Name	Signed	Date
Prepared by	Curtis Blyth	GLSWICK pp	30/6/2014
Reviewed by	Genevieve Smith	aldud	30/6/2014
Approved by	Garry Macdonald	Grudence	30/6/2014
on behalf of	CH2M Beca Ltd		

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This report has been prepared by CH2M Beca on the specific instructions of our Client. It is solely for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. Any use or reliance by any person contrary to the above, to which CH2M Beca has not given its prior written consent, is at that person's own risk



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1 Introduction

CH2M Beca Ltd has been commissioned by Christchurch City Council (CCC) to prepare a Contaminated Soils Management Plan (CSMP) for the proposed wastewater Terminal Pump Station and associated pipeline to be installed in Jubilee Park, Akaroa. This is part of the Akaroa Wastewater Scheme Upgrading Project.

The purpose of this CSMP is to identify procedures that shall be undertaken during site development and to identify and manage potential contaminated soils and/or groundwater.

Further details of the environmental issues on the site can be found in the Preliminary Site Investigation (Contamination) – Akaroa Wastewater Terminal Pump Station report (CH2M Beca, 2014), referred to herein as the PSI.

This CSMP has been prepared by CH2M Beca to support an application for land use consent under the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES).

1.1 Site Location and Description

The Terminal Pump Station (including screening and grit removal) will be located in the boat/car parking area within Jubilee Park, Akaroa. The legal description for the site is Lot 1 DP 79110, which has an approximate area of 37,916m². The relative location of the site is shown in Figure 1-1, and the approximate location of the pump station is shown in Figure 1-2. The site is currently sealed by asphalt and is used as a boat storage yard for the Akaroa boat ramp.



Figure 1-1. Location of Akaroa within the broader region (Source: Environment Canterbury GIS)





Figure 1-2. Map showing approximate location of the Terminal Pump Station and associated pipelines within Jubilee Park (Source: Google Earth Pro – Image © DigitalGlobe)

1.2 Geology/Hydrogeology

The geology of this site is primarily gravel and silts derived from the land reclamation and landfill processes. A layer of asphalt sits upon an engineered silt and gravel layer to 1.2m below ground level (bgl). Silt soils then become dispersed with organic matter to a depth of 2.6m bgl before giving way to gravel type soils consisting or further organic matter and refuse. Alluvial gravel deposits were found at a depth of 2.7m bgl.

1.3 Site History

The PSI identified the site as a historical landfill and site of reclamation from as early as the 1890s to 1978. The Akaroa boat ramp and boat storage yard construction began in 1984 and remains the current land use.

1.4 Contamination Status of Site Soils and Nature of Hazards

The primary concern identified in the PSI was the prior use of the area for landfilling and reclamation. Initial sampling at the site has identified fill material which contains refuse such as plastic bags, metal fragments,



decomposing organic matter, glass, and other house hold waste. Soil testing has confirmed the presence of Total Petroleum Hydrocarbons (TPH), heavy metals and Polycyclic Aromatic Hydrocarbons (PAHs) above background levels. No exceedances of the NES human health criteria for recreational or commercial/industrial land use were identified, although concentrations of arsenic and zinc in some samples exceeded the environmental criteria.

No groundwater testing was undertaken at the site, but given the land use history and contaminants present in the soil, groundwater may be potentially contaminated.

No landfill gas monitoring has been undertaken. Given the landfill was closed in 1978, the peak of landfill gas generation is expected to have passed, however it is possible that gas is still being generated.

Health and safety issues associated with the presence of heavy metals and hydrocarbon residues beneath the site, high groundwater levels and landfill gas could include:

- Soil ingestion, dermal contact, and inhalation of vapours by personnel involved in the site development works.
- Groundwater ingestion, dermal contact and inhalation of vapours by personnel involved in the site development works.
- Landfill gas inhalation by personnel involved in the site development works, and future site users.

Implementation of this CSMP is intended to mitigate any significant potential human health risks. In addition, implementation of the CSMP is intended to reduce the impacts upon the receiving environment (generation of dusts and off-site migration) and provide guidance for disposal options for the removal of surplus soil, groundwater or stormwater during the development works.

1.5 Proposed Works

The proposed works within the property boundaries will include the construction of a Terminal Pump Station (including screening and grit removal) within the Akaroa Boat Park, and installation of a pipeline through the car park, road and across a corner of the recreation grounds.

The actual method of construction is yet to be determined however, minimum volumes of soil disturbance are estimated here. Construction of the pipeline is expected to involve the excavation of between 250-300m³ of material, with materials used as backfill where possible, however some materials may require off-site disposal. The pipeline construction depth is approximately 1.5m below ground level. The construction of the pump station would involve the disturbance of a minimum of 65m³ of material, with the construction methodology being driven piles.

As the groundwater level is high given the proximity to the harbour, it is possible that some dewatering of excavations may be necessary. If dewatering is required, this will be discharged to CCC's reticulated wastewater network.



2 Management Procedures

This section sets out general management procedures and requirements.

- 1. It is recommended that implementation of this plan is mandatory during the site construction works.
- 2. This plan applies to the application site owned by CCC and legally described as Lot 1 DP 79110 covering an area of 37,916m².
- 3. All personnel involved in the site construction works are to be familiar with this plan and must ensure that the requirements of this plan have been followed.
- 4. A copy of this management plan is to remain available onsite at all times so that reference can be made to it when undertaking any site works.
- 5. The plan is intended to assist the Contractor in meeting their legal obligations related to potentially contaminated soils with respect to health, safety and the environment. It is not intended to cover the general site safety procedures required for typical excavation and construction activities at the site. The plan is not intended to relieve the contractor of their legal responsibilities.
- 6. Excavation, demolition and construction activities at the site may be subject to other controls/rules/policies under the relevant district and regional plans, including but not limited to, the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011. Any conditions imposed by the regulatory authorities must be adhered to. However, it is expected that this Contaminated Soils Management Plan (CSMP) will be incorporated into any consent/permit involving excavation/disturbance work at the site to ensure the risks associated with contaminated soils are managed appropriately.
- 7. Overall responsibility for the implementation of this plan shall be held by CCC. However, the specific requirements and provisions of the management plan will be under the control of the Contractor.



3 Site Management Plan

3.1 Pre-development Site Set-up

A site meeting shall be held and attended by the Client, the Contractor, the Engineer's Representative and personnel involved with the earthworks (e.g. sub-contractors, if any) to discuss the risks and site procedures for handling potentially contaminated soils at the site. The Contractor shall prepare a site specific Contractor's Health and Safety Plan (CHSP) for the earthworks which shall cover exposure to contaminated soil, groundwater, and dust.

Landfill acceptance of excavated materials shall be obtained prior to works commencing.

Prior to works commencing, the Contractor shall establish the following controls:

- Access to the earth worked areas shall be restricted to authorised personnel (such as warning tape or barriers), following appropriate site induction procedures
- Signage, including site works information, health and safety requirements, site reporting requirements
- Health and safety facilities such as personal protective equipment, wash areas and first aid points
- Stormwater (surface runoff) diversion and collection systems
- Dust control systems.

Procedures relating to the management of dust, groundwater, stormwater, sediment and stockpiling are detailed in the sections below and shall be implemented by the Contractor. All procedures shall comply with the relevant Council bylaws and conditions of any applicable resource consents.

3.1.1 Stormwater and Sediment Control Procedures

Erosion and sediment controls shall be installed by the Contractor prior to earthworks/excavations commencing and shall be designed for the treatment of surface water runoff in accordance with the Erosion and Sediment Control Guidelines for The Canterbury Region (Environment Canterbury, 2007).

Cesspit protection measures should be installed to treat any sediment laden runoff before it enters the stormwater system. Any water collected within the works site should be treated to remove sediment prior to being allowed to enter the stormwater system.

Runoff should be preferentially maintained onsite and allowed to infiltrate where ever possible and in line with consent conditions to reduce the volume of material discharged to stormwater.

Sediment captured from the excavation of contaminated material should be managed in the same manner as excavated soils at the site, as described in Section 3.2.

3.1.2 **Dust Control Procedures**

Standard good practice for dust controls shall be implemented by the Contractor including the following, as determined in conjunction with the Engineer:

- Timing of works including prevalent wind direction
- Covering any stockpiles
- Dampening any exposed soils during dry and windy conditions through use of a water truck or potable water sprays



- Reduction of vehicle speeds on site
- Minimising drop heights from loaders.

3.1.3 Stockpile Procedure

Stockpiling shall be minimised. Where stockpiles are required they shall be maintained at a low level (no more than 3m in height). Stockpiles shall not be placed in an area where runoff cannot be controlled.

The stockpiling of <u>contaminated</u> soil (as identified in Section 3.2.3) may be necessary for these works. The stockpiles shall be managed by the Contractor as follows:

- Stockpiles shall be sited within an area away from the main working area to minimise potential contact by site workers
- Stockpiled materials shall be placed on suitable material (i.e. polythene sheet) to prevent contaminants leaching into clean soils
- Where adverse weather is forecast, the stockpiled material shall be covered by a suitable material (such as polythene) to prevent the ingress of rainwater into the material and therefore minimise the potential for generation of leachate or sediment in stormwater.

3.1.4 Landfill Gas Monitoring

There is the potential for methane gas to be present in the soils during excavation works in areas which have been used for landfilling. As such, excavations shall be monitored periodically (e.g. on an hourly basis or similar frequency to be confirmed by the Contractor) for methane gas using a hand-held gas monitor. Should methane concentrations be recorded at greater than 1% v/v then works at this location should cease and the gas allowed to vent passively. Work should only recommence at this location once methane concentrations are recorded below 1% v/v for a period of 15 minutes.

3.2 Soil Excavation/Disturbance Procedures

The following are detailed requirements for the disposal of waste materials generated during the site works.

3.2.1 Asphalt removal

Any asphalt excavated from the car park surface can be disposed of off-site to an approved facility.

3.2.2 Onsite Soil Management

Soil sampling within the proposed footprint of the pump station contained contaminant concentrations below the acceptable criteria for commercial/industrial landuse. Excavated materials at this location are likely to contain refuse and organic materials making them unsuitable for any reuse application. It is recommended that these materials are disposed of off-site at an approved facility. Procedures outlined in Section 3.2.4 shall be followed.

No soil sampling was undertaken along the route of the pipeline. Given the previous land use activities at the site, contaminated soil may be encountered and disturbed as part of the development. This material shall be treated as contaminated and unsuitable to remain on site unless soil testing results show that contaminant concentrations are below the acceptable criteria for a commercial/industrial landuse (for pipeline through the car park) or recreational land use (for pipeline through Jubilee Park). Any soil testing shall be undertaken by a suitably qualified environmental scientist/engineer.



Procedures for the identification and handling of contaminated material are detailed in Section 3.2.3. If material is required to be taken off-site then procedures outlined in Section 3.2.4 shall be followed.

The Contractor shall ensure that records are kept of all excavations and soil movements on-site. These shall include the location and dimensions of the excavation, the ground conditions, its movement on site and whether waste materials, unusual staining and/or odour were observed.

3.2.3 Identification and Handling of Contaminated Soils

If suspected contaminated soils or hazardous materials are discovered during the excavation works for the pipeline, the procedures outlined below provide the Contractor with protocols to identify potential contamination and take appropriate action to avoid exposure to site workers or the dispersion of contaminants into the surrounding environment.

Contamination indicators or hazardous materials may include but are not limited to the following:

- Unusual odours
- Discoloured or stained water seeps and soils
- Petroleum hydrocarbon contaminated soil and/or free product
- Liquid waste, putrescible waste, household refuse and any material that normally would be sent to a licensed landfill
- Gas bubbles in standing/pooled water
- Asbestos Containing Material (ACM)
- Intact or broken drums and containers.

During the earthworks on site, the Contractor shall actively monitor for the conditions/materials specified above. In the event that one of these is identified, the Contractor should take the following actions:

- Stop all earthworks within a 5m radius of the area where the suspected material/emission/discharge has been recorded
- Immediately notify the site supervisor
- Cordon off the area as practicable with a suitable barrier.
- Work shall not resume or commence within a 5m radius of the area unless authorised by the Engineer's Representative.

The site supervisor shall contact the Engineer's Representative who will consult with the suitably qualified and experienced practitioner and advise on the appropriate course of action. The suitably qualified and experienced practitioner shall:

- Notify the regulatory authorities (Christchurch City Council), if required, that contamination has been discovered and contingency action is being implemented.
- Characterise the contamination by collecting samples for chemical laboratory analysis.
- If appropriate, advise the Contractor to excavate the suspected contaminated material into a covered bin to allow works to continue with minimum delay.
- If removal of material into a covered bin is inappropriate, advise construction work to proceed to an area clear of contamination indicators until material testing, as necessary, defines the material characteristics.
- When the material characteristics have been established, advise the site supervisor as to whether the materials may remain on site or whether materials should be directly loaded into trucks for disposal at a licensed landfill, assuming it can be accepted without prior stabilisation.



- Disposal must be to a facility licensed to accept such material and approval shall be obtained by the Contractor prior to transportation. The landfill operator may require further testing before accepting materials, in accordance with the landfill's resource consent.
- Trucks shall have their loads covered with tarpaulins before leaving the site.
- Instruct relevant staff so that all appropriate information such as location and quantity of material and offsite weighbridge dockets are recorded. All weighbridge documents for any material removed shall be retained by the Contractor for inclusion in a Site Validation Report (SVR).
- Record all details of unexpected contamination and hazardous materials discovery on an incident form, including GPS of location.

Should asbestos be observed or suspected during the earthworks, all work shall cease and Guidelines for the Management and Removal of Asbestos (revised 1999) for the Department of Labour, and the Health & Safety in Employment (Asbestos) Regulations (1998) will be followed. Works can recommence once all asbestos has been removed safely. Any such asbestos works (assessment, delineation, removal and verification) shall be undertaken by a specialist asbestos contractor.

3.2.4 Off-Site Disposal

No soil shall be transported off-site without the approval of a suitably qualified environmental scientist/engineer. If soil is to be taken away for off-site disposal or should soils require disposal at a licensed landfill, a suitably qualified environmental scientist/engineer shall determine what, if any, additional soil sampling may be necessary to verify whether the soil contaminant concentrations are suitable for the intended disposal location.

The Contractor shall comply with any specific requirements relating to the stockpiling of excavated materials to enable soil sampling, as directed by a suitably qualified environmental scientist/engineer, and in accordance with the procedure in Section 3.1.3.

The excavation, handling and off-site removal of the material shall be managed by the Contractor as follows:

- 1. Materials requiring excavation for disposal to a licenced landfill shall be loaded directly into trucks where possible (limiting stockpiling), subject to the necessary approvals being obtained as outlined above.
- 2. All trucks containing potentially contaminated soils shall be covered before leaving the site and any soils brushed off wheels to avoid tracking onto public roads. Should the site become wet and material adheres to wheels, a wheel wash facility shall be installed and truck wheels washed before exiting the site.
- 3. The Contractor shall maintain a register of landfill disposal activities and records such as location of excavation, disposal location, quantity of material and off site weighbridge documents.

The landfill operator will require a review of soil testing results before accepting materials, in accordance with the landfill's resource consent.

3.3 Post-Earthworks Procedures

Upon completion of earthworks, all plant and equipment shall be cleaned and decontaminated prior to leaving site.

3.4 Imported Materials

Material imported to the site for the purposes of filling and landscaping shall be certified cleanfill only, as per Section 4.2 of A Guide to the Management of Cleanfills (Ministry for the Environment, 2002). Records must be provided by the Contractor to demonstrate that any imported material is obtained from a quarry or other



certified source. Material shall not be imported from any site that is, or would be considered, a Hazardous Activities and Industries List (HAIL) site (MfE, 2011), unless sampled by a suitably qualified environmental scientist/engineer to show that it is suitable for the intended land use and is acceptable to the client.

3.5 Groundwater Procedures

Groundwater levels are expected to be in the region of 2m below ground level and therefore works are expected to intercept groundwater. The groundwater is influenced by tidal movements given the proximity to the harbour.

When groundwater is encountered during the excavation works, the Contractor shall:

- Contain groundwater within the excavation and not allow it to discharge across the site surface.
- If dewatering is required, the pumped groundwater discharge shall be to CCC's reticulated wastewater system.



4 Generic Hazard Minimisation Procedure

Works at known contaminated sites have the potential to encounter contaminated soils and/or groundwater. Prior to work being undertaken, a Job Safety and Environment Analysis (JSEA) s be carried out that will identify the appropriate Personal Protective Equipment (PPE) and behaviours to reduce the exposure risk.

Workers may be exposed to contaminants via the accidental ingestion of, or skin contact with soil and/or groundwater and/or surface water. To prevent this exposure, procedures should be followed by workers who are likely to come in contact with contaminated soil and/or water, including the following:

- Wear cloth overalls or disposable overalls.
- Non-disposable overalls should be removed at the end of each day and should be stored at the work site. The overalls should not be left in vehicles or taken home (to prevent the tracking of potentially contaminated materials into workers' homes).
- Non-disposable overalls should be laundered by a commercial service and should under no circumstances be taken home and washed.
- Disposable overalls should be bagged at the end of each day and disposed of to an appropriate facility.
- All staff physically involved in works likely to result in hand contact with contaminated material shall wear chemical resistant disposable gloves which should be regularly changed.
- Wear a P2 dust mask if conditions generate dust.
- Avoid contact with water where possible.
- Where contact with water cannot be avoided, PPE shall be used to prevent contact with water such as waterproof gauntlets, gumboots, waders etc.
- Minimise hand to mouth contact.
- Wash hands and face prior to eating, drinking or smoking.
- Do not eat or drink within the excavation area.
- Wash immediately any skin abrasions and treat to prevent infections.
- Follow any additional requirements in the Contractor's Site Specific Health and Safety Plan.

If petroleum hydrocarbon contaminated soil or groundwater is encountered there is a potential for petroleum hydrocarbon vapours to be generated. Any site work is therefore required to undergo atmospheric testing and all applicable permits obtained from the permitting authority before the work is carried out.

Further hazards may be identified during the course of the works. The Contractor is responsible for reviewing any new work element and assessing whether there are any new associated hazards, and whether these can be eliminated, isolated or minimised. The Contractor shall then instruct all staff on the health and safety procedures associated with the new hazard and update the site CHSP.



5 Limitations

This report has been prepared by CH2M Beca Ltd solely for Christchurch City Council (Client). CH2M Beca has been requested by the client to provide a Contaminated Soils Management Plan (CSMP) in relation to the assessment of soil contamination for the site at Lot 1 DP 79110, Jubliee Park, Akaroa. This report is prepared solely for the purpose of the management of contaminated soils encountered during this project. The contents of this report may not be used by the Client for any purpose other than in accordance with the stated scope.

This report is prepared solely for the Client. CH2M Beca accepts no liability to any other person for their use of or reliance on this report, and any such use or reliance will be solely at their own risk.

Unless specifically stated otherwise in this report, CH2M Beca has relied on the accuracy, completeness, currency and sufficiency of all information provided to it by, or on behalf of, the Client or any third party, and has not independently verified the information provided. CH2M Beca accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the information provided.

The contents of this report are based upon our understanding and interpretation of current legislation and guidelines ("Standards") as consulting professionals, and should not be construed as legal opinions or advice. Unless special arrangements are made, this report will not be updated to take account of subsequent changes to any such Standards.

This report should be read in full, having regard to all stated assumptions, limitations and disclaimers.



Appendix K

Cultural Effects Assessment

Assessment of Cultural Effects - Akaroa Wastewater Project

The proposed Akaroa Wastewater Project includes a new wastewater treatment plant, new harbour outfall, new Terminal Pump Station and upgrades to existing pump stations and pipelines, and decommissioning of the existing wastewater treatment plant. This assessment of the actual and potential cultural effects of is based upon an assessment of the provisions of the Mahaanui Iwi Management Plan 2013 (Mahaanui IMP 2013). This assessment is not a Cultural Impact Assessment, but a high level assessment of the proposal using the provisions of the Mahaanui IMP 2013.

<u>Manawhenua</u>

Akaroa Harbour and the coastal margins affected by the project fall within the takiwā (territory) of Ōnuku Rūnanga. It is also understood that Wairewa Rūnanga share kaitiakitanga (guardianship) responsibilities for Akaroa Harbour.

Cultural Framework

The Mahaanui IMP 2013 identifies a number of key values that underpin the Ngai Tahu view of the environment and resource management in general, which is central to the consideration of the cultural effects of the proposal. These include¹:

- Whakapapa, which explains the relationship between the world around us, including people.
- Manawhenua, which is effectively the right to exercise authority over an area and its resources.
- **Kaitiaki**, which are the traditional non-human guardians of the environment and which communicate the health and vitality of their environment to tangata whenua charged with interpreting the 'signs' and making decisions accordingly; similar to the manner in which current scientific practices rely on indicator species to understand the health of the environment.
- **Kaitiakitanga**, often referred to as guardianship, which has the dual purpose of protecting mauri (life force), and fulfilling the duty to pass the environment to future generations.
- Mauri, often described as the 'life force' of a place or being. It includes natural and spiritual elements, and is central to kaitiakitanga. Mauri can be affected by human interaction with the environment, and the Mauri of a resource can be understood through indicators such as the health (or otherwise) of mahinga kai species.
- **Mahinga kai,** being the customary gathering of food, and the places where the resources are gathered.
- **Manaakitanga**, being the practice of hospitality. An inability to provide for guests can be seen as a loss of mana.

The importance of Akaroa Harbour to tangata whenua for mahinga kai purposes is clearly identified in the Mahaanui IMP. The Objectives relating to Akaroa Harbour (Section 6.8) clearly identify that the elimination of discharges to the Harbour is a priority. The discharge of wastewater in to the harbour is considered to be culturally offensive and incompatible with the mahinga kai values of the harbour (Issue A1). This issue is understood by the Council in preparing the applications to renew the discharges to the Harbour. In recognition of the cultural significance of the discharges, the

¹ Mahaanui IMP 2013, Section 4.2.



Council intends to work collaboratively with Ōnuku Rūnanga so that tangata whenua values are afforded the appropriate priority throughout the project.

It is accepted that the practice of treating and discharging waste to Akaroa Harbour is inconsistent with the provisions of the Mahaanui IMP 2013, and unacceptable culturally to tangata whenua. Akaroa Harbour is recognised as a mahinga kai, and is identified as a Taiapure (customary fishing area), and the policies of the Plan confirm the fundamental importance of this position. Furthermore, the Plan explains the significance of Akaroa Harbour in Ngai Tahu history.

Notwithstanding that, it is considered that the policies in the IMP offer a practical approach, and guide a thorough assessment of the effects. While discharges to land are preferred, and encouraged, the Plan also recognises that it will take time to eliminate discharges to the harbour and to facilitate land based disposal. To that end, Policy A1.8 supports a short term (5 years) consent for the renewal of the current discharge of waste water to the harbour in order to provide time to investigate, evaluate and develop land based disposal options. This matter is addressed below.

The effects of the proposal on cultural values are considered below in the context of the Policies of the Mahaanui IMP 2012.

Policy A1.1

To support incentives and initiatives to reduce the volume of wastewater entering the system, as per general policy on Waste Management (section 5.4, Issue P7), including but not limited to:

(a) Requiring on-site stormwater treatment and disposal to avoid stormwater entering the waste water system.

On-site stormwater treatment and disposal is not necessarily the sole option for disposing of stormwater and reducing the volume of stormwater entering the wastewater system. The volume of wastewater entering the wastewater system will be reduced as part of the overall upgrade project. At present, the system is very old, and stormwater and groundwater infiltrates the pipes, adding significantly to the flows in the system and placing increasing pressure on the ability of the pump stations to cope with the flows. New pipework along Beach Road will see a reduction in the volume of stormwater being transported through the system, treated and then eventually discharged into the harbour.

Reducing the volume of stormwater entering the system also means that the treatment of wastewater at the wastewater treatment plant is more effective, significantly improving the quality of the treated wastewater that is discharged to the harbour.

Policy A1.2

To require the elimination of the discharge of waste water to Akaroa Harbour, as this is inconsistent with Ngai Tahu tikanga and the use of the harbour as mahinga kai. This includes:

- (a) Direct discharge from treatment plants;
- (b) Indirect discharge via land (run-off), surface water ways or groundwater; and
- (c) Wastewater coming back into the harbour with tides and currents (if pumping out of harbour via pipeline).



It is accepted that the discharge of wastewater, irrespective of whether it is treated or not, is contrary to Ngai Tahu tikanga and is considered to have an adverse effect on the mauri of the harbour. While there will be a reduction in the volume of stormwater entering the system and eventually being discharged via the harbour outfall, and the level of treatment will be significantly improved, the fact remains that there will still be a discharge of treated wastewater to the harbour for the foreseeable future. While the Council is committed to considering and investigating land based disposal options, the nature of Akaroa and its surrounds (i.e. steep topography and unstable soils) is such that it is unlikely that it will be possible to design a system that discharges solely to land.

Notwithstanding that, the project will significantly reduce untreated wastewater discharges to the coastal marine area from the pump stations that presently discharge close to shore in overflow situations, due to the increased capacity of the pump stations and pipelines. In addition, high flows that exceed the capacity of the wastewater treatment plant, will be treated using fine screens (primary treatment) and ultraviolet (UV) disinfection before being discharged via the harbour outfall, whereas at present these high flows would cause untreated wastewater overflows onto the beaches.

The proposed harbour outfall will discharge into approximately 9.5m of water (mean sea level) from an outfall that is approximately 2.5km long. Extensive modelling undertaken by NIWA shows the tidal movements to be relatively slow, which results in greater die-off of pathogens (bacteria and viruses) as a result of exposure to the elements. It is expected that the modelling will show that the proposed wastewater scheme will result in a significant reduction in the risk to public health, both in terms of contact recreation and shellfish gathering in the harbour.

While the wastewater discharge will not be removed from the harbour, the project will result overall in a reduction of untreated wastewater discharges directly from the pump stations during storm events, and will reduce groundwater and stormwater infiltration into the system. The significantly improved wastewater treatment plant will result in a high quality treated wastewater, and we expect that studies being undertaken by specialists will show that the discharge will not have an adverse effect on the species that inhabit the harbour. The proposed wastewater scheme will be a significant improvement on the existing system.

Policy A1.3

Wastewater should be treated and irrigated to land; subject to the following conditions:

- (a) Effluent is treated to the highest possible standard;
- (b) The land used as a receiving environment is suited to the nature and volume of discharge, to avoid run-off or groundwater contamination;
- (c) The land used as a receiving environment is used productively, in a way that is conducive to assimilating waste, such as native or exotic timber plantation; and
- (d) Monitoring programs include both water and soil, and include clear strategies for responding to negative monitoring results.

As noted previously in this assessment, land based disposal is not being proposed as part of this application and this policy is not directly relevant to the consideration of the effect of the activity. However, Council has committed to making provision for land application trials.



Policy A1.4

To assess potential sites for discharge to land with the following considerations:

- (a) Cultural landscape values
- (b) Slope of site
- (c) Proximity to surface waterways, wetland, waipuna;
- (d) Proximity to coast;
- (e) Type of soil (assimilative capacity); and
- (f) Current and potential land use.

This policy is not directly relevant to the current proposal as it does not involve discharges to land.

Policy A1.5

To avoid locating a wastewater treatment plant at:

- (a) Takapuneke;
- (b) Near Ōnuku Marae;
- (c) Near waterways; or
- (d) Near sites identified by tangata whenua as wāhi tapu.

A key objective of the Akaroa Wastewater Project is to decommission the existing wastewater treatment plant at Takapuneke, which meets the first objective of this policy. The proposed wastewater treatment plant will be located at Old Coach Road, which is much further from Ōnuku Marae than the existing wastewater treatment plant, thereby meeting the second objective of this policy. The proposed wastewater treatment plant is not located near a permanent waterway.

The proposed wastewater treatment plant site on Old Coach Road is subject to a silent file, but Ōnuku Rūnanga has advised in a letter dated 6 June 2013 that the Rūnanga is supportive of this location, providing appropriate consultation is undertaken and appropriate consent conditions are put in place.

A review of the New Zealand Archaeological Association database has indicated there are no archaeological sites identified near the proposed wastewater treatment facility. It is understood that there are other Silent Files located in the vicinity of the project. Whilst the exact location of the sites or sites these files protect have not been disclosed (nor need to be), correspondence has been received from Ōnuku Rūnanga that confirms the pump stations and pipelines are not located where they would have an impact on these sites.

Policy A1.6

To adopt a holistic and creative approach to finding a solution for wastewater management in the Akaroa Harbour area, including but not limited to:

(a) Recognising and providing for the cumulative effects of discharges on the harbour, as opposed to assessing effects of individual discharges;



- (b) Minimising the volume of waste water produced (Policy A1.1)
- (c) Recognising and providing for future urban growth and rural land use change;
- (d) Providing increased weight to cultural, social and environment costs and benefits, including costs to future generations; and
- (e) Affording equal weighting to those cultural effects that may be intangible (eg effects on tikanga) with effects identified and measured by western science.

Overall the cumulative effects of discharges will be reduced. The harbour outfall will be the point from which treated wastewater will be discharged. The improvements to the system, which include a new wastewater treatment plant, new pipework, upgraded pump stations and increased capacity, will result a significant improvement in the treated wastewater quality and a reduction in the untreated sewage overflows. The longer outfall pipe to discharge in to deeper water also allows for enhanced dilution and improved die-off of any remaining pathogens, with overall positive effects on the quality of the water in the harbour.

The quality of the effluent is high, with low concentrations of indicator viruses and pathogens. No adverse effects are therefore expected on the health of the harbour and the species it supports (to be confirmed by modelling which is currently underway). From a Ngai Tahu perspective, however, the fact remains that (treated) wastewater is still being discharged into an area with mahinga kai values.

The Cultural Framework discussed in the Mahaanui IMP 2013 has drawn parallels between cultural understandings of the health of indicator species and the use of scientific methods to determine the health and potential effects on the same species. While the modelling is not yet complete, we expect that it will show that there will be no adverse effects on species (including shellfish), which will indicate that there will be no physical effects from their consumption. This does not address the potential cultural contamination; however, as the Policy indicates, equal weighting should be shown to those cultural effects that may be intangible (e.g. effects on tikanga) with effects identified and measured by western science.

As part of the holistic approach to addressing the actual and potential effects of the discharge, various mitigation measures are able to be offered. These include:

- Inclusion of appropriate native species in planting around the wastewater treatment plant and Terminal Pump Station. These species will complement other plantings that have been undertaken in the Akaroa area recently. The Council anticipates that the landscaping will be designed in consultation with tangata whenua so that appropriate species are selected.
- Options such as place naming and interpretive signs can be adopted a means of confirming the historical associations and cultural significance of sites and areas.
- On-going consultation with Ōnuku Rūnanga and others as appropriate (e.g. Wairewa) throughout the life of the project.
- Undertaking ongoing monitoring of the receiving environment, as appropriate.

Policy A1.7

If no local solution to waste water can be found, then wastewater should be transported to Christchurch City and discharged via the existing ocean outfall.



This is not considered to be an effective solution. The costs associated with transporting wastewater to Christchurch would be unaffordable to ratepayers. This solution would require significant and regular truck movements, and would require appropriate storage facilities capable of storing large volumes. Discharging treated wastewater to Akaroa Harbour remains the most appropriate solution, recognising that it is inconsistent with Ngai Tahu tikanga. However, the upgrades proposed to the system will result in a significant improvement in the quality of treated wastewater being discharged, and a reduction in untreated wastewater overflows during storm events or other adverse situations.

Policy A1.8

To support the granting of short term consent of no more than 5 years, for renewal of consent for the discharge of waste water to the harbour, to enable investigation, evaluation and development of discharge to land options.

Consent is being sought for a period of 35 years. This reflects the value of the project (i.e. very high level of investment), and recognises that full land based disposal is not a realistic option for treated wastewater from Akaroa. The project's focus is on improving the level of wastewater treatment, as well as reducing the volume of stormwater and groundwater entering the system so that the treatment can more effectively focus on the waste entering the system. While land based disposal is to be further investigated, this will likely only be available for some of the total wastewater volume, and in periods when the ground is dry enough to accommodate the addition of treated wastewater.

Policy A1.9

To require regular monitoring of the cultural health of the harbour, including samples of kaimoana species at locations, until discharges of wastewater to the harbour cease.

Monitoring of indicator species (mussels) has commenced, in three places in the harbour. Sampling to date has not identified any concentrations of harmful bacteria (such as E. coli), which indicates that the discharge as presently occurs in the harbour is not giving rise to adverse effects on kaimoana species. While these results indicate that these species are unharmed according to 'western science', it is recognised that this does not ameliorate the cultural contamination that occurs from discharging waste into a mahinga kai. However, Policy 1.6 also indicates that equal weight can be given to western and more intangible measurement methods.

Conclusions

It is accepted that the discharge of wastewater to Akaroa Harbour is inappropriate in terms of Ngai Tahu tikanga. However, the Council is faced with the situation where there are no realistic or viable land based options for addressing this issue.

This project will reduce overall the volume of stormwater and groundwater infiltrating the system which in tandem with the system's increased capacity and treatment capability will result in a greater quality of treated wastewater being discharged to the harbour. This in turn will reduce the risks to public health through contact recreation and shellfish gathering.

In addition, the decommissioning of the existing wastewater treatment plant at Takapuneke will bring a cultural benefit to Ōnuku Rūnanga.



Appendix L

Water-Related Health Risks Analysis for the Proposed Akaroa Wastewater Scheme (NIWA, 2014b) Appendix M

Landscape and Visual Assessment



Report

Akaroa Waste Water Scheme Upgrading: Resource Consent Application - Landscape and Visual Assessment

Prepared for Christchurch City Council

Prepared by CH2M Beca Ltd

30 June 2014



Revision History

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Executive Summary

This assessment considers the proposal to construct and operate a new Waste Water Treatment Plant (WWTP) and Terminal Pump Station (TPS) in Akaroa, Banks Peninsula.

The WWTP site consists of open rural land that slopes down to Old Coach Road and is located high on the hills that provide the backdrop to the Akaroa Basin and in close proximity to the 'important' Takamatua Ridgeline. The site has 'typical' rural character when considered in the context of the wider Akaroa basin.

There will be significant **physical effects** on the site itself given the development of the WWTP will result in a fundamental shift in character from rural to utilitarian. That said, the effects of the development on the character of the local and wider landscape will be of a low degree owing to expanse and complexity of the existing viewing catchment and the small scale of the WWTP when considered in that context. The proposal will be consistent with Policy 1A and 3C of the District Plan Rural Zone or Policy 1F of the Utilities Chapter.

The primary **visual effects** associated with the WWTP development relate to vehicles travelling past the site on Old Coach Road, which are of a 'high' degree over the short term and decreasing to a moderate – low degree over subsequent years once the proposed landscape has had an opportunity to establish and mature. Visual effects on the wider viewing audience will be low due to distance and the expanse and complexity of the scene. The WWTP is not located on the important/ prominent Takamatua Ridgeline and nor will it project above the skyline when viewed from the wider landscape. It is consistent with Policy 1A and 3D of the District Plan Rural Zone or Policies 1A and 1E of the Utilities Chapter.

Physical effects of the proposed TPS will be low despite the development introducing a new built element into the local setting. This is due tof the relatively low (landscape) quality of the site and immediate surrounds and resulting low sensitivity to change and subsequently high capacity to absorb the proposal. Effects on coastal natural character values have been assessed as negligible. The development of the proposed TPS is consistent with Policies 1A, 1B, 2A and 2B of the District Plan Recreational Zone and Policies 1A and 1E of the Utilities Chapter.

It is anticipated that **visual effects** from areas surrounding the TPS site will be of a moderate – low degree in the short term and whilst the proposed mitigation planting becomes established and the majority of the lower half of the TPS building becomes screened and the TPS is bedded down in the view. In the medium to long term the proposed planting will mature to heights up to 7-10m and will screen significant portions of the TPS from key viewing locations and resulting visual effects will be of a low degree. It is likely that glimpses of the upper most parts of the TPS will be visible to some degree throughout the life of the TPS although resulting visual effects will not be significant. The proposed TPS is consistent with Policies 3A and 3B of the District Plan Recreational Zone.

Whilst the proposed WWTP and TPS will result in short term adverse effects on rural character and visual amenity ranging from high to low in degree. In general, the respective sites, adjacent land and wider landscape have the capacity to absorb the proposed developments and overtime the overall effect profile of both developments will reduce once the proposed mitigation measures have been implemented and landscaping becomes established and matures over time. For these reasons the development of the proposed WWTP and TPS facilities are considered appropriate in landscape (physical) and visual terms.



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- Appendix 1 Reservoir Consent Application Landscape Plan
- Appendix 2 Preliminary Design Report Relevant Drawings
- Appendix 3 Landscape Mitigation



1 Introduction

1.1 Purpose

The purpose of this report is:

- 1. To describe the existing environment and landscape related aspects of the proposed Resource Consent Application for the Akaroa Waste Water Treatment Plant (WWTP) and the Terminal Pump Station (TPS); and
- 2. To assess the landscape and visual effects that will potentially result from the two developments with specific focus on rural character and visual amenity for the WWTP site and coastal character and amenity for the TPS site.

1.2 Report Structure and Process

The following report will describe the proposal; identify the relevant provisions of the Banks Peninsula District Plan; describe the existing environment including physical and visual characteristics; and assess the effects of the proposal on those landscape characteristics and qualities as required under the District Plan.

The process that provides the foundation for this assessment and its conclusions includes:

- 1. An initial visit to the WWTP and TPS sites and wider Akaroa basin with the wider project team;
- 2. Desk top review of the Banks Peninsula District Plan and associated Banks Peninsula Landscape Study¹;
- 3. A preliminary assessment and recommendations as to the suitability of both sites for development in the context of their existing landscape character and quality;
- 4. Several meetings/ workshops with project engineers and architects as part of the design development process with a specific focus on balancing functionality with visibility and overall aesthetic quality;
- 5. A meeting/ workshop with mana whenua representatives regarding planting in and around the proposed WWTP;
- 6. Subsequent site visit to take additional site photos and carry out an assessment of the visual context of both sites and formulate judgements as to the visibility and potential visual effects of the proposal;
- 7. Preparation of landscape planting plans and associated cross-sections; and
- 8. Preparation of this assessment.

¹ Boffa Miskell Limitied (May 2007) Banks Peninsula Landscape Study – Final Report.



2 The Proposal

2.1 **Project Description**

A full project description is provided under Section 4 of the CH2M Beca Report; Akaroa Wastewater Scheme Upgrading-Resource Consents Application and Assessment of Effects on the Environment. For the purposes of this assessment the proposal consists of a new Terminal Pump Station (TPS) and Waste Water Treatment Plant (WWTP) as well as associated new in-ground and existing infrastructure, including a waste outfall (pipe) to Children's Bay.

Given that the outfall pipe will be underwater and the discharged effluent is considered to be of a very high quality and (visual) clarity neither facets of the proposal will be assessed as part of this assessment – it is therefore restricted to the consideration of the new WWTP and TPS and associated construction works.



Figure 1 – Location Map

2.1.1 Waste Water Treatment Plant

The WWTP is to be located on the uphill side and at the top end of Old Coach Road near the intersection with Long Bay Road.

The site sits at an elevation between 121m and 126m above MSL and is approximately 70m long, 17 - 28m wide and with a footprint of 1440m². The proposed facility consists of a suite of utility buildings and structures ranging in height from approximately 3m above existing ground level at the north western end of



the site to 8m to the southeast. The base of the 5m high balance tank located at the south eastern end is elevated approximately 3m above existing road level giving it an overall perceived height of 8m.



Figure 2 – WWTP Layout Plan

Given its recession into the hill side retaining walls are required for the full length of the site with a combination of proposed building walls and standalone structures providing for retention of cut batters up to a height of 3.5m. A 4m wide one-way access lane and associated gateways and fences will be located along the Old Coach Road frontage of the site and setback approximately 4m from the edge of the existing carriageway.



The final form and appearance of the WWTP will be designed in accordance with the SCIRT Pump Station Design Guide.² With the following excerpt taken from the Preliminary Design Report:

"It is proposed that the higher structures are sited further down the hill so as to reduce their visual impact. In addition, smaller elements such as tanks, should be clustered together where possible, set back from the main frontages and screened. The design of the buildings proposed will follow the functional requirements including use of pre-cast concrete panels to meet the Importance Level and Design Life requirements. The concrete will be patterned or stained, and a secondary material (such as timber or corten steel) will be added to introduce design feature elements and reduce the industrial appearance and reflectivity of the concrete finish. The detailing on the concrete panels is intended to respond to the context as well as to help deter graffiti. The elevations will also be treated with anti-graffiti products."³

The proposal includes an allowance for screening and amenity planting immediately to the southwest of the proposed access road and adjacent to Old Coach Road and on the open pasture land to the northeast and above the proposed WWTP.

The final design and construction of the WWTP will be subject to a Design – Build procurement process and therefore the details around final form of the Plant and associated construction method and timing haven't been finalised. Despite this it is anticipated that the construction period is likely to consist of 21 month construction period including two months of site establishment, 16 months of civil works and a further three months of completion works. It is likely that landscaping will occur during this final three months prior to commissioning of the Plant.

2.1.2 Terminal Pump Station

The TPS is to be located in the south eastern corner of the Akaroa Boat Park approximately 50m from the coastal edge of Children's Bay and Jubilee Park.



Figure 3 - TPS Layout Plan

It includes a pump station building, separate power and standby generator and underground infrastructure as illustrated in Figure 3 and Appendix 2. The pump station building will be 13m wide, 17.5m long and 7m high

³ Page 42.



² SCIRT (30 August, 2012) Pump Station Design Guide; A guide to siting, architectural treatment and landscaping of pump stations and vacuum stations; Final issue – Revision 01

and will also be designed in accordance with the SCIRT Pump Station Design Guide. The generator will be approximately 3m wide, 5m long and 2m high. According to the Effects of Sea Level Rise for Christchurch City (Tonkin & Taylor, 2013) report the site may be affected by sea level rise and in response the pump station will be elevated approximately 800mm above the existing ground level.

The following excerpt taken from the Preliminary Design Report:

"The design of the building proposed will follow the functional requirements for the pump station, including use of pre-cast concrete panels to meet the Importance Level and Design Life requirements. The form of the building will follow the 'residential context' design guidance and include high level glazing, hipped roof and deep overhanging eaves. The concrete will be patterned or stained and a secondary material (such as timber) will be added to introduce design feature elements and reduce the industrial appearance and reflectivity of the concrete finish. The detailing on the concrete panels is intended to respond to the context as well as to help deter graffiti. The elevations will also be treated with anti-graffiti products."⁴

The proposal includes an allowance for screen and amenity planting adjacent to the TPS and generator.

The final design and construction of the TPS will be subject to a conventional design and construct procurement process and although a detailed design process is yet to be undertake it is anticipated that the construction period is likely to include a period of 12 months and is likely to include one month of excavation and site preparation prior to construction and subsequent commissioning of the TPS.

^₄ Page 27.



3 Banks Peninsula District Plan

A detailed analysis of the relevant policy framework and associated planning provisions is provided in Section 9 of the Assessment of Effects on the Environment report (AEE).⁶ The provisions of the Banks Peninsula District Plan (BPDP) are most relevant to this assessment and are identified separately below and in relation to the WWTP and TPS.

3.1 Wastewater Treatment Plant

The proposed WWTP is located within the Rural Zone and is being assessed as a 'utility', resulting in a **discretionary** activity status under the BPDP. In addition, the site is located within the Visual Amenity Landscapes category and therefore the following landscape and visual matters are particularly relevant:

3.1.1 Rural Zone

Objective 1:

To maintain the **landscape values, natural character and amenity values** of each of the **Landscape Categories** identified within the Rural Zone.

- <u>Policy 1A</u>: The following qualities or elements contribute to the landscape character and amenity values of the rural environment and are to be maintained and enhanced;
 - A generally small scale low density of buildings and residential development in those areas of the District where landscape character and amenity values are vulnerable to degradation.
 - Absence of highly visible structures and development on prominent ridges and skylines. (See also Chapters 12, 13 and 31.)
 - Prominent rocky outcrops.
 - Areas of indigenous vegetation and habitat.
 - The quality and clarity of water in rivers and streams.
 - Indigenous streamside (riparian) and coastal vegetation.
 - The ability to sustainably provide for the evolving nature of land based activities.

Objective 3:

To maintain and enhance the amenity values and conditions required for health and safety within the Rural Zone.

Policy 3C: Any adverse effects on amenity values, health and safety from increased density of development, vehicle movements or changes to the level of intensity or character of road usage on district roads, are to be avoided remedied or mitigated.

⁵ CH2M Beca Report (date TBC); Akaroa Wastewater Scheme Upgrading-Resource Consents Application and Assessment of Effects on the Environment



Policy 3D: Adverse effects from any activity affecting the rural outlook and privacy of adjoining properties are to be avoided, remedied or mitigated.

3.1.2 Utilities

Objective 1:

To protect the environment from the actual and potential adverse effects of utilities;

- Policy 1A: Above-ground utility buildings and structures should not be located on ridgelines or in Conservation Reserves, or on Heritage Items, unless there is no technically feasible alternative;
- <u>Policy 1E</u>: Utilities should not require the removal of indigenous vegetation.
- <u>Policy 1F</u>: Earthworks associated with any utility should not detract from any significant landforms.

3.2 Terminal Pump Station

Although the TPS site is zoned Recreation Reserve it is to be assessed as a **restricted discretionary** activity under the BPDP due to being a Utility. In addition, the site is located within the Visual Amenity Landscapes category and therefore the following landscape and visual matters are particularly relevant:

3.2.1 Recreational Reserve

Objective 1:

To ensure that activities and development on reserves do not compromise the contribution which land in the Recreational Reserve Zone makes to the health and welfare of residents and visitors.

- <u>Policy 1A</u>: Activities in the zone should not unduly compromise the existing use, enjoyment and amenity of reserves.
- Policy 1B: Development on recreational reserve land such as buildings, facilities and car parking areas should not be located or be of a design, size or intensity which detracts from any recognised use or amenity of the land.

Objective 2:

To ensure that activities and development do not detract from the contribution which land of recognised natural amenity and value makes to the amenity of Banks Peninsula.

- <u>Policy 2A:</u> Activities within the Recreational Reserves Zone should not adversely affect land of recognised natural amenity and value.
- Policy 2B: Development such as buildings, facilities and car parking area should only be undertaken where they do not adversely affect land with recognised natural amenity and value within the Recreational Reserves Zone.

Objective 3:

To ensure that the effects of development and activities on recreational reserve land are not detrimental to land and activities in other areas



- Policy 3A: The design, appearance, location, size and intensity of activities and development including buildings, facilities and car parking areas should not have an adverse effect on the amenity of surrounding land nor other activities.
- Policy 3B: The generated effects of activities such as noise and traffic and of development such as shadowing, and visual domination by buildings should not adversely affect the amenity of surrounding land or other activities.

3.3 Banks Peninsula Landscape Study

The Banks Peninsula Landscape Study (BPLS) was prepared in 2007 and focussed on the evaluation and categorisation of rural areas within Banks Peninsula into outstanding natural features and landscapes (ONFL); visual amenity landscapes (VAL); valued/cultural heritage landscapes (HL); and coastal natural character landscapes (CNCL). Important ridgelines within visual amenity landscapes were also identified and mapped.

Both the WWTP and TPS are located within Landscape Character Area (LCA) 18 – Akaroa which identifies the bulk of the rural backdrop to the Akaroa Township as VAL with the upper reaches of the backdrop hills and rocky outcrops being considered ONL.

VAL's are generally characterised by:

"...small scale development and land use creating a mixed pattern or mosaic of activities in a varied topographical landscape e.g. bush and pasture with housing dotted in-between. There is an absence of large scale and concentrated development...⁷⁶

LCA 18 – Akaroa is described in detail on pages 142 and 143 of the BPLS with the following key characteristics and features being identified:

- "Includes built settlement of Akaroa
- Coastline includes one bay, which is in turn made up of three small bays
- Takamatua Hill is a prominent feature
- The rugged relief and high elevation of the skyline behind Akaroa
- The scale of built form is still dominated by natural elements and the large vertical scale of the unbuilt landscape above"

In addition to these characteristics and features the ridgeline above and to the north/ rear of the WWTP is identified as an important ridgeline under the study and has subsequently been mapped on the BPDP map set.⁷

In terms of the assessment of landscape and visual effects the BPLS identified the following threats in relation to VAL's:

⁷ Christchurch City Council (October 2012); Banks Peninsula District Plan; Rural Map R9



⁶ Page 203. BPLS – Boffa Miskell Limitied (May 2007) Banks Peninsula Landscape Study – Final Report.

- "activities become larger in scale and therefore a more dominant and singular feature of the landscape e.g., large scale forestry compared with small scale tree planting interspersed with indigenous outcrops and open pasture;
- housing is developed in locations that detract from open and natural characteristics or in more intensive clusters that contrast with the mosaic pattern or open coastal character that currently exists;
- planting and/or structures obscure or alter the outline of natural landforms;
- earthworks alter natural contours;"

In general terms it is considered that the BPLS provides a useful and accurate assessment of the existing environment.

However, in the case of the proposed TPS site its underlying Recreation Reserve zoning appears to be the primary reason for its inclusion within a VAL. In terms of its function as an existing carpark and boat storage area and overall visual amenity the site does not embody those characteristics and subsequent threats to VAL quality as is typified of the surrounding rural hill backdrop to Akaroa. The impact that the development of the TPS will have on the character and quality of the site as it currently sits will be discussed in detail under Section 5.

^e Page 204. BPLS – – Boffa Miskell Limitied (May 2007) Banks Peninsula Landscape Study – Final Report.


4 Existing environment

A sufficiently detailed description of the wider Akaroa Basin is provided on pages 142 and 143 of the BPLS and those specific characteristics and features of the basin that contribute most to its overall character have been listed above. Therefore an additional description of the wider landscape will not be provided here, the focus instead will be on describing the physical, perceptual and associative attributes and resulting character and quality (significance) of the WWTP and TPS sites and immediately surrounding landscape context.

4.1 Wastewater Treatment Plant

4.1.1 Physical Attributes

The site, as defined by the underlying legal boundaries includes 6260m² of steeply sloping rural land covered in pasture and with a south westerly aspect. It does not have any notable features aside from a large Poplar tree and several smaller exotic bushes located along the southwest boundary and adjacent to Old Coach Road. The southern corner of the site also clips the edge of an existing stand of native vegetation although the footprint of the proposed development will not affect this vegetation.

The elevation of the site is between 120m and 141m above sea level (asl) and has a 70m frontage directly onto Old Coach Road.

It should also be noted that a resource consent application to construct a water reservoir in the southern corner of the site, adjacent to the native vegetation, is currently being considered by Christchurch City Council. If approved the resource consent would see the construction of a 5m high x 12m diameter water reservoir (tank), which is illustrated in the drawings attached as **Appendix 1**.

For the purposes of this assessment the local landscape includes an area of the backdrop hills bound by Christchurch – Akaroa Road; the lower half of Old Coach Road; Morgans Road; and Long Bay Road between Morgans Road and Christchurch – Akaroa/ Old Coach Road intersection (see Figure 4 below). This area is characterised by:

- South westerly aspect
- Elevation above sea level
- Takamatua hill and associated prominent ridgeline
- Nearby valley and stream with regenerating native vegetation
- Combination of open pasture, densely vegetated gullies and scattered vegetation
- Widely dispersed farm houses and ancillary buildings
- Fence lines
- Utilities including power lines
- Local (metal) road network
- Nearby low density scattered residential properties containing housing, pasture and native and exotic vegetation



• A mosaic of land use patterns



Figure 4 – WWTP Local Landscape

4.1.2 Perceptual Attributes

The perceptual attributes that characterise both site and local landscape are considered in terms of legibility (geomorphic and orientation), visibility, aesthetics and coherence.⁹

- Orientation legibility how landmarks, edges and different character areas provide visual clarity
- Visibility is somewhat self-explanatory and includes public and private views

Aesthetics – includes concepts such as picturesque, beautiful and wildness and includes qualities like water, lighting contrast and view perspective

Coherence – how well do human elements and patterns reinforce the underlying natural landscape.



⁹ Geomorphic legibility – how obviously the landscape is an expression of geomorphic processes

Legibility:

One of the defining characteristics of the wider Bank Peninsula and Akaroa Basin (as a smaller subset) is that it is, on the whole a highly legible landscape in terms of its formative volcanic/ geomorphic process and the often highly visible and expressive landform, skylines and rocky outcrops. The prominence of the main (caldera) skyline and associated secondary ridgelines that run down to the coastal interface below add to the orientation legibility of the wider landscape, with the various basins, bays and settlements all exhibiting their own distinctive character and charm.

Whilst the local landscape does not contain any notable geomorphic features (e.g. outcrops) the Takamatua Ridgeline is one of the most visible and readily identifiable features of the Akaroa Basin and establishes the northern (physical and visible) edge to the local landscape. Whilst the site is not 'on' the ridgeline its proximity means that it is relatively easy to locate when viewing in the wider context and the fact that it 'sits on a pasture/ native bush edge contributes to this overall visual orientation/ legibility.

Coherence and Aesthetics:

Conversely the presence of both established and regenerating native bush, particularly in gullies and scattered across hill faces, establishes a 'messy veil' over the underlying landform which tend to detract from overall visual (landform) coherence whilst at the same time providing an additional reference point to precolonial land cover and formative processes that have led to the current Akaroa 'scene'. Overall the combination of vegetated gullies, pasture with scattered trees, nestled houses, presence of water and overall land/ sea interface and associated transient aspects like weather patterns lend themselves to an overall picturesque¹⁰ aesthetic.

Visibility and visual attributes:

Although locating the site in the wider view and local landscape is relatively easy, aside from a large Poplar tree at the western end it is devoid of any notable features and is a non-descript piece of pasture land viewed within the wider scene described above.

The site is neither readily identifiable nor visually prominent when viewed from a distance and within the wider backdrop to Akaroa. The primary reason being distance itself with the closest available views from the foreshore being from approximately 1km with (for example) views from French Bay/ Beach Road being >1.8km away and from the wider Akaroa township and those elevated residential areas to the east being screened by adjacent buildings, vegetation, landform or a combination of these factors.

¹⁰ *"roughness and sudden variation joined to irregularity of form, colour, lighting, and even sound".* Christopher Hussey: The picturesque: studies in a point of view, G.P. Putnam's Sons, London and New York 1927.





Figure 5 – View to the site from French Bay/ Akaroa Township

Observations from local roads and the dwelling located at 29 Old Coach Road (approximately 500m south and 55m below the site) suggest that views to the site are largely non-existent from within the local landscape with all dwellings being oriented south and views being across Children's Bay and the wider Akaroa Harbour. Any additional views from these dwellings are largely obscured by well-established vegetation and further reduced by the fact that the site sits significantly higher than the vast majority of existing dwellings.



Figure 6 – View up to the site from dwelling at 29 Old Coach Road

Views from roads are restricted to a 120m stretch of Old Coach Road between the intersection of Christchurch-Akaroa Road, Old French Road, Long Bay Road and Old Coach Road and the patch of existing



native bush adjacent to the south eastern end of the site as described previously. This represents approximately 8.5 seconds of travel time¹¹ for those people travelling along Old Coach Road and excludes all vehicles travelling on any of the above roads that are not stationary or slowing into Old Coach Road.



Figure 7 - View from Old Coach Road to the west and looking along the frontage of the site



Figure 8 - View from Old Coach Road to the east and looking along the frontage of the site

¹¹ Calculated using 50km/h speed limit (14m/s) for a 120m travelling distance.



4.1.3 Associative Attributes

These sorts of attributes include the cultural associations that people have with a place including aspects of history and heritage, colonisation, specific mana whenua associations such as wahi tapu sites and modern day community values.

With its widely recognised and celebrated connections to early French efforts to colonise New Zealand, Akaroa is a unique place in terms of the history of Banks Peninsula, Canterbury and New Zealand as a whole. These particular associative values are evident throughout Akaroa through the naming of roads (Rue) and natural features like French Bay.Mana whenua associations with Akaroa and the wider Banks Peninsula are also widely recognised.

The District Plan identifies a 'silent file' referenced against the site but consultation with mana whenua representatives has confirmed it is not relevant to the proposal and outside of this the site has no other known associative values worthy of consideration as part of this assessment.

4.2 Terminal Pump Station

The site is oriented towards the existing boat lock area and the harbour beyond and Oinako Creek is approximately 6m to the south with an adjacent mini golf course immediately to the east.

For the purposes of this assessment the local landscape includes:

4.2.1 Physical Attributes:

The site and local landscape are characterised by the following physical attributes:

- Large scale asphalt car parks and boat parking secured by 1.8m chain link fence, boat wash down area, boat launch ramp, scattered vehicle signage;
- Limited natural elements with scattered Ngaio (*Myoporum laetum*) trees and grass along the boulder strewn banks of the Oinako Creek immediately to the south of the site.
- Built development and recreation facilities including mini golf course, public skate park, playing fields and club rooms, fenced crochet club, play centre and adjacent picnic tables.
- Pedestrian pathway alongside river connecting the waterfront recreational zone with Rue Lavaud.

4.2.2 Perceptual Attributes:

4.2.2.1 Legibility:

In the same way as the primary and secondary ridgelines have a key role in assisting in the interpretation of the Akaroa landscape and people's orientation within it, the coastal edge is another of the key landscape legibility elements in both local and wider landscape contexts.

While the majority of the Akaroa coastal edge is characterised by either open pasture/ vegetated or fully developed (i.e. township) interface the TPS site is set back from the coastal edge within an area of reclaimed land that is now a large asphalt carpark area. In this sense the site does little to reinforce the (natural geomorphic) processes that led to its formation however in terms of way-finding/ visual legibility and it's connection with the Akaroa townscape the carpark area is a recognisable feature/ area within the local landscape.



4.2.2.2 Coherence and Aesthetics:

Despite being located at the coastal edge the formation of the carpark (as a human intervention) does not reinforce the underlying natural landscape with the carpark adding very little in terms of the aesthetic quality of the local landscape – the site is a flat, discrete and non-descript area within an asphalt carpark/ boat storage lot.

4.2.2.3 Visibility and visual attributes:

The overall visibility of the TPS site has been considered in terms of close-up and middle ground views with distant views from the wider area and Akaroa Township in particular largely non-existent and/or obscured.

Close-up views are from:

The Akaroa Boat Park to the north of Oinako Greek;



Figure 9 - View of the site from the car/ boat park area

• The large carpark to the south of the site including through traffic and people using the picnic tables located on the creek edge and adjacent to the site;





Figure 10 - View to the site from adjacent picnic table and walkway to the south.



Figure 11 – View to the site from Akaroa car park to the south.

• The adjacent recreation reserve activity centres at Jubilee Park including playing fields, club rooms and the skate park, preschool and walkway linking the carpark area with Rue Lavaud.

Middle ground views include glimpses of the site by pedestrians and vehicles driving north on Rue Lavaud and Rue Brittan and looking across the Jubilee Park. . It also includes 10-15 second views to the site through the existing Ngaio (*Myoporum laetum*) for from vehicles travelling south into Akaroa on SH75.





Figure 12 - View to the site from Rue Brittan looking to the north across Jubilee Park.

Observations of the orientation and potential views to the site from houses elevated above and to the north of the site (e.g. Tirohanga Terrace) were also made from public roads. In these cases it is likely that occupants will have views down to the site, however the extent of these views will vary and the majority of views are out across Childern's Bay and the wider Akaroa coastal setting. Where views to the site do exist they will be characterised by relatively 'busy' foreground views of roads, established vegetation, buildings, carpark and boat storage areas and recreational facilities with views of the open water beyond. The site is neither readily identifiable nor visually prominent when viewed from these locations.

4.2.2.4 Associative attributes:

Aside from the general associations with the wider Akaroa area described under 4.1.3 above the site has no known cultural values attached to it. The district plan identifies a 'silent file' located in proximity to the north-western edge of the existing carpark but is not considered relevant to the TPS site itself. Given the carpark consists of reclaimed land (circa 1930) it is unlikely to be of great significance to the local community outside of its existing value as boat storage facility and its role in reaffirming people's connection with the sea.

4.3 Landscape character and amenity

4.3.1 Wider landscape

In addition to the descriptive material above the following excerpt from the BPLS provides a useful description of the character of the wider Akaroa landscape (i.e. Character Area 18):

"... the key sensitivities and values associated with the Akaroa landscape include the relationship of the semi-urban settlement with the landscape it is situated in, its notable historic Maori and European connections and its popularity as a tourist recreation-based destination.

The number of visitor attractions and recreation opportunities in the area also contribute to the high level of amenity-related values.



Landscape values such as natural science and expressiveness are also present in this area. The distinctive outcrops of the Akaroa volcanics clearly punctuate the ridgeline high above the township, and while they are not identified as significant landforms, they are important local features.

Similarly, while the values of the QEII covenanted areas of bush have been recognised and protected, the overall vegetation pattern and the way fingers of bush extend down the gullies from the crater rim to the township and balance with clean grazed spurs, is also an important characteristic of this landscape.

There are also considerable cultural and heritage values attached to the presence of the Onuku Marae at the Kaik as well as the well-known French connections still legible in this landscape..."

Overall it is considered that the wider landscape has predominantly a rural 'mixed use' character with a high degree of naturalness with rural character underpinned by a dominance of pastoral land use and overall sense of openness overlaid by a network of scattered buildings, utilities and vegetation.

The high degree of naturalness is based on the combination of:

- Visual connection with the coastal environment;
- Landform legibility;
- The small scale land use patterns are in fact a fine grained mosaic of different uses draped over the landscape rather than working in discordance with the landscape patterns;
- Absence of large scale development;
- The presence of natural drainage patterns; and
- Dominant ridgelines.

4.3.2 Waste Water Treatment Plant

The WWTP site sits above Akaroa located between regenerating native vegetation and open pasture which reflects the character described above and in a visual sense the site contributes to the existing land use matrix including a collection of scattered buildings nestled amongst vegetation and open pasture all viewed as part of the wider scene.

The fact that the site consist of open, sloping pasture land located on the margin of regenerating bush below means that it does possess a degree of visibility and in combination with its close proximity to the main Takamatua Rdigeline there is potential for development to generate a degree of visual prominence, detract from the character described above and have a negative impact of the overall visual amenity of the local landscape.

However, the potential for this to occur needs to be considered in the context of the existing rural character and the presence of adjacent elements such as Old Coach Road, power lines and fence lines.

4.3.3 Terminal Pump Station

Unlike the WWTP site the TPS site does not accurately reflect the character described above as it relates to the wider Akaroa landscape. The character of the TPS site is best described as 'utilitarian' with aspects of peri-urban, coastal and recreational character combining to form a moderate to low degree of amenity. By way of further explanation utilitarian character is described in this context as being a car and boat dominated environment enclosed by utilitarian fencing and cluttered with vehicle signage and boat trailers. The site and its surrounds consist of simple buildings, scattered vegetation, signage, furniture, fencing and dominance of



asphalt. The landscape is visually 'busy' consisting of many different elements and the overall quality of this area is low in terms landscape character.

In terms of amenity it is important to consider the physical relationship between the adjacent coastline used for recreation and tourism and the adjacent recreational facilities. These facilities provide an important amenity value for local residents and tourists alike and the relationship of the site with these attributes raises the level of amenity of the site by association.



5 Assessment of Effects

5.1 Terms of Reference

The key landscape and visual effects of the proposed WWTP and TPS developments include:

5.1.1 Rural character

The impact that future development of the WWTP will have on existing rural character described above largely relates to the overall balance between built (i.e. structures and human modification) and non-built (i.e. natural) elements and how they are perceived within the current setting. The factors that contribute to effects on rural character (in general) include:

- Whether the proposal is consistent with existing land uses (i.e. is it 'foreign' or widespread);
- Whether the proposal includes modification to the existing landform and any significant features in particular;
- Whether the site is unique in the local rural context and whether development is consistent with these unique qualities;
- Whether the proposal is consistent with existing rural distribution patterns;
- Whether the proposal is located in an area that is already subject to modification; and
- Whether the proposal will have an effect on bio physical attributes such as vegetation and water ways.

5.1.2 Utilitarian character

Given the higher degree of modification and resulting utilitarian character of the TPS site and surrounding carpark area their ability to absorb (built) development is generally higher than is the case in the rural or unmodified coastal environment where the introduction of the building of the nature proposed would establish a stark and highly contrasting feature in the landscape.

The key criteria in considered effects of the existing character of the site and immediate surrounds include:

- Whether the proposal is consistent with existing land uses (i.e. is it 'foreign' or widespread);
- Whether the proposal is of a scale and location that does not compromise associated recreational and coastal natural character;
- Whether the proposal will have an effect on bio physical attributes such as coastal processes and water ways.
- Whether the development compromises the current function (i.e. carpark and boat storage) of the site and immediate surrounds

5.1.3 Visual Amenity

Relates to the impact that the proposed WWTP and TPS may have on the existing visual qualities of the local landscape and whether they will detract from existing visual amenity. The factors that (generally) contribute to effects on visual amenity include:



- The nature and sensitivity of the viewing location (e.g. static or moving; orientation of view; public or private location);
- The nature and sensitivity of the viewing audience (e.g. tourists, locals, 'boatees' etc)
- Overall bulk and scale of the Proposal;
- The nature and duration of construction works;
- Operational requirements (i.e. 24/7)
- Distance of the proposal from key view points;
- The complexity of the view and extent of intervening elements (e.g. topography, structure and vegetation);
- The nature of the existing view (e.g. heavily modified vs 'natural'; fixed or moving structures); and
- Transient values such as seasonal variation and weather patterns.

The degree of effect on both rural, utilitarian character and visual amenity have been considered using a five point scale including very low; low; moderate; high and very high. By way of explanation:

- Effects that are **very low and low** are considered acceptable on their own and cumulatively and do not require additional mitigation;
- Effects that are **moderate** are discernible, without being significant on their own. There is the potential for cumulative effects to be more significant but they can generally be mitigated to an appropriate level;
- Effects that are high are significant on their own and are likely to increase in a cumulative sense. In general, a high degree of effect is likely to represent an inappropriate development¹² however, there is potential for additional mitigation to reduce effects to a lower degree; and
- Effects that are **very high** are also significant and additional mitigation is unlikely to reduce the degree of effect to any discernible degree.

5.2 Waste Water Treatment Plant Assessment

5.2.1 Effects on Rural Character

Although the site is not unique or of a particularly high quality either on its own or in the context of the wider rural land resource, the level of earthworks required to provide a suitable building platform for the WWTP does represent a significant change to the existing landform resulting in adverse effects on the existing rural character of the site. Additionally, it is clear that the WWTP will result in a fundamental change to the character of the site from open, undeveloped rural pasture to a fully developed and functioning treatment plant and in this sense the utilitarian character of the WWTP is inconsistent with the nature of development in the wider rural landscape.

¹² In a landscape and visual sense alone and not taking into account the 'balance' required under the broader RMA decision making process.



However these factors need to be balanced against the fact that:

- a) the site itself is not recognised as being of particular value in terms of the wider rural resource;
- b) the introduction of the WWTP will not result in a noticeable shift in the existing balance between built/ natural landscape characteristics;
- c) the scale and location of the WWTP is consistent with the existing rural character and in terms of the prevalence and distribution of development across the backdrop hill slopes; and
- d) the WWTP will not result in any changes to existing vegetation distribution patterns or notable geomorphic features in the wider setting.

So, while the proposed WWTP does represent a significant and fundamental change to the character of the site itself it is considered that the local and wider landscape contexts have the capacity to absorb future development without compromising landscape character to any discernible degree. Of particular importance in making this judgement is the relationship between the WWTP and the identified prominent Takamatua Ridgeline above and immediately to the north of the site. **(see Appendix 2 and 3)**

As illustrated in Appendix 2 and 3 the ridgeline¹³ is some 20m from the closest corner of the WWTP when measured in plan view and given this separation the proposal will not compromise the physical integrity of the ridgeline despite the level of excavation that will be undertaken.

Overall adverse effects on both local and wider rural landscape character will be very low.

5.2.2 Effects on Visual Amenity

There are three key viewing audiences that need to be considered in assessing the visual effects of the WWTP:

5.2.2.1 Vehicles travelling on Old Coach Road:

As described previously in Section 4.2.2.3 the length of Old Coach Road that will afford views of the proposed WWTP is in the order of 120m from the junction to the west to the stand of native bush immediately to the east of the site.

In terms of viewer experience, those vehicles travelling along Old Coach Road towards Akaroa Township will pass through the junction and immediately have a view to the site with the full extent of the WWTP's frontage being visible for a period of approximately 8.5 seconds. While the natural orientation of views from this upper section of Old Coach Road are out over the Akaroa harbour the close proximity of the WWTP site to the road means that the plant will be clearly visible and its structure and composition will be readily identifiable i.e. people will be able to see that it's a treatment plant that is utilitarian in nature.

For the first two months the site will consist of an open excavation whilst site establishment process is being carried out and in this sense it will represent a stark, exposed cut into what is currently an unmodified hill slope. For the remaining 16 months of civil works the site will be in a constant stage of change with the establishment of a suitable building platform making way for retaining structures and the subsequent construction of buildings, balance tanks and smaller scale structures. Over the following three months of

¹³ Taken as the 'apex' of the ridge as mapped in the District Plan Maps.



completion works the site will begin to resemble its final form and passers-by will be able to gain an appreciation for the full scale of the Plant.

Of the (general) factors that contribute to adverse visual effects the proximity of the site to passers-by; the small size of the visual catchment and the Plants sudden appearance in the view; the overall scale of the Plant; and the fact that it will contrast with the immediately surrounding undeveloped rural land are key in this case. Adverse visual effects will be of a high degree.

5.2.2.2 Local Residents:

The closest house to the WWTP site is located at 29 Old Coach Road and is approximately 450m to the south and well below the site. Views from the house are primarily oriented to the south across Children's Bay and to the distant backdrop hills. While the living areas (i.e. kitchen, dining and lounge rooms) are at the southern end of the house there are also secondary views up to the WWTP from the bedrooms at the northern end of the house and also from the deck that runs the full length of the western side of the house. These views are characterised by the photo in Figure 13 below and due to distance, elevation and intervening vegetation visual effects will be very low and will become negligible overtime as the proposed mitigation planting matures. No other dwellings were considered as part of this assessment due to mitigating factors such as distance, orientation of view and intervening landform and vegetation.



Figure 13 – Photo taken from deck of dwelling at 29 Old Coach Road looking towards the site.

5.2.2.3 People looking towards the backdrop hills from Akaroa Township and the coastal edge:

Section 4.2.2.3 makes the observation that the site is neither readily identifiable nor visually prominent when viewed from a distance and within the wider backdrop to Akaroa. With the closest available views from the foreshore being from approximately >1km away and those views from the wider Akaroa township and elevated residential areas to the east largely screened by adjacent buildings, vegetation, landform or a combination of these factors.

The primary mitigating factor in terms of these more distant views is distance itself and when combined with the existing mosaic of landform features, vegetation and scattering of built development (primarily houses)



across the back drop hills the capacity of the current scene to absorb development of the scale and location of the WWTP is high. The development will not compromise those VAL characteristics that were identified in the BPLS and highlighted previously in Section 4.3.1. Even in an 'unmitigated state' the proposed WWTP will not be barely discernible from a distance, it will not be visually prominent and nore will it compromise the physical and visual integrity of the important Takamatua Ridgeline, which provides the skyline to the backdrop hills. Adverse visual effects will be low.

5.3 Terminal Pump Station Assessment

5.3.1 Effects on Utilitarian Character

Given the TPS is utilitarian itself its introduction to the landward edge of the existing carpark area will not fundamentally alter the character of the local landscape. Granted the TPS will introduce a new built element into the local setting but given the relatively low (landscape) quality of the site and immediate surrounds they are not considered to be particularly sensitive to change and have the capacity to absorb the proposed TPS with a low degree of effect on existing utilitarian character. In addition and given the setback of the TPS from the coastal edge any effects on coastal natural character values will be negligible.

5.3.2 Effects on Visual Amenity

There are three key viewing audiences that need to be considered in assessing the visual effects of the TPS:

5.3.2.1 Local Residents:

Where views to the site do exist from those dwellings to the north of the site the TPS will appear low in a relatively cluttered foreground view characterised by roads, established vegetation, buildings, carpark and boat storage areas. While the TPS may be visible from these dwellings it will not be visually prominent and given the existing complexity and capacity of the view to absorb change any resulting visual effects will be of a low degree.

5.3.2.2 Vehicles travelling on local roads and SH75:

On approach into Akaroa on SH75 people will have obscured views through the existing Ngaio trees, between the road and coastal edge, through to the TPS. These views are from an approximately 150m long stretch of the carriageway which represents an approximately 9-10 second travel time. Given that views are already largely screened/ obscured, vehicles are travelling at 50km/hr and the orientation of view is along the carriageway the overall visibility of the TPS will be low and any associated visual effects will be of a very low degree. Similarly, views from both Rue Lavaud and Rue Brittan are between 150 – 200m from the site and a relatively complex with intervening vegetation screening/ obscuring future views of the TPS building. Therefore visual effects will be of a low degree.

5.3.2.3 People using the carparks, boat facilities and other areas adjacent to the site:

For those people using the Akaroa Boat Park the TPS will be set against the backdrop of the fencing that surrounds the mini golf and tennis facilities to immediately to the east. People will be in close proximity to the TPS when viewing from this area and building will be visible in its entirety with the upper half projecting above the existing fence/ building/ vegetation backdrop. There will be variable sensitivity to the TPS in this location due to the variety of people that move through this area (e.g. locals, tourists and 'boatees') and given the building will be 'hard to miss' it is likely that adverse visual effects will result.

The primary mitigating factors in this case include the already low quality of the existing scene, being a highly modified, working boat storage and parking area and the fact that the TPS has been pushed back from the



coastal edge into a 'step' in the property boundary. For these reasons visual effects are considered moderate – low for people using and passing through this area.

For those people using the large carpark and skate park to the south of the site the upper 1/3 (approximately) of the TPS will be visible above existing vegetation and intervening structures like the Skate Park and clubrooms/ community pavilion. The height of the building is the primary contributing factor in this context, however in terms of adverse visual effects this needs to be considered alongside the following mitigating factors:

- a) Primary views are away from the TPS site out across Childrens Bay;
- b) The presence of other buildings in the view is widespread with the Skate Park and clubrooms/ community pavilion in the foreground and residential development scattered across the backdrop hills beyond. The presence of the expansive asphalt carpark reinforces the level of modification in this view;
- c) As a counterpoint, but equally valuable in terms of mitigation, is the prevalence of vegetation in the view with well-established trees in the middle ground view set against the proliferation of vegetation across the backdrop hills beyond.

This combination of built and natural elements results in a relatively complex scene which has the capacity to absorb the proposed TPS without the existing visual quality being significantly altered. Visual effects will be moderate – low in this context.

As is illustrated previously in Figure 10 the closest views of the TPS from the south will be from the public walkway, picnic tables and Skate Park all located 20-30m away and adjacent to Oinaku Creek. There are some well-established Ngaio Trees between the site and the stream that will provide partial screening of the TPS however people will still be able to clearly see the build through and over this vegetation and given its proximity to the viewer the TPS will project above the backdrop hills and skyline beyond. The sensitivity of this audience is considered slightly higher than those using and passing through the wider boat park/ car park areas to the north and south due to proximity to the site and their recreational activity. Although the quality of the existing scene is not considered to be high there is the potential for the TPS to be visually prominent and visual effects will be moderate – high for that reason.

5.4 Cumulative Effects

There are no significant cumulative effects associated with the introduction of the WWTP and TPS into the Akaroa landscape. The developments are a significant distance from one another and given their locations are in two distinctly different character areas it is unlikely that people will perceive any level of physical or visual connection between the two.

In addition, there will be no notable cumulative effects resulting from the proximity of the proposed WWTP to the recently consented water reservoir, both located adjacent to Old Coach Road. In general terms the overall physical presence and 'effect profile' of the reservoir is very small and will effectively be assimilated (over shadowed) by the effects of the WWTP as assessed above. Adding to this conclusion further is the fact that mitigation planting for both developments has been developed in relation to one another. For example the landscape planting plan prepared for the water reservoir included planting underneath the power lines opposite and for the full length of the WWTP which will assist in screening the Plant from distant views and assimilating it into the existing vegetation framework. Similarly, the planting that is being proposed on the area of hill side above the WWTP will also serve to bed the water reservoir down into the landform.



5.5 Proposed Mitigation

The design and appearance of the WWTP and TPS have been considered as part of the Preliminary Design Report preparation and development and a commitment has been made to adhere to the SCIRT Pump Station Design Guide as the primary mitigation measure for the development of both facilities.

In terms of the WWTP it is proposed that:

"...the higher structures are sited further down the hill so as to reduce their visual impact. In addition, smaller elements such as tanks, should be clustered together where possible, set back from the main frontages and screened.

...concrete will be patterned or stained, and a secondary material (such as timber or corten steel) will be added to introduce design feature elements and reduce the industrial appearance and reflectivity of the concrete finish. The detailing on the concrete panels is intended to respond to the context as well as to help deter graffiti."

In terms of the **TPS** it is proposed that:

"The form of the building will follow the 'residential context' design guidance and include high level glazing, hipped roof and deep overhanging eaves. The concrete will be patterned or stained and a secondary material (such as timber) will be added to introduce design feature elements and reduce the industrial appearance and reflectivity of the concrete finish. The detailing on the concrete panels is intended to respond to the context as well as to help deter graffiti."

Landscaping is also being proposed for both WWTP and TPS sites as illustrated in the landscape concept plans attached as **Appendix 3** to this assessment.

The purpose of the landscaping around the WWTP is to (in the first instance) provide native shrub and tree planting along the front of the site to screen/ obscure the Plant when viewed from vehicles travelling along Old Coach Road. It is anticipated that this planting will take approximately five years to establish and in the order of 10 years to reach a stage where the vast majority of the Plant will be screen from the road.

Additional planting is proposed above the WWTP as a way of adding to the overall quality of the site and local landscape vegetation patterns as well as serving to further 'bed' the WWTP into the landscape when viewed from more distant locations. The mitigation planting that was proposed as part of the recently consented water reservoir (confirm decision number) will also assist in screening/ bedding the Plant into the existing rural setting.

The purpose of the landscaping around the TPS is to increase the visual quality of the TPS in addition to the architectural measures that are proposed. The proposed planting seeks to increase the extent and density of existing vegetation surrounding the site in an effort to not only screen/ obscure/ soften the appearance of the TPS building and stand-alone generator but to also promote the balance between built and natural elements that is characteristic of the wider Akaroa landscape.

5.6 Post-mitigation summary of effects

5.6.1 WWTP

The WWTP development represents a fundamental change in character of the *existing site* and for this reason adverse effects will be significant in degree. Whilst the proposed mitigation planting will provide some benefits/ positive effects in relation to the wider vegetative framework it will do little to change the fact that the character of the site will change from rural to utilitarian. As discussed in Section 5.2.3 above the



introduction of the WWTP to the site will not result in any notable adverse effects on the character of the wider Akaroa landscape and in that context additional mitigation is not required.

Adverse visual effects on users of Old Coach Road have been assessed as being of a high degree due to the proximity of the site to passers-by; the small size of the visual catchment and the Plant's sudden appearance in the view; the overall scale of the Plant; and the fact that it will contrast with the immediately surrounding undeveloped rural land are key in this case. The proposed planting along the front of the WWTP site, between Old Coach Road and the WWTP access road, will assist in screening/ obscuring the Plant over time when viewed from the road. It is anticipated the planting will begin to effectively screen the Plant after reaching a height of 2-3m over a period of five years and increasing to 4-7m over a 10 years. Given these timeframes it is likely that visual effects will remain 'high' over the short term and decreasing to a moderate – low degree over subsequent years.

Although visual effects on the viewing audience has been assessed as being of a low degree the proposed planting will assist in reducing this further over time with vegetation screening/ shrouding the development and building on the existing vegetation framework over time.

5.6.2 TPS

As described above the purpose of the landscaping around the TPS is to increase the visual quality of the building in addition to the architectural measures that are proposed; to screen/ obscure/ soften the appearance of the TPS building and stand-alone generator; and promote the balance between built and natural elements that is characteristic of the wider Akaroa landscape.

After a period of five years it is anticipated that the proposed landscaping will be approximately 2-3m high (max), will screen the majority of the lower half of the TPS building and help to bed it down in the view. Overtime the planting will mature to heights up to 7-10m and will screen significant portions of the TPS from those key viewing locations described above and as a result visual effects will reduce from a moderate – low to low degree. It is likely that glimpses of the upper most parts of the TPS will be visible to some degree throughout the life of the TPS, however for the reasons discussed in Section 5.3.2.3 above resulting effects will not be significant.



6 Conclusion

This assessment has considered the proposal to construct and operate a new Waste Water Treatment Plant (WWTP) and Terminal Pump Station (TPS) in Akaroa, Banks Peninsula.

The WWTP site consists of open rural land that slopes down to Old Coach Road and is located high on the hills that provide the backdrop to the Akaroa Basin and in close proximity to the 'important' Takamatua Ridgeline.

The effects of the WWTP on rural character of the site itself has been assessed as significant given that the development represents a fundamental shift in character from rural to utilitarian. The effects of the development on the character of the local and wider landscape will be of a low degree owing to expanse and complexity of the existing viewing catchment and the small scale of the WWTP when considered in that context. The proposal will maintain the existing pattern of small scale and low density of built development in this wider context and in accordance with Policy 1A and 3C of the District Plan Rural Zone or Policy 1F of the Utilities Chapter.

The primary visual effects associated with the WWTP development relate to vehicles travelling past the site on Old Coach Road, which are of a 'high' degree over the short term and decreasing to a moderate – low degree over subsequent years once the proposed landscape has had an opportunity to establish and mature. Visual effects on the wider viewing audience will be low due to distance and the expanse and complexity of the scene. The WWTP is not located on the important/ prominent Takamatua Ridgeline and nor will it project above the skyline of the ridge when viewed from the wider landscape and is not contrary to Policy 1A and 3D of the District Plan Rural Zone or Policies 1A and 1E of the Utilities Chapter.

The character of the TPS site is best described as 'utilitarian' with aspects of peri-urban, coastal and recreational character combining to form a moderate to low degree of amenity. It is a car dominated environment enclosed by utilitarian fencing and cluttered with vehicle signage and boat trailers. The site and its surrounds consist of simple buildings, scattered vegetation, signage, furniture, fencing and dominance of asphalt.

Even though the TPS will introduce a new built element into the local setting resulting adverse effects on utilitarian character will be low as a result of the relatively low (landscape) quality of the site and immediate surrounds and resulting low sensitivity to change and subsequently high capacity to absorb the proposed TPS. Effects on coastal natural character values have been assessed as negligible. For these reasons the proposed TPS is consistent with Policies 1A, 1B, 2A and 2B of the District Plan Recreational Zone and Policies 1A and 1E of the Utilities Chapter.

It is anticipated that visual effects from areas surrounding the TPS site will be of a moderate – low degree in the short term and whilst the proposed mitigation planting becomes established and the majority of the lower half of the TPS building becomes screened and the TPS is bedded down in the view. In the medium to long term the proposed planting will mature to heights up to 7-10m and will screen significant portions of the TPS from those key viewing locations described above and as a result visual effects will be of a low degree. It is likely that glimpses of the upper most parts of the TPS will be visible to some degree throughout the life of the TPS although resulting visual effects will not be significant.

In addition to effects on visual amenity it is possible that the TPS could cast some shadow onto the mini gold course located to the east of the site, particularly in the winter when the afternoon sun is low in the sky. The extent of these shadows will be limited to the western end of the mini golf course and is unlikely to adversely affect the existing experiential quality of the site to any great degree. For the reasons above the proposed TPS is consistent with Policies 3A and 3B of the District Plan Recreational Zone.



Whilst the proposed WWTP and TPS will result in short term adverse effects on rural character and visual amenity ranging from high to low in degree. In general, the respective sites, adjacent land and wider landscape have the capacity to absorb the proposed developments and overtime the overall effect profile of both developments will reduce once the proposed mitigation measures have been implemented and landscaping becomes established and matures over time. For these reasons the development of the proposed WWTP and TPS facilities are considered appropriate in landscape and visual terms.





AKAROA WASTEWATER SCHEME UPGRADING - RESOURCE CONSENTS LANDSCAPE AND VISUAL ASSESSMENT - APPENDICES

Prepared for Chrsitchurch City Council by CH2M Beca Limited June 2014





Revision History

Revision No.	Prepared By	Description	Date
А	Anne Braithwaite	Draft	June 2014
В	Anne Braithwaite	Final	June 2014

Document Acceptance

Action	Name	Signed	Date
Prepared by	Anne Braithwaite	Albraithwaite	June 2014
Reviewed by	Wade Robertson	Mille.	June 2014
Approved by	Garry MacDonald		June 2014
on behalf of Beca Ltd.			

This document should be printed at A3.

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APPENDIX 1 - RESERVOIR RESOURCE CONSENT APPLICATION - LANDSCAPE PLAN



AKAROA WASTEWATER SCHEME UPGRADING - RESOURCE CONSENTS LANDSCAPE AND VISUAL ASSESSMENT - APPENDICES DRAWN: AB **REVIEWED: WR**

BECA REF: 6517986-L-201

DRAWING ISSUE: B FINAL JUNE 2014



APPENDIX 2 - PRELIMINARY DESIGN REPORT - RELEVANT DRAWINGS (UPDATED)



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APPENDIX 3 - LANDSCAPE MITIGATION



AKAROA WASTEWATER SCHEME UPGRADING - RESOURCE CONSENTS LANDSCAPE AND VISUAL ASSESSMENT - APPENDICES

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KEY



Area covered under the separate Water Reservoir Consent Application

1m wide strip for bio-filter \bullet \bullet \bullet

Retaining wall



Property boundary



Tree species: Hoheria populnea

Tree species, mix of:

- Kunzea ericoides
- Podocarpus totara

Mixed native vegetation. Suggested species mix: • Coprosma rotundifolia

- Cordyline australis
- Corokia cotoneaster
- Hebe salicifolia
- Melicytus ramiflorus
- Phormium cookianum •
- Pittosporum eugenioides ٠
- Pittosporum tenuifolium ٠
- Poa cita •
- Pseudopanax crassifolius ٠
- Sophora prostrata •

Note: all plants to be eco-sourced



LANDSCAPE PLAN Scale 1:500 @ A3

> AKAROA WASTEWATER SCHEME UPGRADING - RESOURCE CONSENTS LANDSCAPE AND VISUAL ASSESSMENT - APPENDICES WASTE WATER TREATMENT PLANT LANDSCAPE

DRAWN: AB REVIEWED: WR BECA REF: 6517986-L-201

Christchurch City Council

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SECTION A Scale 1:200 @ A3



Scale 1:200 @ A3



AKAROA WASTEWATER SCHEME UPGRADING - RESOURCE CONSENTS LANDSCAPE AND VISUAL ASSESSMENT - APPENDICES WASTE WATER TREATMENT PLANT LANDSCAPE

KEY

Area covered under the separate Water **Reservoir Consent** Application

	136m	
	134m	
0.995	132m	
	130m	
	128m	SL)
	126m	A)
	124m	
	122m	
	120m	

KEY



Existing Ngaio trees to be retained. (Myoporum laetum)



Proposed Tree species: Myoporum laetum.

Mixed native vegetation. Suggested species mix:

- Apodasmia similis (lower banks of stream)
- Coprosma rotundifolia
- Cordyline australis •
- Corokia cotoneaster
- Dianella nigra •
- Hebe salicifolia •
- Libertia ixioides
- Myrsine australis
- Phormium cookianum •
- Pittosporum tenuifolium
- Poa cita •
- Pseudopanax crassifolius ٠
- Sophora prostrata

Note: all plants to be eco-sourced

BIOFILTER TERMINAL PUMP STATION SECTION C

LANDSCAPE PLAN Scale 1:500 @ A3

> AKAROA WASTEWATER SCHEME UPGRADING - RESOURCE CONSENTS LANDSCAPE AND VISUAL ASSESSMENT - APPENDICES **TERMINAL PUMP STATION LANDSCAPE**

Christchurch City Council







DRAWING ISSUE: B FINAL JUNE 2014



SECTION C Scale 1:200 @ A3



AKAROA WASTEWATER SCHEME UPGRADING - RESOURCE CONSENTS LANDSCAPE AND VISUAL ASSESSMENT - APPENDICES **TERMINAL PUMP STATION LANDSCAPE**

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Appendix N

Objectives and Policies

New Zealand Coastal Policy Objectives and Policies

Objective 1

To safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land, by:

- maintaining or enhancing natural biological and physical processes in the coastal environment and recognising their dynamic, complex and interdependent nature;
- protecting representative or significant natural ecosystems and sites of biological importance and maintaining the diversity of New Zealand's indigenous coastal flora and fauna; and
- maintaining coastal water quality, and enhancing it where it has deteriorated from what would otherwise be its natural condition, with significant adverse effects on ecology and habitat, because of discharges associated with human activity.

Policy 1: Extent and characteristics of the coastal environment

- 1. Recognise that the extent and characteristics of the coastal environment vary from region to region and locality to locality; and the issues that arise may have different effects in different localities.
- 2. Recognise that the coastal environment includes:
 - a. the coastal marine area;
 - b. islands within the coastal marine area;
 - c. areas where coastal processes, influences or qualities are significant, including coastal lakes, lagoons, tidal estuaries, saltmarshes, coastal wetlands, and the margins of these;
 - d. areas at risk from coastal hazards;
 - e. coastal vegetation and the habitat of indigenous coastal species including migratory birds;
 - f. elements and features that contribute to the natural character, landscape, visual qualities or amenity values;
 - g. items of cultural and historic heritage in the coastal marine area or on the coast;
 - h. inter-related coastal marine and terrestrial systems, including the intertidal zone; and
 - i. physical resources and built facilities, including infrastructure, that have modified the coastal environment.

Policy 2: The Treaty of Waitangi, Tangata Whenua and Māori

In taking account of the principles of the Treaty of Waitangi (Te Tiriti o Waitangi), and kaitiakitanga, in relation to the coastal environment:

- a. recognise that tangata whenua have traditional and continuing cultural relationships with areas of the coastal environment, including places where they have lived and fished for generations;
- b. involve iwi authorities or hapū on behalf of tangata whenua in the preparation of regional policy statements, and plans, by undertaking effective consultation with tangata whenua; with such consultation to be early, meaningful, and as far as practicable in accordance with tikanga Māori;


- c. with the consent of tangata whenua and as far as practicable in accordance with tikanga Māori, incorporate mātauranga Māori1 in regional policy statements, in plans, and in the consideration of applications for resource consents, notices of requirement for designation and private plan changes;
- d. provide opportunities in appropriate circumstances for Māori involvement in decision making, for example when a consent application or notice of requirement is dealing with cultural localities or issues of cultural significance, and Māori experts, including pūkenga2, may have knowledge not otherwise available;
- e. take into account any relevant iwi resource management plan and any other relevant planning document recognised by the appropriate iwi authority or hapū and lodged with the council, to the extent that its content has a bearing on resource management issues in the region or district; and
 - i. where appropriate incorporate references to, or material from, iwi resource management plans in regional policy statements and in plans; and
 - ii. consider providing practical assistance to iwi or hapū who have indicated a wish to develop iwi resource management plans;
- f. provide for opportunities for tangata whenua to exercise kaitiakitanga over waters, forests, lands, and fisheries in the coastal environment through such measures as:
 - i. bringing cultural understanding to monitoring of natural resources;
 - ii. providing appropriate methods for the management, maintenance and protection of the taonga of tangata whenua;
 - iii. having regard to regulations, rules or bylaws relating to ensuring sustainability of fisheries resources such as taiāpure, mahinga mātaitai or other non commercial Māori customary fishing;
- g. in consultation and collaboration with tangata whenua, working as far as practicable in accordance with tikanga Māori, and recognising that tangata whenua have the right to choose not to identify places or values of historic, cultural or spiritual significance or special value:
 - i. recognise the importance of Māori cultural and heritage values through such methods as historic heritage, landscape and cultural impact assessments; and
 - ii. provide for the identification, assessment, protection and management of areas or sites of significance or special value to Māori, including by historic analysis and archaeological survey and the development of methods such as alert layers and predictive methodologies for identifying areas of high potential for undiscovered Māori heritage, for example coastal pā or fishing villages

Policy 6: Activities in the Coastal Environment

- 1. In relation to the coastal environment:
 - a. recognise that the provision of infrastructure, the supply and transport of energy including the generation and transmission of electricity, and the extraction of minerals are activities important to the social, economic and cultural well-being of people and communities;



- consider the rate at which built development and the associated public infrastructure should be enabled to provide for the reasonably foreseeable needs of population growth without compromising the other values of the coastal environment;
- encourage the consolidation of existing coastal settlements and urban areas where this will contribute to the avoidance or mitigation of sprawling or sporadic patterns of settlement and urban growth;
- d. recognise tangata whenua needs for papakāinga3, marae and associated developments and make appropriate provision for them;
- e. consider where and how built development on land should be controlled so that it does not compromise activities of national or regional importance that have a functional need to locate and operate in the coastal marine area;
- f. consider where development that maintains the character of the existing built environment should be encouraged, and where development resulting in a change in character would be acceptable;
- g. take into account the potential of renewable resources in the coastal environment, such as energy from wind, waves, currents and tides, to meet the reasonably foreseeable needs of future generations;
- h. consider how adverse visual impacts of development can be avoided in areas sensitive to such effects, such as headlands and prominent ridgelines, and as far as practicable and reasonable apply controls or conditions to avoid those effects;
- i. set back development from the coastal marine area and other water bodies, where practicable and reasonable, to protect the natural character, open space, public access and amenity values of the coastal environment; and
- j. where appropriate, buffer areas and sites of significant indigenous biological diversity, or historic heritage value.
- 2. Additionally, in relation to the coastal marine area:
 - a. recognise potential contributions to the social, economic and cultural wellbeing of people and communities from use and development of the coastal marine area, including the potential for renewable marine energy to contribute to meeting the energy needs of future generations;
 - b. recognise the need to maintain and enhance the public open space and recreation qualities and values of the coastal marine area;
 - c. recognise that there are activities that have a functional need to be located in the coastal marine area, and provide for those activities in appropriate places;
 - d. recognise that activities that do not have a functional need for location in the coastal marine area generally should not be located there; and
 - e. promote the efficient use of occupied space, including by:
 - i. requiring that structures be made available for public or multiple use wherever reasonable and practicable;



- ii. requiring the removal of any abandoned or redundant structure that has no heritage, amenity or reuse value; and
- iii. considering whether consent conditions should be applied to ensure that space occupied for an activity is used for that purpose effectively and without unreasonable delay.

Policy 18: Public Open Space

Recognise the need for public open space within and adjacent to the coastal marine area, for public use and appreciation including active and passive recreation, and provide for such public open space, including by:

- a. ensuring that the location and treatment of public open space is compatible with the natural character, natural features and landscapes, and amenity values of the coastal environment;
- b. taking account of future need for public open space within and adjacent to the coastal marine area, including in and close to cities, towns and other settlements;
- c. maintaining and enhancing walking access linkages between public open space areas in the coastal environment;
- d. considering the likely impact of coastal processes and climate change so as not to compromise the ability of future generations to have access to public open space; and
- e. recognising the important role that esplanade reserves and strips can have in contributing to meeting public open space needs.

Policy 21: Enhancement of Water Quality

Where the quality of water in the coastal environment has deteriorated so that it is having a significant adverse effect on ecosystems, natural habitats, or water-based recreational activities, or is restricting existing uses, such as aquaculture, shellfish gathering, and cultural activities, give priority to improving that quality by:

- a. identifying such areas of coastal water and water bodies and including them in plans;
- b. including provisions in plans to address improving water quality in the areas identified above;
- c. where practicable, restoring water quality to at least a state that can support such activities and ecosystems and natural habitats;
- d. requiring that stock are excluded from the coastal marine area, adjoining intertidal areas and other water bodies and riparian margins in the coastal environment, within a prescribed time frame; and
- e. engaging with tangata whenua to identify areas of coastal waters where they have particular interest, for example in cultural sites, wāhi tapu, other taonga, and values such as mauri, and remedying, or, where remediation is not practicable, mitigating adverse effects on these areas and values.

Policy 23: Discharge of Contaminants

- 1. In managing discharges to water in the coastal environment, have particular regard to:
 - a. the sensitivity of the receiving environment;
 - b. the nature of the contaminants to be discharged, the particular concentration of contaminants needed to achieve the required water quality in the receiving environment, and the risks if that concentration of contaminants is exceeded; and



- c. the capacity of the receiving environment to assimilate the contaminants; and:
- d. avoid significant adverse effects on ecosystems and habitats after reasonable mixing;
- e. use the smallest mixing zone necessary to achieve the required water quality in the receiving environment; and
- f. minimise adverse effects on the life-supporting capacity of water within a mixing zone.
- 2. In managing discharge of human sewage, do not allow:
 - a. discharge of human sewage directly to water in the coastal environment without treatment; and
 - b. the discharge of treated human sewage to water in the coastal environment, unless:
 - i. there has been adequate consideration of alternative methods, sites and routes for undertaking the discharge; and
 - ii. informed by an understanding of tangata whenua values and the effects on them.
- Objectives, policies and rules in plans which provide for the discharge of treated human sewage into waters of the coastal environment must have been subject to early and meaningful consultation with tangata whenua.
- 4. In managing discharges of stormwater take steps to avoid adverse effects of stormwater discharge to water in the coastal environment, on a catchment by catchment basis, by:
 - a. avoiding where practicable and otherwise remedying cross contamination of sewage and stormwater systems;
 - b. reducing contaminant and sediment loadings in stormwater at source, through contaminant treatment and by controls on land use activities;
 - c. promoting integrated management of catchments and stormwater networks; and
 - d. promoting design options that reduce flows to stormwater reticulation systems at source.
- 5. In managing discharges from ports and other marine facilities:
 - a. require operators of ports and other marine facilities to take all practicable steps to avoid contamination of coastal waters, substrate, ecosystems and habitats that is more than minor;
 - require that the disturbance or relocation of contaminated seabed material, other than by the movement of vessels, and the dumping or storage of dredged material does not result in significant adverse effects on water quality or the seabed, substrate, ecosystems or habitats;
 - c. require operators of ports, marinas and other relevant marine facilities to provide for the collection of sewage and waste from vessels, and for residues from vessel maintenance to be safely contained and disposed of; and
 - d. consider the need for facilities for the collection of sewage and other wastes for recreational and commercial boating.



Canterbury Regional Environment Plan Coastal

Objective 7.1 Enable present and future generations to gain cultural, social, recreational, economic, health and other benefits from the quality of the water in the Coastal Marine Area, while:

(a) maintaining the overall existing high natural water quality of coastal waters;.

(b) safeguarding the life-supporting capacity of the water, including its associated: aquatic ecosystems, significant habitats of indigenous fauna and areas of significant indigenous vegetation;

(c) safeguarding, and where appropriate, enhancing its value for providing mahinga kai for Tangata Whenua;

(d) protecting wahi tapu and wahi taonga of value to Tangata Whenua;

(e) preserving natural character and protecting outstanding natural features and landscapes, where water quality is an aspect of their value, from reductions in water quality;

(f) maintaining, and where appropriate enhancing, amenity values; and

(g) recognising the intrinsic values of ecosystems and any finite characteristics of the coastal environment.

Policy 7.2(b)(vi) Establish water quality classes, set water quality standards and control the

discharge of contaminants and water within the parts of the Coastal Marine Area

defined in Schedule 5 that contain areas of degraded water quality or which need

classifications to reflect existing or potential uses of the areas:...

(b) The water quality in the following areas will be classified as water managed for contact recreation and for the maintenance of aquatic ecosystems, and the water quality maintained and where necessary improved for these purposes:...

(vi) Childrens Bay, Takamatua Bay, Robinsons Bay, Duvauchelle Bay,

Barrys Bay and French Farm Bay in Akaroa Harbour;

Policy 7.4 Before being granted a resource consent for a point source discharge of a contaminant or water into water, or onto or into land in the Coastal Marine Area in

circumstances where the discharge, after reasonable mixing, would not achieve the water classification purposes for which the water quality standards set in this

plan, the applicant must satisfy Environment Canterbury:

(a) that exceptional circumstances justify the granting of the consent; or

(b) that the discharge is of a temporary nature; or

(c) that the discharge is associated with necessary maintenance work; or

(d) that practicable alternatives to avoid such a discharge are not available.



Policy 7.5 Only grant a resource consent to discharge human wastewater into water, or onto or into land in the Coastal Marine Area, without it passing through land or a specially constructed wetland outside the Coastal Marine Area, where:

(a) the discharge better meets the purpose of the Act than disposal through land or a wetland outside the Coastal Marine Area; and

(b) there has been consultation by the applicant with Tangata Whenua in accordance with Tikanga Maori and due weight has been given to sections 6, 7 and 8 of the Act; and

(c) there has been consultation by the applicant with the community generally; and

(d) the discharge is not within an Area of Significant Natural Value, unless the applicant satisfies Environment Canterbury that exceptional circumstances justify the discharge in such an area.

Policy 7.6 In setting conditions on a resource consent to discharge a contaminant or water into water, or onto or into land in the Coastal Marine Area, a reasonable mixing

zone should be determined by considering, amongst other matters, the following:

(a) the volumes, contaminant loading and contaminant concentrations involved with the discharge;

(b) factors such as sea conditions, tides, wave action, water depths, water velocity, and flushing characteristics that will normally affect the assimilative capacity of the receiving water and the dispersion of the contaminants or the discharge water;

(c) the presence of an Area of Significant Natural Value at the site or in close proximity;

(d) the existing use of the immediate area, including the presence of other discharges;

(e) if in any area within which a water quality standard is set, the size of the area in relation to the mixing zone; and

(f) the proximity of adjacent areas where water quality standards have been set; and

(g) the natural values of the receiving environment.

Policy 7.7 Ensure that discharges of water or contaminants into water, or onto or into land in the Coastal Marine Area avoid significant adverse effects on cultural or spiritual values associated with sites, (e.g. areas covered by controls such as taiapure or mahinga mataitai), of special significance to the Tangata Whenua.

Objective 8.1

(1) To enable people to use the Coastal Marine Area and its resources while avoiding, remedying or mitigating the adverse effects of that use on the environment, including avoiding, remedying or mitigating the adverse effects:

(a) of conflicts between these uses and people's well-being, health, safety and amenity; and

(b) on natural character, and other (natural, ecological, amenity, Tangata Whenua, historic and cultural) values of the coastal environment.



(2) To enable the efficient and effective operation and development of the Ports of Lyttelton and Timaru and network utilities while avoiding, remedying or

mitigating adverse effects on the environment consistent with the normal requirements of commercial ports and network utilities.

Policy 8.2

Environment Canterbury will regulate activities in the Coastal Marine Area that may have adverse effects on the environment.

These activities include:..

- (a) the placement of swing moorings;
- (b) the introduction or planting of exotic plants;
- (c) the emission of noise;
- (d) reclamations;
- (e) the transfer of petroleum products between vessels;
- (f) the use of vessels or buildings for habitation;
- (g) activities involving: structures, foreshore and sea bed disturbance,
- deposition of material, occupation, or taking of water or heat or energy

from water; where those activities are not authorised as a Permitted

Activities; and

(h) production and storage of hazardous substances.

Policy 8.3

In considering applications for resource consents to undertake activities in the Coastal Marine Area, Environment Canterbury will have regard to:

(a) the existing level of use and development in the area and the national priority in the New Zealand Coastal Policy Statement to preserve the natural character of the coastal environment; and

(b) the need to protect characteristics of the coastal environment of special value to Tangata Whenua; and

(c) effects on the public use and enjoyment of the coast, including public access to and along the Coastal Marine Area, and the contribution of open space to the amenity value of the coast; and

(d) cumulative effects of such activities on the coastal environment both within and outside the immediate location; and

(e) existing agricultural and other use and development of the adjacent land area, and any adverse effects on that activity; and



(f) the status of any lands or areas administered by the Department of Conservation that are affected; and

(g) the publicly notified purpose of any proposal for protected status, if the application affects an area proposed for protection under a statute administered by the Department of Conservation; and(h) the possibility of natural features migrating inland as the result of dynamic coastal processes, including sea level rise, and the ability of natural features to protect subdivision, use and development from erosion and inundation; and

(i) the need to protect existing network utility infrastructure where such infrastructure is located adjacent to or within the Coastal Marine Area.

Policy 8.5

In considering applications for resource consents to occupy the Coastal Marine Area, Environment Canterbury should:

(a) give priority to maintaining safe anchorages for vessels; and

(b) avoid impeding navigational channels and access to wharves, slipways and jetties; and

(c) avoid displacing existing public recreational use of the area where there are no safe adjacent alternative areas available; and

(d) have regard to existing commercial use of the area and any adverse effects on that activity, including recognition of the designated Port Operational Areas; and

(e) have regard to any adverse effects on the values relating to the natural character of the coastal environment, both within and outside the immediate location; and

(f) have regard to any adverse effects on the cultural, historic, scenic, amenity, Tangata Whenua, and natural values of the area; and

(g) have regard to available alternative sites and the reasons for the applicant's choice of site; and

(h) have regard to existing use and development of the area and the extent to which the natural character of the area has already been compromised; and

(i) only provide for the period or periods of occupation that are reasonably necessary to meet the purposes for which occupation is sought.

Policy 8.7

Activities in the Coastal Marine Area should not take place where they have, or have the potential to have, a significant or irreversible adverse effect on the natural or cultural values of an Area of Significant Natural Value, or on the natural or cultural values of areas of the coastal environment adjacent to an Area of Significant Natural Value; unless:

(a) there are special or extraordinary and unique reasons why the activity should be sited in the area; and

(b) any adverse effects on areas of significant indigenous vegetation or significant habitats of indigenous fauna, are avoided, remedied or mitigated.



Chapter 3 NRRP

Objective AQL1 Objective for localised air quality. This objective aims to ensure that localised air discharges do not cause significant adverse effects.

Policy AQL5 Odour Nuisance

Water Quality – Chapter 4 NRRP

Policy WQL9 Prevent the entry of hazardous contaminants to groundwater

(1) Avoid the discharge of contaminants into groundwater from new solid or hazardous waste landfills by:

(a) not locating new landfills, except for cleanfills, over unconfined or semiconfined aquifers; and

(b) prohibiting new landfills, except for cleanfills, in the Coastal Confined Gravel Aquifer System and in Community Drinking Water Supply Protection Zones.

(2) Prevent, as far as practicable, the discharge of contaminants onto or into land where they may enter groundwater, or directly into groundwater from; a hazardous facility, waste storage facility, or a pipeline used to transport contaminants, by:

(a) not locating new facilities or pipelines in areas where there is a significant risk that the contaminants could enter an aquifer as a result of:

(i) permanent ground deformation caused by movement on an active fault line;

- (ii) inundation by flood waters; or
- (iii) subsidence or slippage of land.

(b) requiring the implementation of best practices in the design, construction and use of hazardous or waste storage facilities and associated pipelines

transporting contaminants, including appropriate containment and emergency response measures, to minimise the risk of contaminants being discharged and

entering an aquifer as a result of:

(i) a system failure, including leakage or accidental discharge; or

(ii) seismic activity that is likely to result in structural damage from ground motion or liquefaction.

(3) Prohibit the discharge of the following contaminants into groundwater via a bore, excavation, storage tank or other means:

(a) hazardous substances and hazardous wastes, except where the discharge occurs during the remediation of contaminated land or it is required as part of a groundwater investigation, provided the discharge does not result in any significant adverse effects on groundwater quality;

(b) wastes from industrial or trade processes, excluding heated water or cleanfill material;

(c) human sewage effluent; or



(d) animal effluent from a collection system.

Water Quality – Chapter 5 NRRP

Policy WQN12 Effects of de-watering

Control the de-watering of construction sites or de-watering for other activities, by limiting the rate and duration of pumping from groundwater, and/or requiring other mitigation measures, to prevent localised land subsidence and significant adverse effects on flow, level and allocation regimes.





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