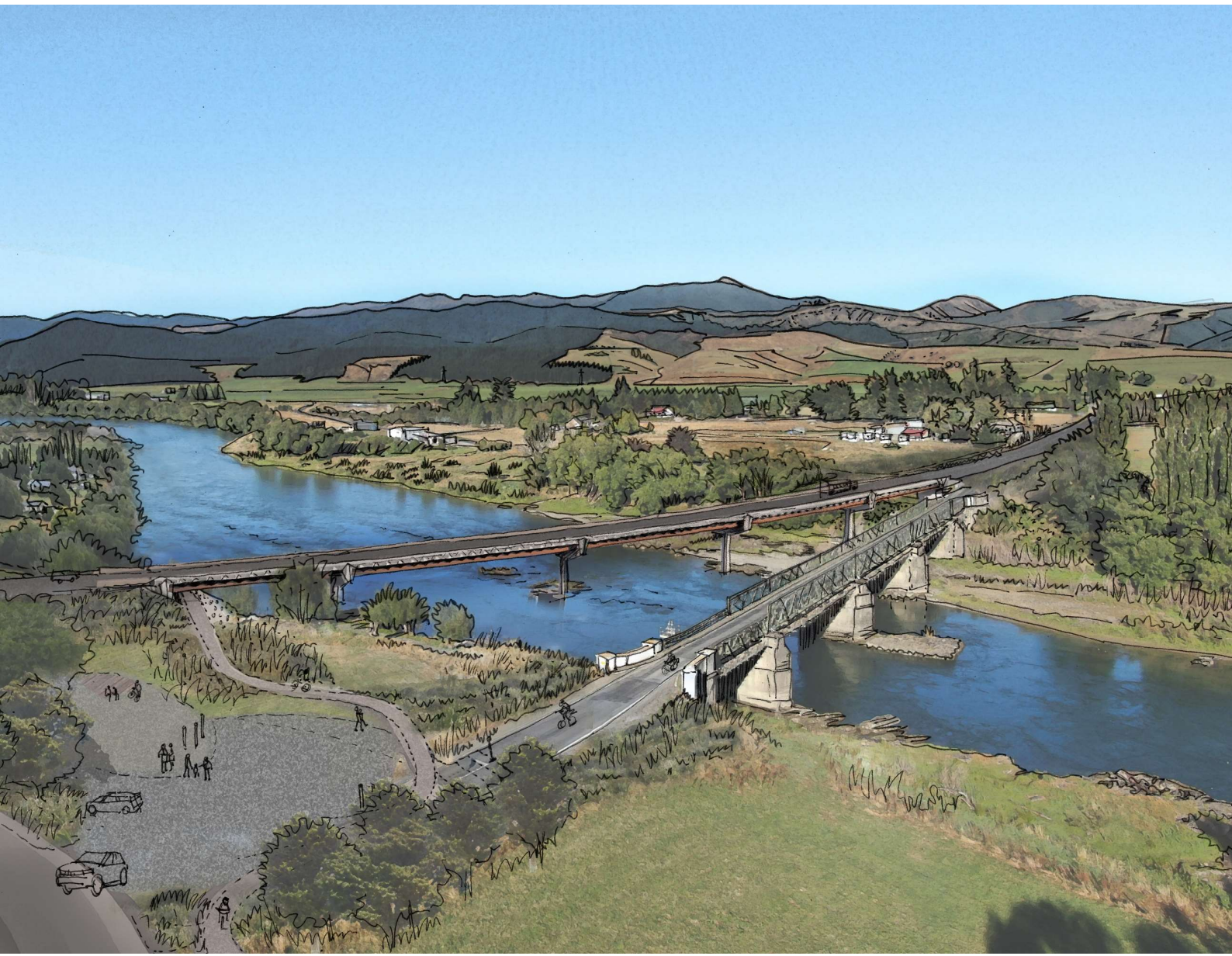




# New Beaumont Bridge

Preliminary Site Investigation



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## Report Checklist

Summary contaminated sites report checklist					
Report contained in this document	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Report sections and information to be presented	PSI	DSI	RAP	SVR	MMP
Executive summary	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scope of work	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Site identification	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Site history	<input checked="" type="checkbox"/>	S	S	S	S
Site condition and surrounding environment	<input checked="" type="checkbox"/>	S	S	S	S
Geology and hydrology	A	<input type="checkbox"/>	S	S	S
Sampling and analysis plan and sampling methodology	A	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
Field quality assurance and quality control (QA/QC)	N	<input type="checkbox"/>	X	<input type="checkbox"/>	S
Laboratory QA/QC	N	<input type="checkbox"/>	X	<input type="checkbox"/>	X
QA/QC data evaluation	N	<input type="checkbox"/>	X	<input type="checkbox"/>	X
Basis for guideline values	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Results	A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S
Site characterisation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remedial actions	X	X	<input type="checkbox"/>	S	S
Validation	X	X	X	<input type="checkbox"/>	S
Contaminated materials management plan (CMMP)	X	X	<input type="checkbox"/>	S	S
Ongoing site monitoring	X	X	X	N	<input type="checkbox"/>
Conclusions and recommendations	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Key:

**PSI** - preliminary site investigation report  
**SIR** - detailed site investigation report

**RAP** - site remedial action plan

**SVR** - site validation report

**MMP** - ongoing monitoring and management plan

**A** - Readily available information should be included

**S** - A summary of this section's details will be adequate if detailed information has been included in an available referenced report

**N** - Include only if no further site investigation is to be undertaken

**X** - Not applicable and can be omitted.

(MfE. *Contaminated Land management guidelines No. 1*. 2011a)

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## Executive Summary

This executive summary presents the salient points of the report only and should not be referred to in isolation from the content of the whole report.

	Summary
Introduction	<p>A Preliminary Site Investigation has been undertaken on behalf of NZTA (New Zealand Traffic Agency) for a site at the Beaumont Bridge, State Highway 8 (SH8), Beaumont, Clutha District (herein referred to as 'the site') in order to assess the potential for contamination to be present on the site.</p> <p>The site is located at the Beaumont Bridge (including the immediate area to the east and west of the current road bridge), State Highway 8, Clutha District and includes the surrounding area to the east and west of the current road bridge. This PSI has been commissioned as part of the realignment and replacement of the existing Beaumont Road Bridge.</p>
Proposed Development	<p>We understand the development of the site will be the construction of a new bridge and realignment of the existing highway and Clutha Gold Trail Cycleway.</p>
Environmental Setting	<ul style="list-style-type: none"> <li>• The western and eastern banks of the River are underlain by the Late Pleistocene River Deposits; and</li> <li>• The eastern part of the site is underlain by Undifferentiated Caples terrane TZIII.</li> <li>• The Clutha River/Mata-au flows south through the centre of the site;</li> <li>• There is not a known aquifer beneath the site, but the area is considered sensitive</li> </ul>
Site details	<ul style="list-style-type: none"> <li>• Historical Māori presence in the area from the 13<sup>th</sup> century;</li> <li>• European use from 1853 with establishment of a township and gold mining from 1860's;</li> <li>• Gold dredging was ongoing from 1890's until 1930's goldrush;</li> <li>• Current Beaumont bridge was opened in 1887;</li> <li>• Railway was established in 1905 and closed in 1968;</li> <li>• Currently the site is pasture/farmland or reserve</li> <li>• Historical activities include an orchard to the north west and a sheep dip/drench to the south west of the proposed realignment;</li> <li>• The area to the west of the site comprises the Beaumont township with predominantly pasture/farmland surrounding that; and</li> <li>• No obvious signs of vegetation dieback were noted in any location across the site.</li> </ul>
Discussion	<p>It is considered more likely than not that the risks to human health associated with the development identified on the site, based on an industrial/commercial end use is <b>LOW</b>. As such, it is considered <b>highly unlikely</b> that there will be a risk to human health associated with the proposed development.</p>

Summary	
Conclusions	<p>The conceptual site model and initial qualitative human health risk assessment presented herein are based upon information gained from a site inspection, anecdotal evidence, information gained from CDC and other sources, to determine the chemical characteristics of determined contaminants of concern.</p> <p>The site identified in this investigation has been triggered under the NES as a result of a proposed development. The site history, anecdotal evidence, historical aerial photography and site inspections have identified that there is low potential risk of having contaminated the proposed development area on the basis of an industrial/commercial end use. On this basis, the risk to human health associated with the potential contaminants identified during this PSI for the site is considered to be <b>LOW</b>.</p> <p>This Preliminary Site Investigation identifies that on the proposed development area of the site it is <b>highly unlikely</b> that there is a risk to human health should the proposed land use change be undertaken. Any land use change and associated ground disturbance within this area is considered a permitted activity.</p>
Recommendations	<ul style="list-style-type: none"> <li>• Should any items or strata of potential archaeological interest be encountered an archaeologist should be consulted and the relevant authorities informed;</li> <li>• Should any ground conditions be encountered across the site which are not anticipated from the findings of this report a Suitably Qualified and Experienced Practitioner (SQEP) should be consulted in order to reassess the risks to human health;</li> <li>• This Preliminary Site Investigation report is submitted to the consenting authority; and</li> <li>• This Preliminary Site Investigation report is submitted to the regional authority in to facilitate updating the HAIL database.</li> </ul>

# 1 Introduction

## 1.1 Background

A Preliminary Site Investigation has been undertaken on behalf of NZTA (New Zealand Traffic Agency) for a site at the Beaumont Bridge, State Highway 8 (SH8), Clutha District (herein referred to as 'the site') in order to assess the potential for contamination to be present on the site.

The site is located at the Beaumont, State Highway 8, Clutha District and includes the surrounding area to the east and west of the current road bridge. This PSI has been commissioned as part of the realignment and replacement of the existing Beaumont Road Bridge.

## 1.2 Purpose of this Report

Preparation of a PSI under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) Regulations (2011) will provide information as to whether soil contamination from potential HAIL activities are likely to be present and if so whether they are at levels that could adversely impact human health.

This PSI report will address these requirements in relation to any resource consent application in order to satisfy CDC's requirements under the NESCS Regulations 2011 relating to human health impacts from potentially contaminated land.

Part of the site is currently a working farm with livestock located in a paddock to the eastern bank downstream of the current bridge.

As such the following objectives have been identified:

- Assess the current site condition and its surrounding environment;
- Determine whether HAIL activities have occurred;
- Assess the risks to human health associated with these activities; and
- Characterisation of the site in line with NES guidance giving recommendations of remedial options should they be required.

## 1.3 Scope of Work

This Report will be prepared in general accordance with the requirements for a PSI referred to in the Users' Guide: National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, Ministry for the Environment, April 2012 (NESCS Users' Guide) and the Ministry for the Environment's Contaminated Land Management Guideline No.1: Reporting on Contaminated Sites in New Zealand (MfE CLMG #1).

The PSI is likely to include the following:

- A site walkover to assess the current site condition and its surrounding environment;
- Discussions with current and previous site owners if possible;
- An assessment of historical information relating to the site and its surroundings (this may be from documented or anecdotal evidence), including the review of historical aerial photographs;
- A review of information relating to resource consents, geological conditions and hydrology of the site;
- An assessment of existing analytical information regarding soil quality from nearby investigations undertaken by ourselves and from other publicly available sources;



- 
- A review of local authority records and searches of the Otago Regional Council's (ORC's) contaminated land register; and
  - Site characterisation indicating the potential health and environmental risks associated with the site, along with recommendations for further work should it be deemed necessary.

The PSI will be presented in the form of a written report reviewed by a Suitably Qualified and Experienced Practitioner (SQEP), as required by the NESCS Regulations 2011.

## 2 Environmental Setting

### 2.1 Site Identification

The site is located at Beaumont Bridge SH8, approximately 34.75km southeast of Roxburgh town centre as shown on Figure 1 below. Site details are provided in Table 1.

Table 1: Site Identification

<b>Site Address</b>	Section 4 SO Plan 23609		Section 2 SO Plan 23610		Section 4 SO Plan 23610	
<b>Territorial Authority</b>	Clutha District Council (CDC)					
<b>Legal Description</b>	Section 4 Survey Office Plan 23609		Section 2 Survey Office Plan 23610		Section 4 Survey Office Plan 23610	
<b>Titles</b>	OB/673T		OT14B/688		OT14B/689	
<b>Valuation No.</b>	28607-01100		28603-00100		28603-01800	
<b>Owner</b>	Alexander Trevor Peters Karen Ann Peters Fairfield Trustees No 3 Limited		Dale Clifford Mitchell Jennifer Anne Mitchell		Dale Clifford Mitchell Jennifer Anne Mitchell	
<b>Approximate total site area</b>	3000m <sup>3</sup>	0.3ha	10700m <sup>3</sup>	1.07ha	76289m <sup>3</sup>	7.6289ha
<b>NES Permitted Activity threshold volumes: 1) disturbance, and 2) yearly off-site movement of soil based on the approximate parcel area</b>	1) 150m <sup>3</sup> 2) 30m <sup>3</sup>		1) 535m <sup>3</sup> 2) 107m <sup>3</sup>		1) 3814.45m <sup>3</sup> 2) 762.89m <sup>3</sup>	

A Quickmap diagram detailing the current legal site boundaries, and appellations of properties nearby are shown in Figure 2 along with the approximate location of the site under investigation.

A current site layout plan is attached as Appendix A, with photographs taken during the site investigation presented in Appendix E.

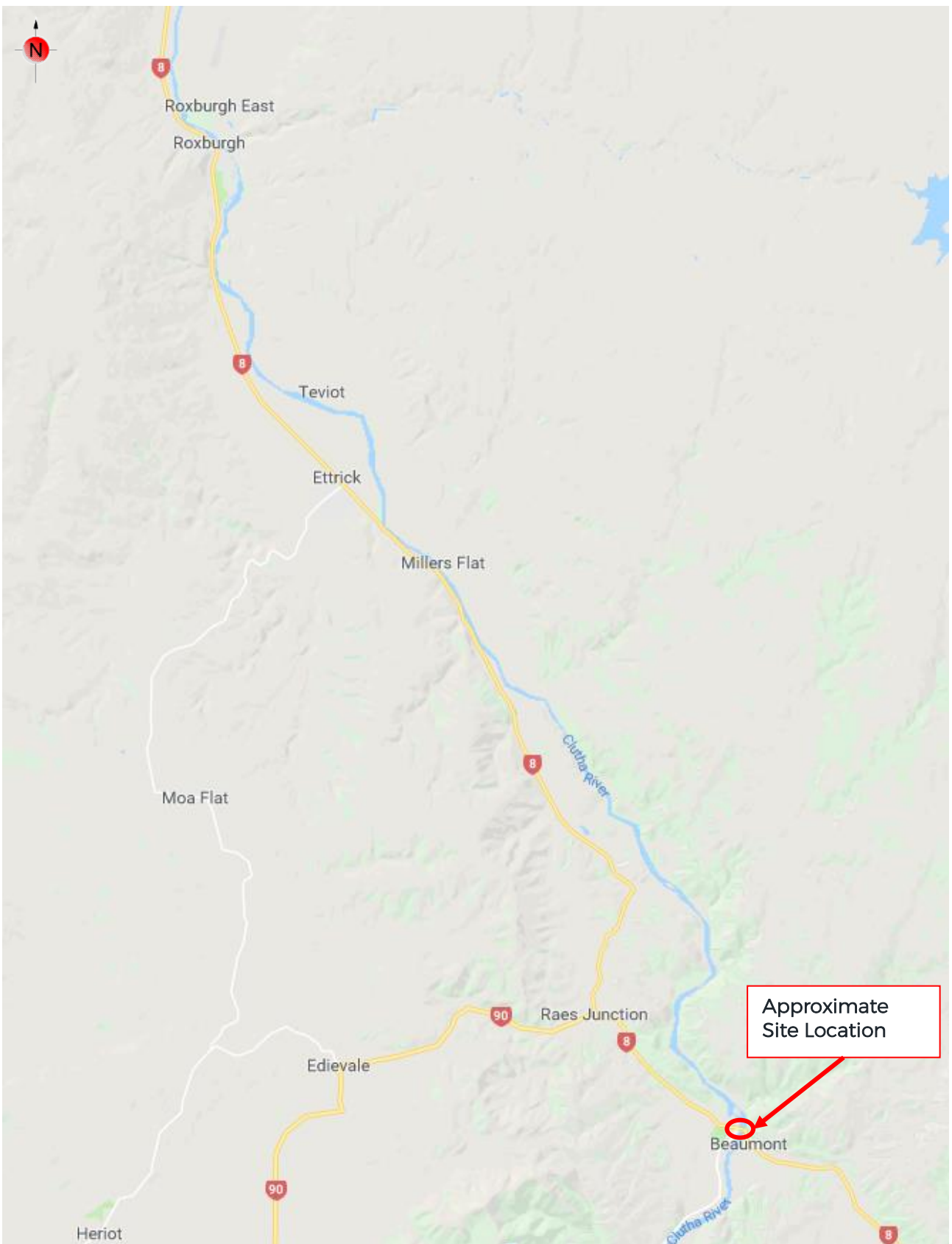


Figure 1: Site Location Plan

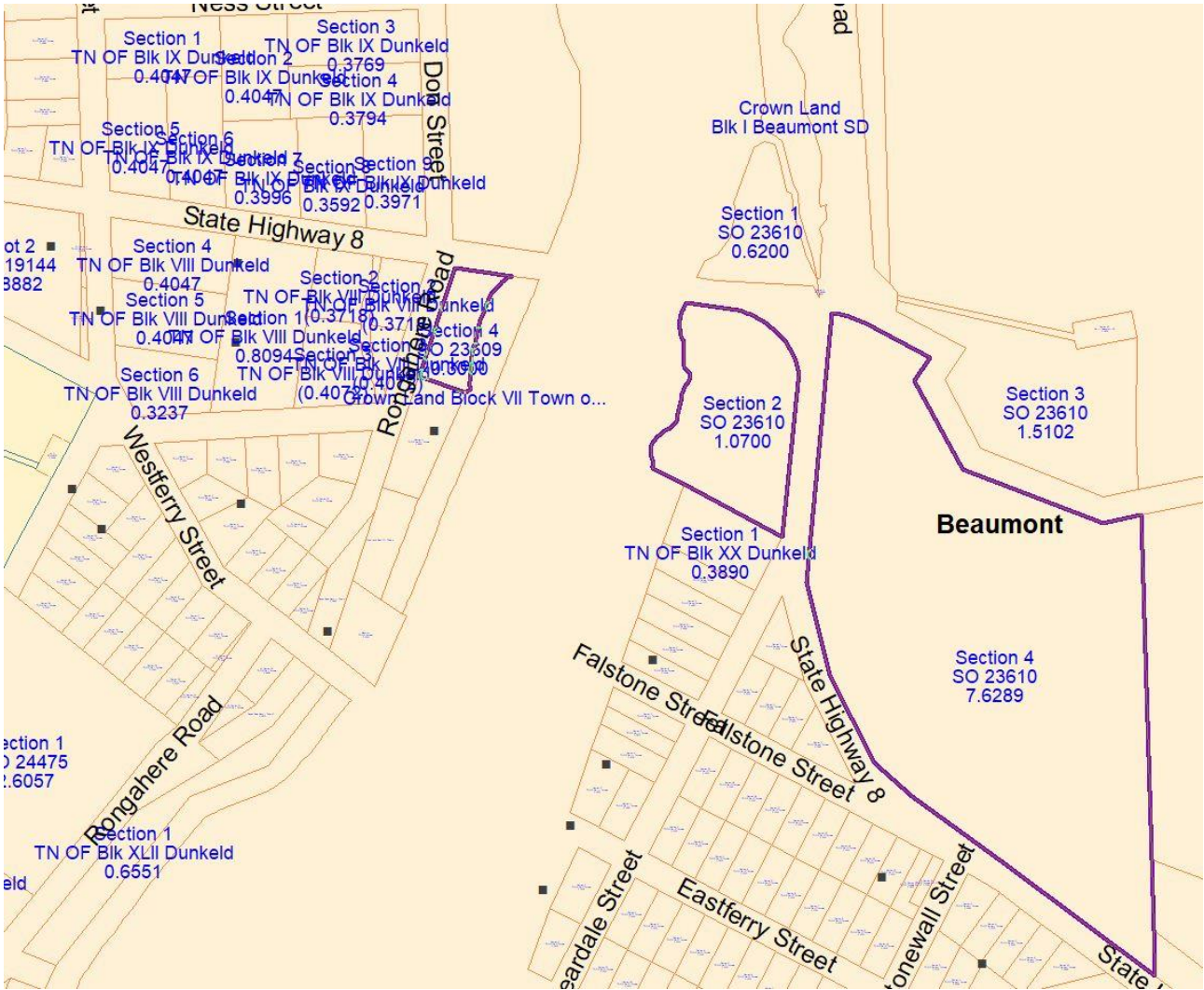


Figure 2: Quickmap of Site and Surrounds



## 2.2 Geology

The geology of the site is shown on the 1:250,000 scale GNS Geology Web Map extract (accessed February 2019) as shown in **Figure 3** below.

This map indicates the western and eastern banks of Clutha River are underlain by the Late Pleistocene River Deposits commonly comprising sandy greywacke gravel overlain by loess; schist-greywacke-quartz sandy gravel in the Clutha catchment. The eastern part of the site is underlain by Undifferentiated Caples terrane TZIII Schist; a well foliated psammitic and pelitic schist with incipient segregation; minor greenschist and metachert; quartz veins common; TZ3<sup>1</sup>.

A review of the GNS Active Faults Database indicates that the nearest active fault, the normal Tuapeka Fault, lies approximately 40m southwest of the site, as shown in Figure 3. No other information is known about this fault.



Figure 3: Extract from GNS Active Faults Database

### 2.2.1 Natural Hazards Database Report

The Otago Regional Council's Natural Hazards Database was used to produce two reports (one pertaining to the east bank of Clutha River the other detailing the west bank) relevant

<sup>1</sup> <http://data.gns.cri.nz/geology/>

hazard information with specific relation to the site. This report is presented within Appendix C.

Of the 10 hazards that the report looks at the highest risk to the site appears to be that of liquefaction. The seismic liquefaction map; for the west bank Figure 5, and the east bank Figure 6 shows that the parts of the site that are underlain by late Pleistocene River Deposits are possibly susceptible to liquefaction.

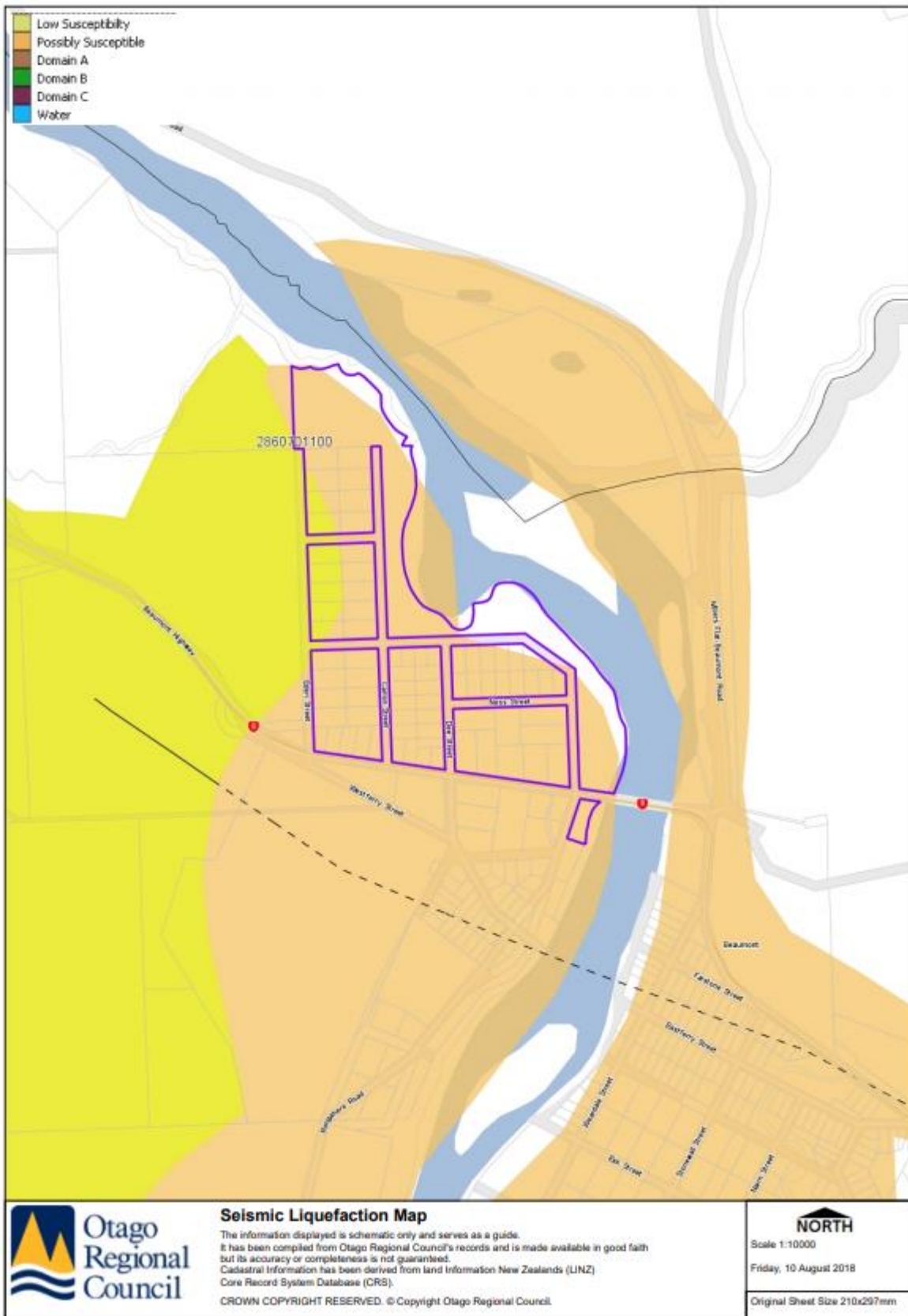


Figure 4: Seismic Liquefaction Map; West Bank Natural Hazards Database Report





## 2.3 Hydrology and Hydrogeology

Details of the site hydrology and hydrogeology have been gained from a review of sources including Google Earth, Grow Otago<sup>2</sup> and a search of council records.

Table 2: Summary of Hydrological and Hydrogeological Data

Nearest Surface Water Body	Clutha River / Mata Au passes through the centre of the site
General flow Direction	South
Groundwater Status	The area is not considered to be part of a known aquifer
No. of known Boreholes and wells within 500m <sup>3</sup>	2
Annual Median Rainfall	850mm/yr
Median Annual Potential Evaporation	520mm/yr

### 2.3.1 Groundwater Sensitivity Assessment

The site is not located on a named aquifer, however there are two borehole wells within 500m of the site. The nearest surface water body, is the Clutha/ Mata Au River running through the centre of the site.

The site area is considered to be in a sensitive ground water catchment zone due to the location of the Clutha Mata Au River in addition to the known boreholes and wells.

However, a wide range of factors may affect the migration of contaminants from soil to groundwater, including the presence of low permeability zones which may limit migration, or preferential pathways which may result in much more rapid migration of contaminants. Therefore, the Tier 1 soil acceptance criteria for the protection of groundwater quality should not be rigidly applied; rather, judgement should be applied when they are used, accounting for site-specific conditions.

Should analysis of soils reveal that contaminant concentrations are found to exceed the soil acceptance criteria, consideration should be given to a more detailed evaluation of the possible fate and transport of contaminants and the beneficial uses for which the aquifer is to be protected.

<sup>2</sup> <https://www.orc.govt.nz/media/1293/map-c20.pdf>


<sup>3</sup> <http://data.orc.govt.nz/>

### 3 Identification of HAIL Activities

#### 3.1 Site History

Details of the site history have been gained from a review of sources including historical aerial photographs from Google Earth and Retrolens, historical topographical maps from Maps Past, and a review of WSP Opus’s Quickmap ArcGIS database. Historical information is presented in Appendix B with aerial photos presented in Table 3.

Table 3: Site History (approximate site location is outlined in red)

Photograph Year and Source	Observations
<p>1929 Maps Past</p>	 <p>Only the eastern part of the site can be seen on this map. However, the road bridge is evident and it can be noted that a railway is running across the western most part of the site.</p>

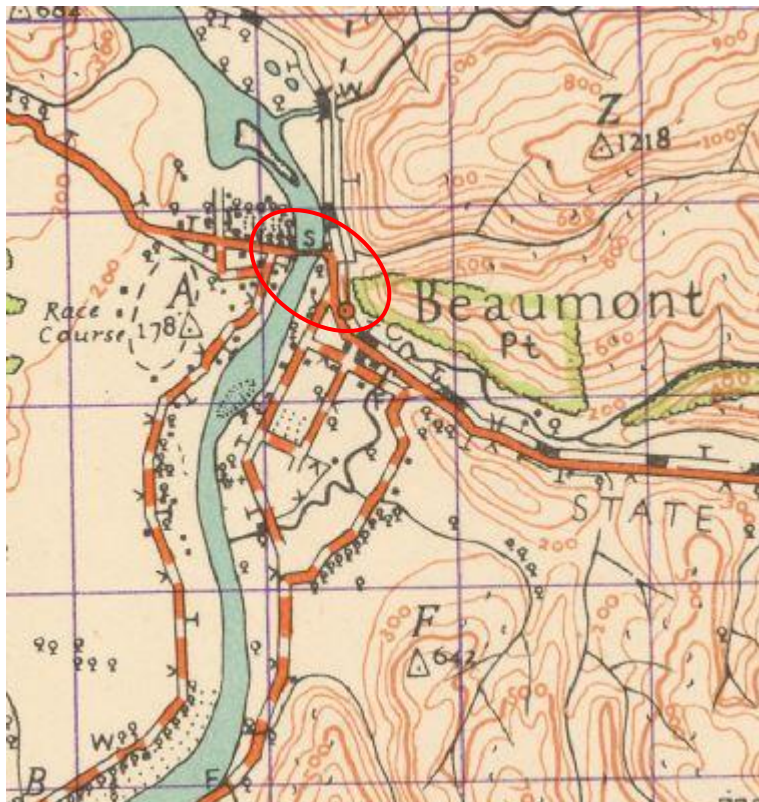
Photograph Year and Source	Observations
----------------------------------	--------------

1949  
Maps Past



The whole of the site can be seen, the western back of the river appears to be built up.

1959  
Maps Past





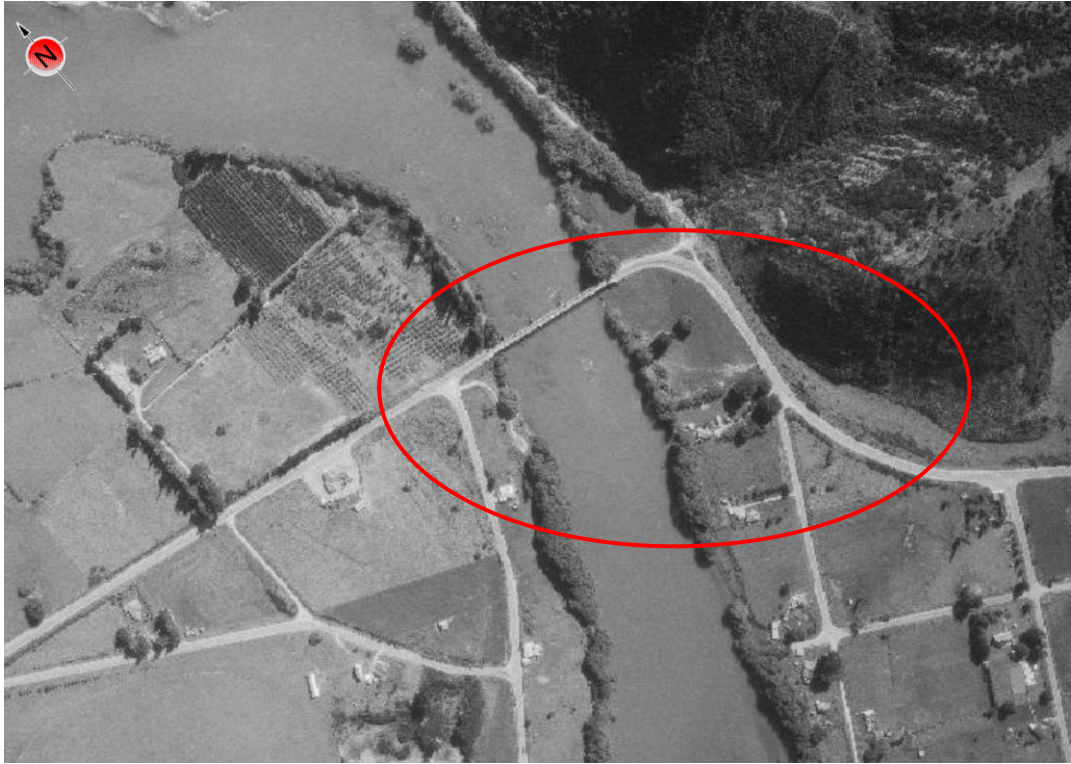
The Railway can still be seen running north south through the site. An orchard can be seen to the northwest of the site.





Photograph Year and Source	Observations
<p><b>1959</b> Retrolens Aerial Photograph Survey No.: SN1053 Elevation: 16,500 Run No.: P Photo No.: 33 Scale: 44,500</p>	 <p>An orchard can be seen to the northwest of the site the remainder of the area appears to be State Highway 8 or pasture with the occasional building.</p>
<p><b>1960</b> Retrolens Aerial Photograph Survey No.: SN1271 Elevation: 16,500 Run No.: C Photo No.: 1 Scale: 44,500</p>	 <p>There are no apparent changes to the site and surrounding area.</p>

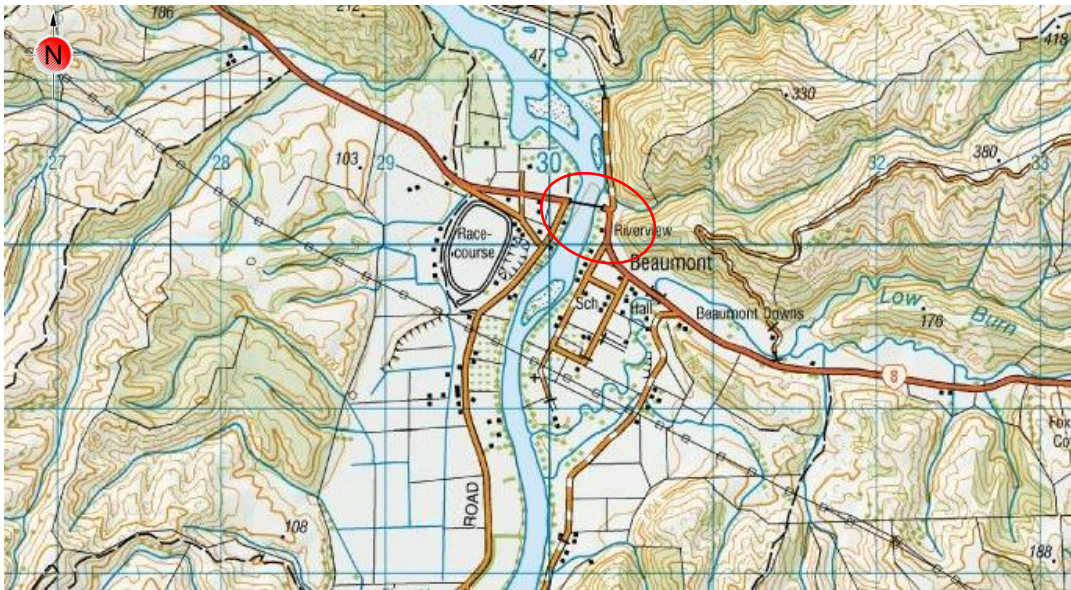



Photograph Year and Source	Observations
<p>1964 Retrolens Aerial Photograph Survey No.: SN1627 Elevation: 14,000 Run No.: B Photo No.: 1 Scale: 37,800</p>	 <p>A track can be seen extending towards the river in the western part of the site. There are no apparent changes to the surrounding area.</p>
<p>1979 Maps Past</p>	 <p>The railway is no longer apparent in the east of the site or in the surrounding area.</p>

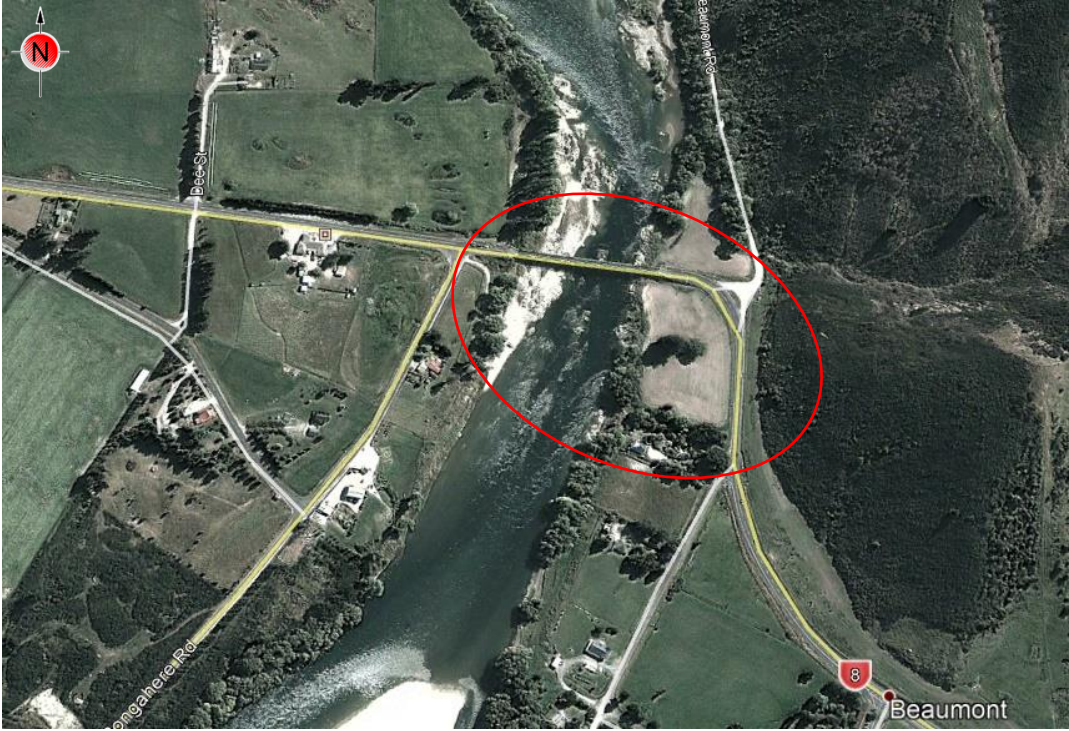
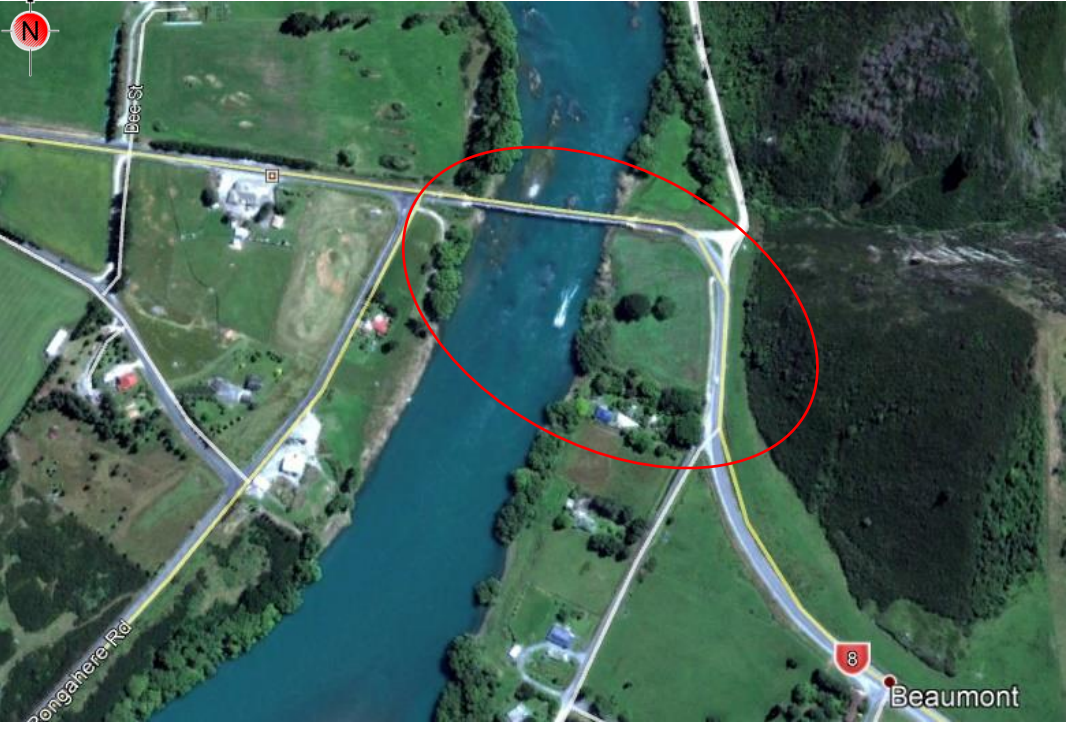
Photograph Year and Source	Observations
<p><b>1980</b> Retrolens Aerial Photograph Survey No.: SN5682 Elevation: 4,000 Run No.: B Photo No.: 8 Scale: 8,000</p>	 <p>There are no changes to the site and surrounding area.</p>
<p><b>1983</b> Retrolens Aerial Photograph Survey No.: SN8215 Elevation: 27,000 Run No.: G Photo No.: 8 Scale: 50,000</p>	 <p>There are no changes to the site and surrounding area.</p>



Photograph Year and Source	Observations
<p>1984 Retrolens Aerial Photograph Survey No.: SN8286 Elevation: 25,000 Run No.: K Photo No.: 2 Scale: 50,000</p>	 <p>There are no apparent changes to the site and surrounding area.</p>
<p>1999 Maps Past</p>	 <p>There are no apparent changes to the site. The orchard is no longer apparent to the northwest of the site.</p>

Photograph Year and Source	Observations
<p>2009 Maps Past</p>	 <p>There are no changes to the site and surrounding area.</p>
<p>2010 Google Earth</p>	 <p>There are no changes to the site and surrounding area.</p>



Photograph Year and Source	Observations
<p>2012 Google Earth</p>	 <p>There are no changes to the site and surrounding area.</p>
<p>2013 Google Earth</p>	 <p>There are no changes to the site and surrounding area.</p>

Photograph Year and Source	Observations
<p>2017 Google Earth</p>	 <p>There are no changes to the site and surrounding area.</p>

### 3.1.1 Heritage

The Heritage New Zealand Pouhere Taonga Act 2014 makes it unlawful for any person to modify or destroy, or cause to be modified or destroyed, the whole or any part of an archaeological site without the prior authority of Heritage New Zealand.

A heritage significance assessment was carried out by OPUS in October 2016 (ref: 6-CT010.00) in order to provide insights regarding the history and development of both the Beaumont Bridge and local Beaumont community, and identify and assess their cultural heritage values.

This report states that the earliest occupation was Māori dating back to at least the 13<sup>th</sup> century with seasonal expeditions and establishment of river trails.

First Europeans arrived in 1853; gold was discovered in the Beaumont area in 1860 as such the river crossing became vital. Dredging for gold was carried out from the 1890's to a second smaller gold boom in the 1930's.

The Beaumont township continued to grow with connections to steam powered trading vessels and the first bridge was constructed in 1873. In 1878 severe flooding destroyed this bridge. In 1883 construction of a replacement bridge began. In 1887 construction of the bridge was finished and the bridge was opened to the public. The bridge now forms part of SH8 through Central Otago. It is listed as a historic structure in Clutha District Council's Register of Heritage Buildings, item no. H61; but is not listed with Heritage New Zealand Pouhere Taonga.

In 1905 a railway line from Lawrence to Roxburgh through Beaumont was started, however it took almost 10 years to reach Beaumont. At this time the industries in the area included goldmining, sheep farming and fruit growing. By 1925 forestry had become established. The railway branch line was closed in 1968.



### 3.2 Council Records

A review of CDC's District Plan Maps indicates that the site lies in an area which is currently zoned as Rural on the western bank of the Clutha Mata-au River and as rural settlement on the immediate eastern bank of the river. On the eastern side of SH8 the site is zoned as rural.

A review of the HAIL database held by ORC has revealed that the site does not currently appear on the database. However, a historic railway is known to have previously run through the site and in addition the current site is used for farming practices.

The response continues indicating that *"If your enquiry relates to a rural property, please note that many current and past activities undertaken on farms may not be listed on the database, as they can be more difficult to identify. Activities such as use, storage, formulation, and disposal of pesticides, offal pits, landfills, animal dips, and fuel tanks have the potential to contaminated land".*

*Similarly, the long-term use of lead-based paints on buildings can, in some cases, cause soil contamination. The use of lead-based paint is generally not recorded on the database."*

A copy of the HAIL search results is provided in Appendix B.

It should be noted that the lack of detail on a property file or "no files of note" entry is not confirmation of no HAIL activities being present, or historically present on the site, it merely represents the council's knowledge of the site.

### 3.3 Certificates of Title

A search for relevant certificates of title was undertaken for the site along with any associated survey plans in order to help determine the historical ownership and layout of the site. These details may give an indication as to past uses on the site and the potential for HAIL activities. Relevant certificates of title and survey plans are also presented within Appendix B.

No indication of horticultural activities are noted on the certificates of title. However gold mining rights are mentioned on the titles.

## 4 Walkover Survey

### 4.1 Initial Site Condition and Surrounding Environment

A site walkover was undertaken as part of the investigation by a WSP Opus Engineer. A summary of the inspection is outlined in Table 4 below, and a selection of site photographs presented within Appendix E.

Table 4: Walkover Summary

	Western Bank	Eastern Bank	Eastern side of SH8
Site Access	Rongahere Road	State Highway 8	State Highway 8
Current Site Use	Copse of trees, with scrub and rough pasture. Rocky river bank with gravel beach for access. (reserve)	Pasture/farmland with rocky river bank	Pasture/farmland
Existing Structures	Unpaved car parking/ turning circle for river access.	Possible sheep run/drenching area	Historical railway – Clutha Gold Trail, cycleway
Existing Vegetation	Bushes, trees and grass	trees and grass	Bushes, trees and grass
Adjoining Sites Uses	Rongahere Road to the east and SH8 to the north beyond this Beaumont township, including historical orchards can be seen to the west.	The site is predominantly surrounded by pasture or farmland with a farm to the south	The site is predominantly surrounded by pasture or farmland
Surface Water Bodies	Clutha River/ Mata-au flowing through the centre of the site		
Site Observations	The shorelines of the Clutha are clearly defined by rock outcrops with several exposures being visible and forming the base rock for the existing bridge foundations. An abandoned historic dredging barge was observed in the river (at low flow) downstream of the site.		
HAIL activities that apply under the NES guidance:	<p><b>A10: Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds</b> (historical orchards to the north west)</p> <p><b>I: Any other land that has been subject to the international or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment</b> (Historical settlements and car park/boat access to the river)</p>	<p><b>A8: Livestock dip or spray race operations</b> (potential sheep drenching area in the eastern bank paddock)</p>	<p><b>I: Any other land that has been subject to the international or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment</b> (Historical Railway, close to the eastern site boundary)</p>

## 5 Implications of Identified HAIL Activities

### 5.1 Contaminants of Potential Concern

The contaminants of potential concern associated with the identified HAIL activities are detailed in Table 5 below.

Table 5: Contaminants of Potential Concern

HAIL activity	Associated contaminants pertaining to this site
A8: Livestock dip or spray race operations (Potential Sheep Dip area)	Organochlorine pesticides and heavy metals (Arsenic)
A10: Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds (Historic orchard)	Organochlorine pesticides and heavy metals
I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.  (Carpark/ boat access to the river, Historical Railway, settlement and gold mining)	Heavy metals, polycyclic aromatic hydrocarbons and petroleum hydrocarbons and herbicides

### 5.2 Proposed Development

We understand the development of the site will involve the construction of a new bridge and the realignment of the existing highway and Clutha Gold Trail cycleway.

The layout of the site including a potential development location is shown in Appendix A.

### 5.3 Implications of the NES

The NES is relevant when specified activities are undertaken on HAIL sites. These activities are:

- Removing or replacing a fuel storage system;
- Sampling soil;
- Disturbing the soil;
- Subdividing land; and
- Changing the use of the piece of land.

The proposed development includes a change of land use and disturbing the soil.

It is recommended that a planner determine the relevance of the NES to the proposed work.

### 5.4 Conceptual Site Model

A conceptual site model is used to support the decision-making process for contaminated land management.

The five basic activities associated with developing a conceptual site model are:

- Identification of potential contaminants;

- Identification and characterisation of the source(es) of contamination;
- Delineation of potential migration pathways through environmental media, such as groundwater, surface water, soils sediment, biota, air, service lines etc.;
- Identification and characterisation of potential receptors (human, ecological or building infrastructure);
- Determination of the limits of the study area or system boundaries.

Data gaps and uncertainties are identified during the preparation of the conceptual site model, which assists in designing any detailed investigation that may follow.

For there to be an effect on receptors there must be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor).

Using the desk-based information on the site, a conceptual site model has been developed as shown in Figure 6 on the following page.

A possible pollutant linkage between the contaminant source and receptor is defined as one that has the potential to represent unacceptable risks to human health or the environment. Where a possible pollutant linkage has been identified above, further investigation and risk assessment through a DSI may be necessary to establish whether a **significant** pollutant linkage exists.

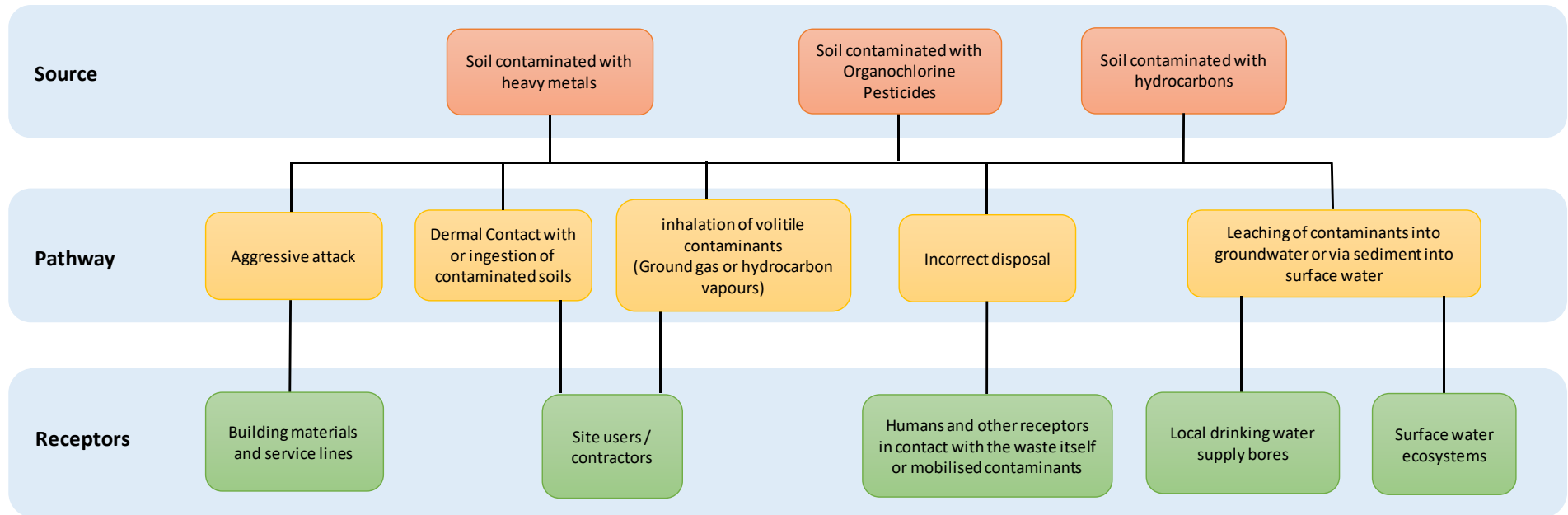


Figure 6: Conceptual Site Model



## 6 Statutory Provisions

### 6.1 National Environmental Standard

Regulation 8(3) of the NES makes provision for disturbing the soil as a permitted activity subject to meeting the following standards:

- (a) controls to minimise the exposure of humans to mobilised contaminants must—
  - (i) *be in place when the activity begins:*
  - (ii) *be effective while the activity is done:*
  - (iii) *be effective until the soil is reinstated to an erosion- resistant state:*
- (b) the soil must be reinstated to an erosion-resistant state within 1 month after the serving of the purpose for which the activity was done:
- (c) the volume of the disturbance of the soil of the piece of land must be no more than 25 m<sup>3</sup> per 500 m<sup>2</sup>:
- (d) soil must not be taken away in the course of the activity, except that, —
  - (i) *for the purpose of laboratory analysis, any amount of soil may be taken away as samples:*
  - (ii) *for all other purposes combined, a maximum of 5 m<sup>3</sup> per 500 m<sup>2</sup> of soil may be taken away per year:*
- (e) soil taken away in the course of the activity must be disposed of at a facility authorised to receive soil of that kind:
- (f) the duration of the activity must be no longer than 2 months:
- (g) the integrity of a structure designed to contain contaminated soil or other contaminated materials must not be compromised.

If the proposed construction of a bridge and road infrastructure is to proceed as indicated, the NES regulations apply because:

The site accommodates potential HAIL activities.

The NES flow chart shown as Figure 8 demonstrates the various ways the NES could apply to sites and activities performed on those sites.

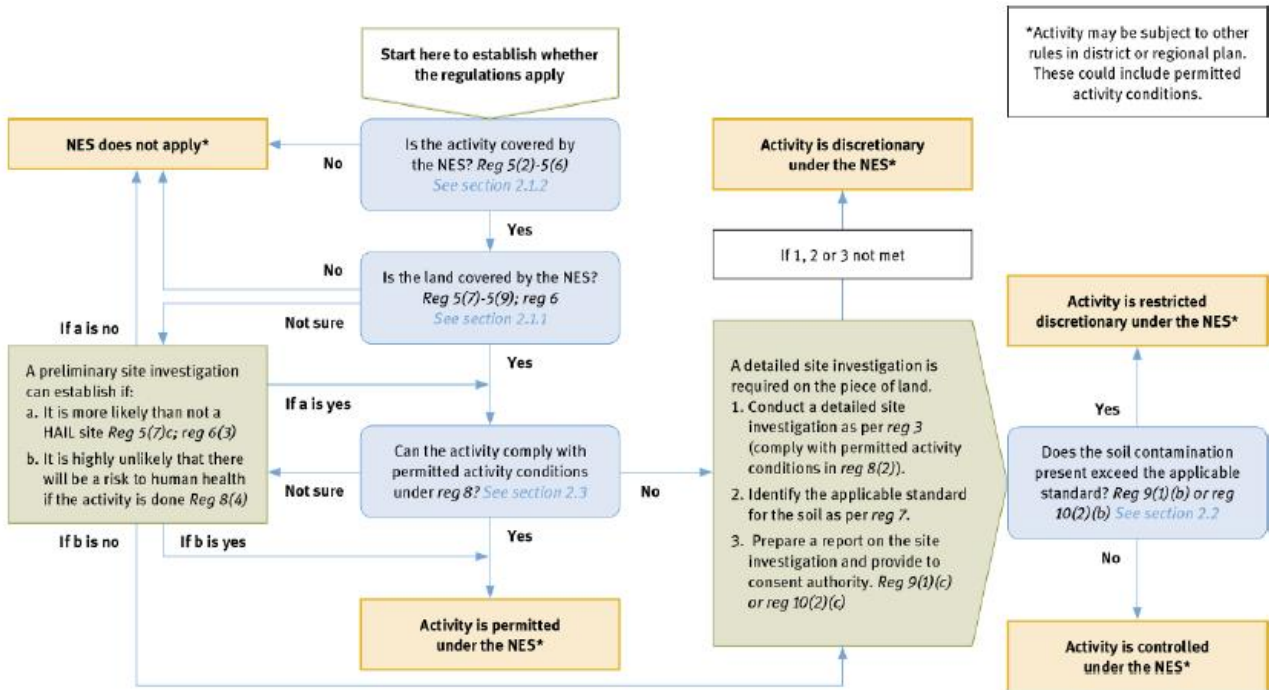


Figure 7: NES Flow Chart

## 7 Basis for Land Use Scenario

For contaminated site assessments, the hierarchy of reference documents containing guidelines for soils and waters, the MfE Contaminated Land Management Guidelines No 2 (November 2003) are referred to.

The site currently comprises open pasture land.

The primary human health receptors have been determined to be site workers, local residents and visitors following the construction of the new bridge.

As the proposed development involves the construction of the new Beaumont Bridge and associated road infrastructure, a commercial/ Industrial outdoor worker (unpaved) end use has been used to assess risks to site workers during construction, and to future users of the site.

The land use scenario is highlighted in Table 10 below.

Table 6: Land Use Scenario

Scenario	Description
Rural / lifestyle block	Rural residential land use, including home-grown produce consumption (25 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land.  Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home-grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site-specific basis.
Residential	Standard residential lot, for single dwelling sites with gardens, including home-grown produce consumption (10 per cent).
High-density residential	Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.
Parks / recreational	Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Commercial / industrial outdoor worker (unpaved)	Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.

## 8 Discussion

The purpose of this PSI, in general accordance with CLMG No1 and the NES for Assessing and Managing Contaminants in the Soil to Protect Human Health (2011), is to provide an assessment of the historical land uses and intended land use to determine whether or not the activities have, more likely than not, resulted in contamination of the soil that may be hazardous to human health.

On this basis, a review of information currently available, as well as observations made during the site inspection, and through the compilation of a conceptual site model our assessment of the site is as follows:

- Historical Māori presence in the area from the 13<sup>th</sup> century;
- European use from 1853 with establishment of a township and gold mining from 1860's;
- Gold dredging was ongoing from 1890's until the 1930's goldrush;
- Current Beaumont bridge was opened in 1887;
- The railway was established in 1905 and closed in 1968;
- Currently the site is pasture/farmland or reserve
- Historic activities on the farmland include orchards to the north west and sheep drenching on site;
- The area to the west of the site comprises the Beaumont township with predominantly pasture/farmland surrounding that;
- No obvious signs of vegetation dieback were noted in any location across the site;
- The Clutha River/Mata-au flows south through the centre of the site;
- There is not a known aquifer beneath the site, but the groundwater in the area is considered sensitive
- It is understood that the development of the site will include the construction of a new bridge with realignment of the state highway and Clutha Gold Trail cycleway.
- The western and eastern banks of the River are underlain by the Late Pleistocene River Deposits; and
- The eastern part of the site is underlain by Undifferentiated Caples terrane TZIII.

Potential human health risks have been evaluated using the Likelihood and Consequence scales tabulated below to determine a risk level – low, moderate, high, very high or extreme. The assessed risk level allows prioritisation of investigations and assessment measures.

Table 7: Risk Allocation Table

	Consequence				
Likelihood	Insignificant	Minor	Medium	Major	Catastrophic
Almost certain	Moderate	Moderate	Very High	Extreme	Extreme
Likely	Low	Moderate	High	Very High	Extreme
Possible	Low	Moderate	Moderate	Very High	Very High
Unlikely	Low	Low	Moderate	High	Very High
Rare	Low	Low	Low	Moderate	High

The risks to human health have been assessed based on the historical activities which may have occurred on specific areas of the site based on an industrial/commercial end use and can be split in to the following contaminants:

Table 8: Level of Contamination Risk

HAIL	Location	Contamination Risk
A8: Livestock dip or spray race operations	Area surrounding the potential sheep dip area	Risk is <b>low</b> : The potential sheep dipping activities occurred in an area of the site that will not be disturbed in any way by the construction of the new bridge or highway realignment.
A10: Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	Historical orchard to the north west of the site	Risk is <b>low</b> : Orchards are not known to have been present on the site itself and as such any risk of contamination by pesticides is considered highly unlikely.
I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.	Carpark/boat access to the river	Risk is <b>low</b> : There is no visual or olfactory evidence of contamination and vehicles do not appear to use the area very often or for a long duration. As such it is considered highly unlikely this activity has contaminated the site or surrounding area.
	Historical railway	Risk is <b>low</b> : The site of the historic railway is now utilised by the Clutha Gold Trail Cycleway and, for the most part, will not be disturbed by the construction. Some slight changes to the cycle way are proposed to enable an easier river crossing however these are considered highly unlikely to pose a risk to human health.
	Historical settlement	Risk is <b>low</b> : While historic settlement may have occurred on the site it is considered to be a low risk with regards to human health. The area to be disturbed is relatively small and the nature of settlement intermittent. Should anything be discovered archaeologists will be contacted.
	Historical gold mining)	Risk is <b>low</b> : Gold mining is not known to have occurred directly on the site.

It is considered more likely than not that the risk to human health associated with the development identified on the site is **LOW**. As such, it is considered **highly unlikely** that there will be a risk to human health associated with the proposed development.



## 9 Conclusions and Recommendations

The conceptual site model and initial qualitative human health risk assessment presented herein are based upon information gained from a site inspection, anecdotal evidence, information gained from CDC and other sources, to determine the chemical characteristics of determined contaminants of concern.

The site identified in this investigation has been triggered under the NES as a result of a proposed development. The site history, anecdotal evidence, historical aerial photography and site inspections have identified that there is low potential risk of having contaminated the proposed development area in terms of an industrial/commercial end use. On this basis, the risk to human health associated with potential contaminants identified during this PSI for the site is considered to be **LOW**.

### 9.1 NES Implications

This Preliminary Site Investigation identifies that on the proposed development areas of the site it is **highly unlikely** that there is a risk to human health should the proposed land use change and subsequent (industrial/ commercial end use) development be undertaken.

As such, any land use change and associated ground disturbance within this area is considered a permitted activity.

### 9.2 Safety in Design

Safety in Design (SID) considers the safety of those who are involved in the construction of, maintenance of, cleaning of, repair of and demolition of a structure, or anything that has been constructed.

As part of the assessment of this site, we have taken reasonably practicable steps to assess the potential for hazards associated with potentially contaminated land to exist. We have, through the development of a conceptual site model assessed the qualitative level of risk posed to human health and have made various recommendations to address the plausible risks.

Where identified this report indicates hazards and risks to health and safety associated with contaminated land which must be communicated to the design team, the client and associated stakeholders as required by the Health and Safety at Work Act 2015.

### 9.3 Recommendations

Based on the results of this investigation, WSP Opus recommends that:

- Should any items or strata of potential archaeological interest be encountered an archaeologist should be consulted and the relevant authorities informed;
- Should any ground conditions be encountered across the site which are not anticipated from the findings of this report a Suitably Qualified and Experienced Practitioner (SQEP) should be consulted in order to reassess the risks to human health;
- This Preliminary Site Investigation report is submitted to the consenting authority; and
- This Preliminary Site Investigation report is submitted to the regional authority in to facilitate updating the HAIL database.

## 10 Limitations

### 10.1 Scope of Services

This PSI report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP Opus. In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

### 10.2 Reliance on Data

In preparing the report, WSP Opus has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP Opus has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP Opus will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP Opus.

### 10.3 Environmental Conclusions

In accordance with the scope of services, WSP Opus has relied upon the data and has conducted environmental field monitoring in the preparation of the report. The nature and extent of monitoring conducted is described in the report.

The conclusions are based upon the data and the environmental field monitoring and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions. Should further data be obtained that differs from that presented in this report, then conclusions and recommendations may no longer be valid.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time. Within the limitations imposed by the scope of services, the monitoring and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

The report is valid at the date of release. The condition of the site may change with time so that the results and interpretation are no longer valid. In addition, guidelines and legislation may change, making assessment of results and recommendations invalid.

This investigation concentrates on potential contamination levels in the soil within the site. However, any earthworks, should be undertaken with due care and should ground conditions other than those anticipated be encountered work should cease and an SQEP consulted to further assess the risks to human health.

### 10.4 Report for Benefit of Client

The report has been prepared for the benefit of the New Zealand Transport Agency and no responsibility is accepted to any third party for all or any part. WSP Opus assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or

organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP Opus or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report).

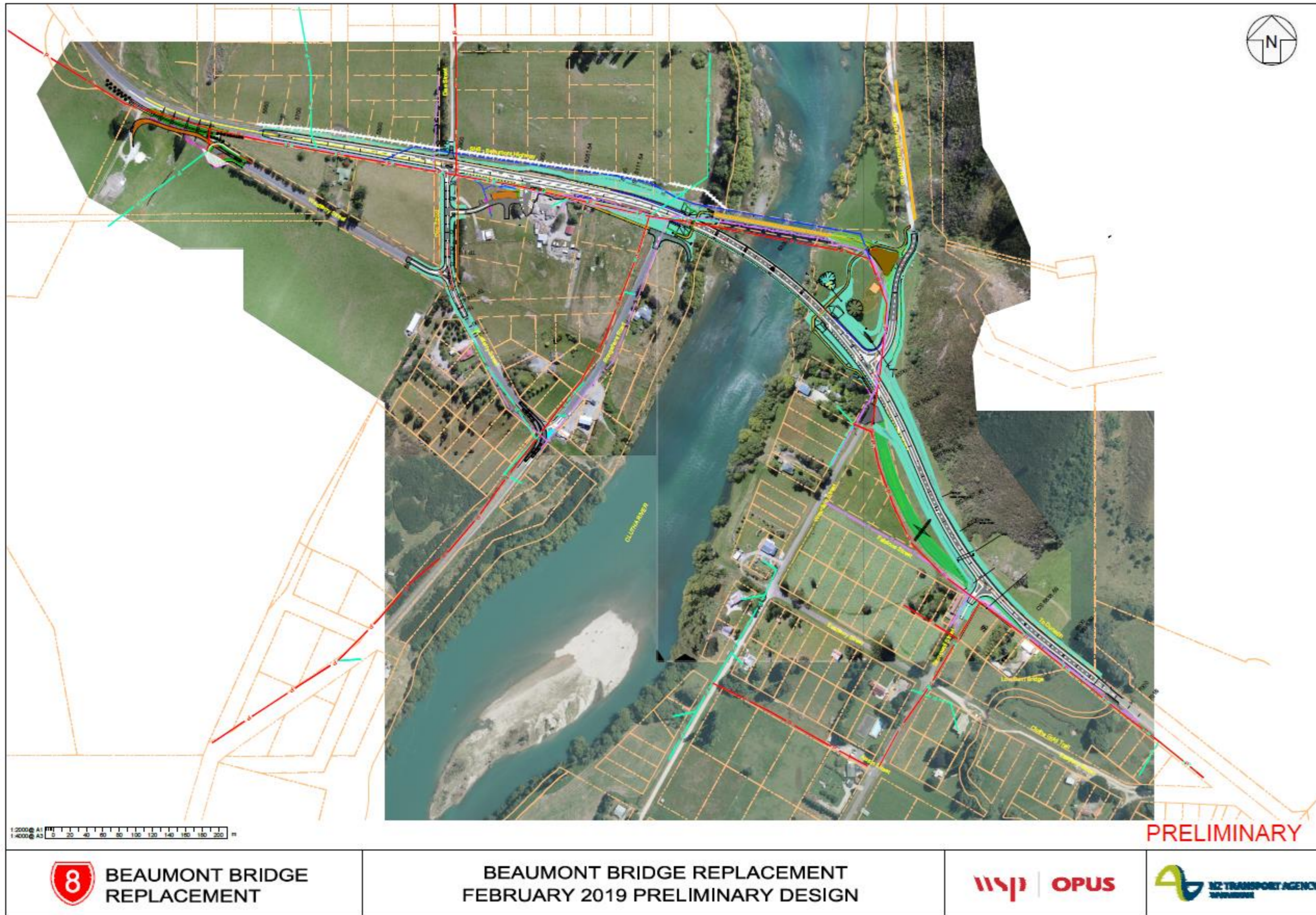
This report should not be relied upon or transferred to any other parties without the express written authorisation of WSP Opus. Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters. This report should only be reproduced in full.

### 10.5 Other Limitations

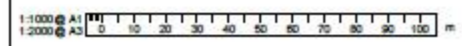
WSP Opus will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report. The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

# Appendix A: Potential Development Plan









PRELIMINARY

**8** BEAUMONT BRIDGE REPLACEMENT

BEAUMONT BRIDGE REPLACEMENT  
FEBRUARY 2019 PRELIMINARY DESIGN

WSP | OPUS

NZ TRANSPORT AGENCY  
MAKKA HEIHEI

DATE: 22/02/2019 PROJECT NUMBER: 6 CT012.00 PRELIM DESIGN SHEET 2/3





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1:2000 @ A3

PRELIMINARY



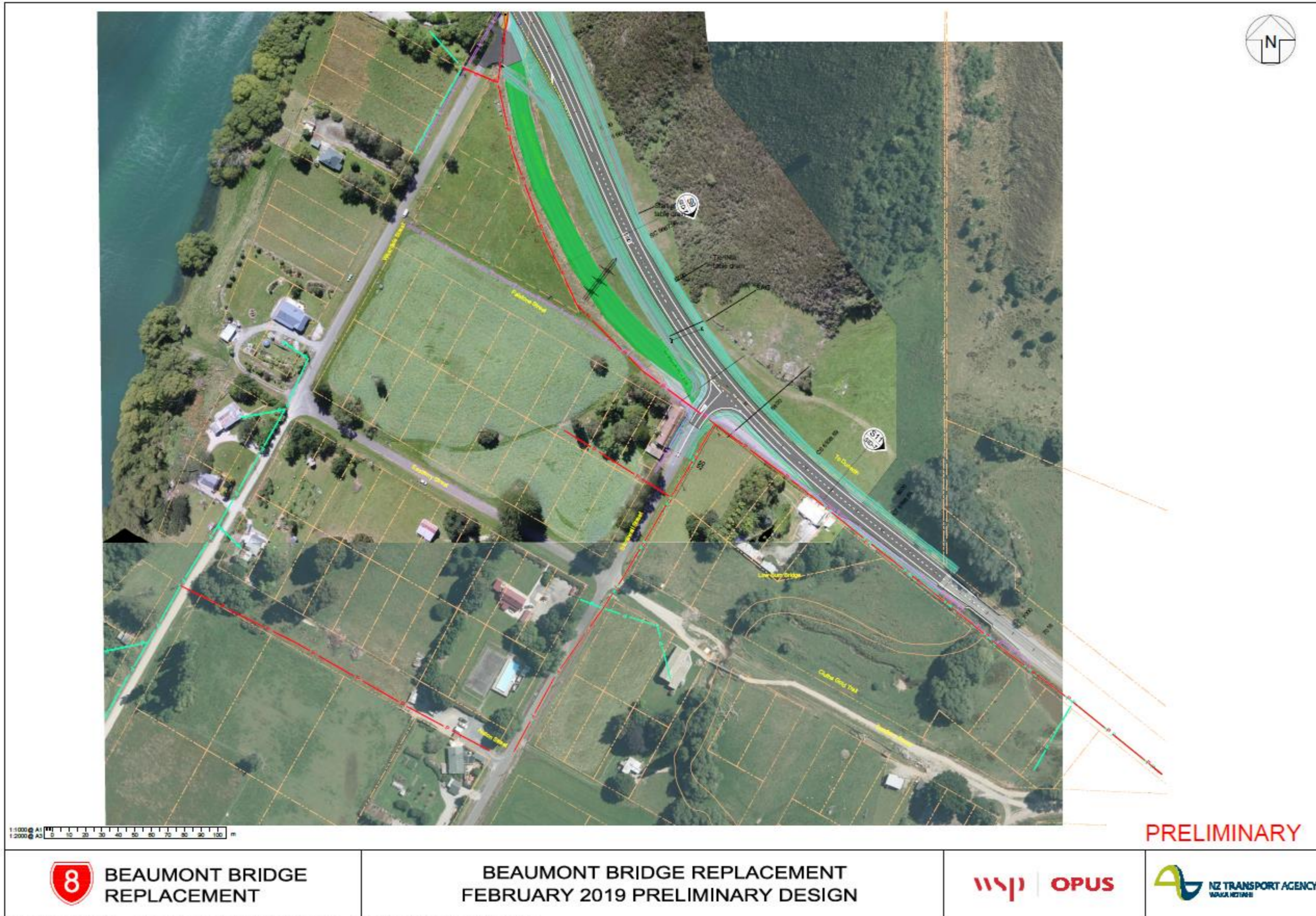
**BEAUMONT BRIDGE  
REPLACEMENT**

**BEAUMONT BRIDGE REPLACEMENT  
FEBRUARY 2019 PRELIMINARY DESIGN**



DATE: 22/02/2019 PROJECT NUMBER: 6 CT012.00 PRELIM DESIGN SHEET 2/3





**8** BEAUMONT BRIDGE REPLACEMENT

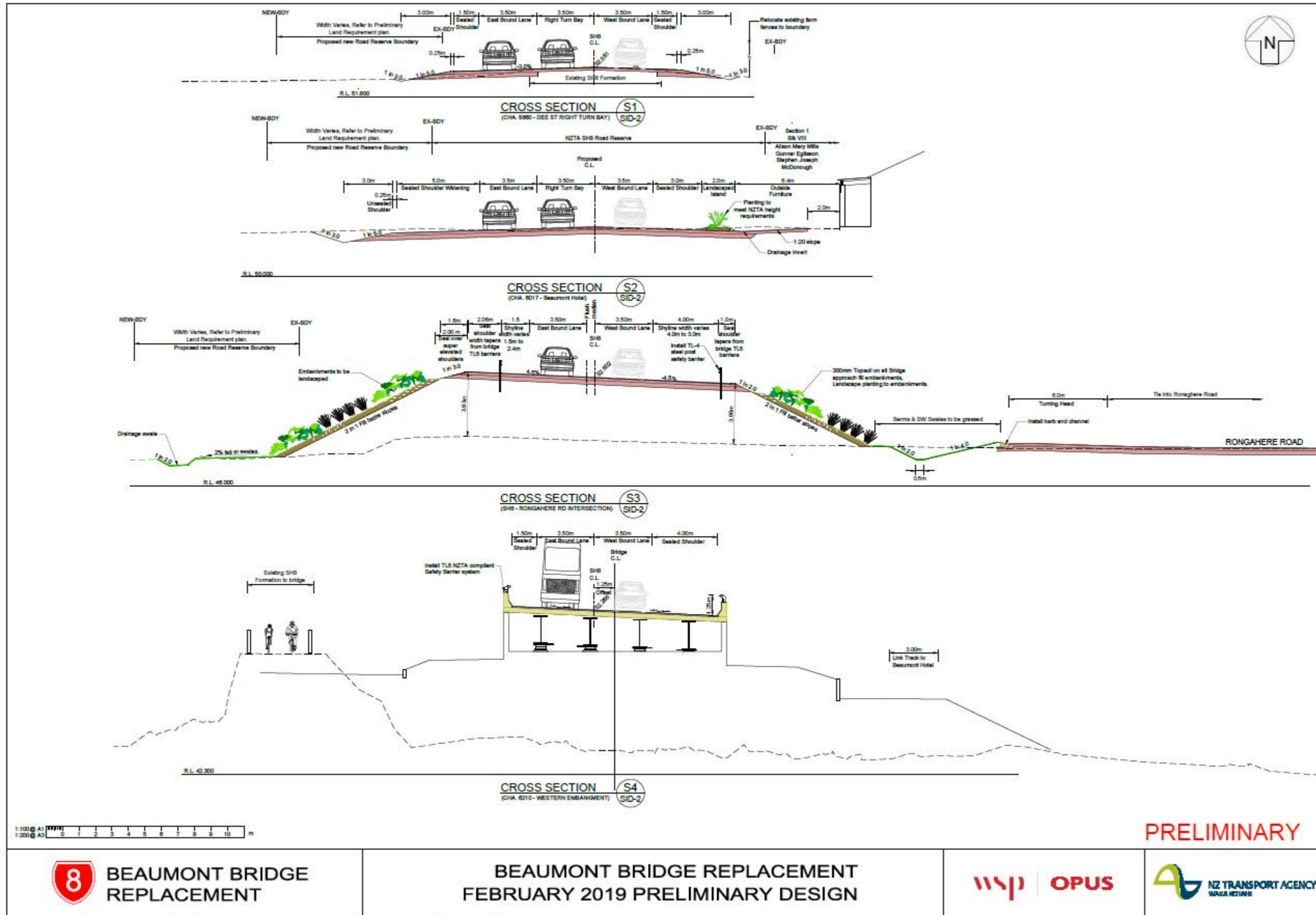
BEAUMONT BRIDGE REPLACEMENT  
FEBRUARY 2019 PRELIMINARY DESIGN

WSP | OPUS

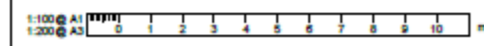
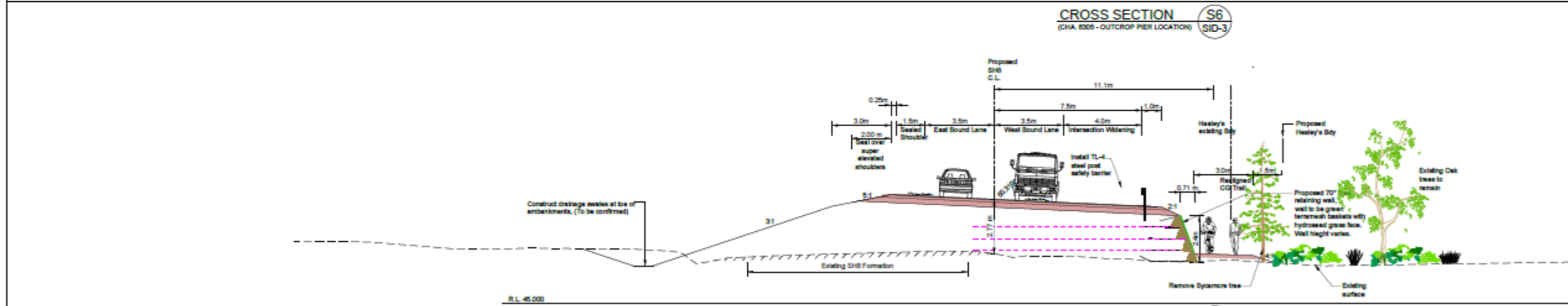
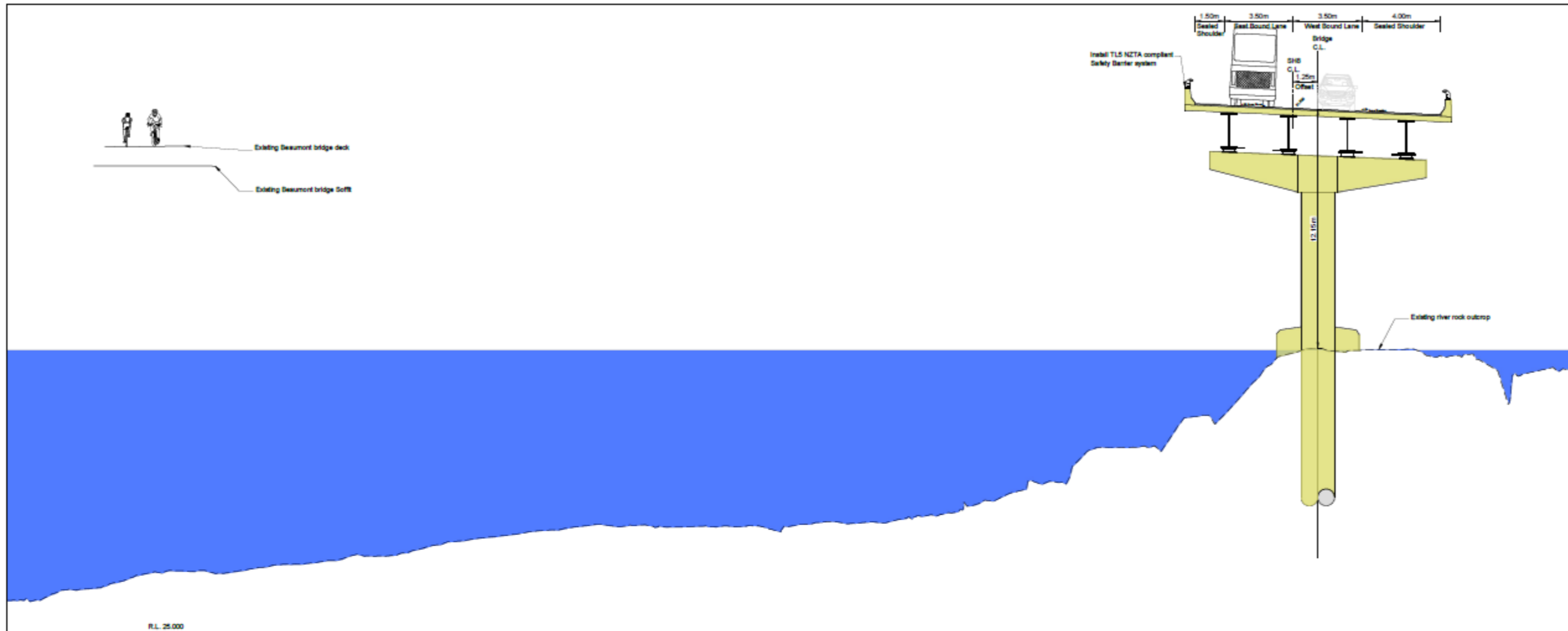
NZ TRANSPORT AGENCY  
WAIKAIHIAKI

DATE: 22/02/2019 PROJECT NUMBER: 6 CT012.00 PRELIMINARY SHEET 4/5





DATE: 22/02/2019 PROJECT NUMBER: 6 CT042.00 PRELIMINARY DESIGN SHEET 5/11

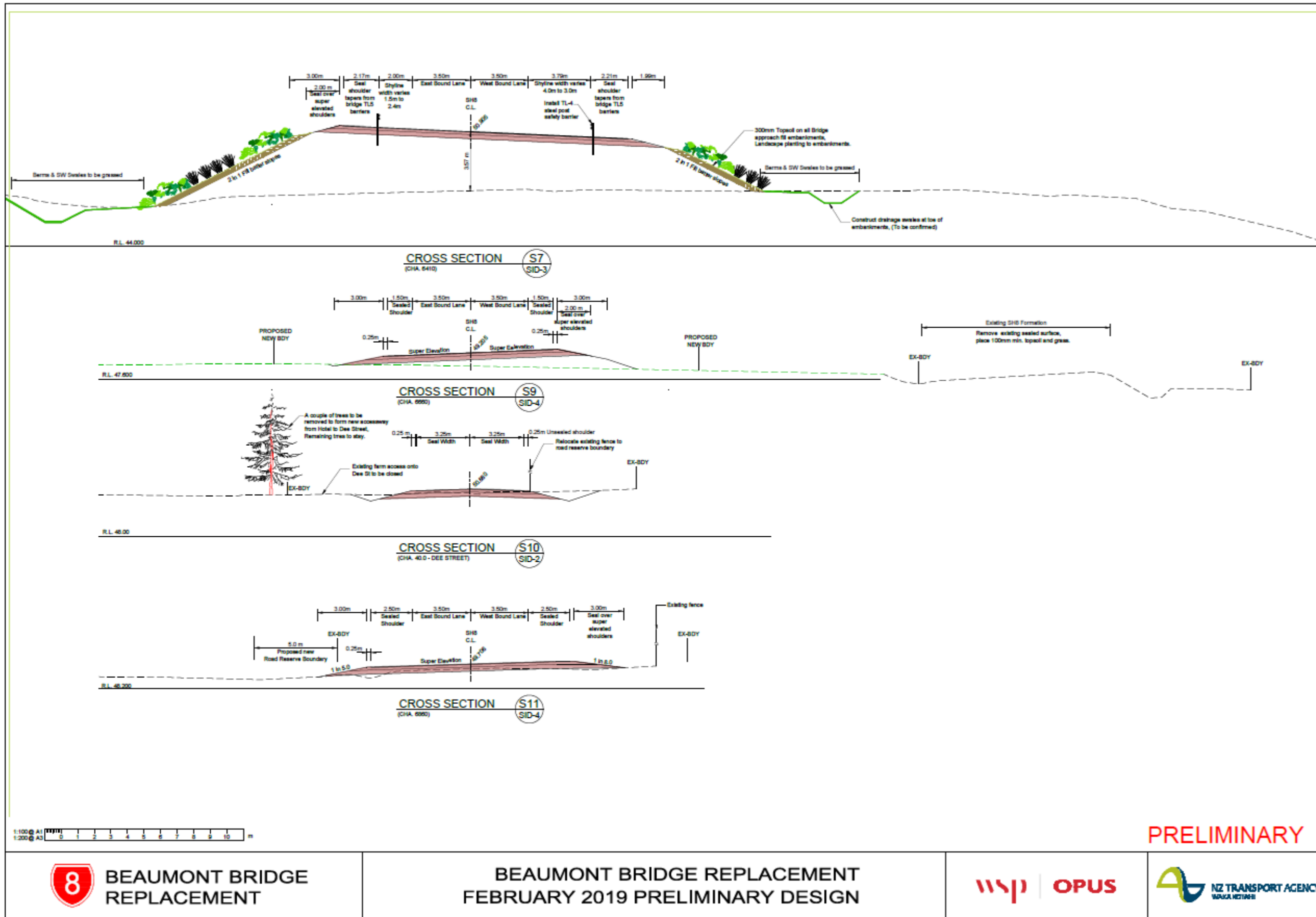


PRELIMINARY

<p><b>BEAUMONT BRIDGE REPLACEMENT</b></p>	<p><b>BEAUMONT BRIDGE REPLACEMENT FEBRUARY 2019 PRELIMINARY DESIGN</b></p>		
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DATE: 22/02/2019 PROJECT NUMBER: 8 CT012.00 SHEET NUMBER: 8/11





PRELIMINARY



BEAUMONT BRIDGE REPLACEMENT  
 FEBRUARY 2019 PRELIMINARY DESIGN



# Appendix B: Historical Information and Site Searches

# QuickMap Title Details Historic Information



Information last updated as at 17-Feb-2019

## FREEHOLD DERIVED FROM LAND INFORMATION NEW ZEALAND

**Identifier** OT14B/673  
**Land Registration District** Otago  
**Date Issued** 03 February 1992

---

### Historic Memorials

The bed of the Clutha River is excluded from Section 1 SO Plan 23609

Subject to Part IV A Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

5011169.1 Exploration Permit to Central Goldfields Mining Limited for a term of 5 years commencing on 10.10.2000 - 30.10.2000 at 9:54 am

6615393.1 Expiry of Exploration Permit 5011169.1 on 9.10.2005 - 19.10.2005 at 9:00 am

9992621.1 Transfer to Alexander Trevor Peters (1/3 share), Karen Anne Peters (1/3 share) and Alexander Trevor Peters, Karen Anne Peters and Fairfield Trustees No 3 Limited (1/3 share) - 31.3.2015 at 1:39 pm

10293471.1 Mortgage to ASB Bank Limited - 23.12.2015 at 4:38 pm

---

### Historic Owners

**CONTACT ENERGY LIMITED**

*The information provided on this report forms a guideline only. As a result, Custom Software Limited cannot and does not provide any warranties or assurances of any kind in relation to the accuracy of the information provided through this report, the Site and Service. Custom Software Limited will not be liable for any claims in relation to the content of this report, the site and this service.*

# QuickMap Title Details

Information last updated as at 05 Aug 2018



## COMPUTER FREEHOLD REGISTER DERIVED FROM LAND INFORMATION NEW ZEALAND

**Identifier** OT14B/688  
**Land Registration District** Otago  
**Date Issued** 03 February 1992

**Prior References**  
OIC 796160

**Type** Fee Simple  
**Area** 1.6900 hectares more or less  
**Legal Description** Section 1-2 Survey Office Plan 23610

**Proprietors**  
Dale Clifford Mitchell as to a 1/2 share  
Jennifer Anne Mitchell as to a 1/2 share

The bed on the Clutha River and the bed of an unnamed stream are excluded  
Subject to Part IV A Conservation Act 1987  
Subject to Section 11 Crown Minerals Act 1991  
9944846.3 Mortgage to Southland Building Society - 28.1.2015 at 3:14 pm

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# QuickMap Title Details Historic Information



Information last updated as at 05 Aug 2018

## COMPUTER FREEHOLD REGISTER DERIVED FROM LAND INFORMATION NEW ZEALAND

**Identifier** OT14B/688  
**Land Registration District** Otago  
**Date Issued** 03 February 1992

---

### Historic Memorials

The bed on the Clutha River and the bed of an unnamed stream are excluded

Subject to Part IV A Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

9944846.2 Transfer to Jennifer Anne Mitchell (1/2 share) and Dale Clifford Mitchell (1/2 share) - 28.1.2015 at 3:14 pm

9944846.3 Mortgage to Southland Building Society - 28.1.2015 at 3:14 pm

---

### Historic Owners

CONTACT ENERGY LIMITED

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## QuickMap Title Details

Information last updated as at 05 Aug 2018



### COMPUTER FREEHOLD REGISTER DERIVED FROM LAND INFORMATION NEW ZEALAND

**Identifier** OT14B/689  
**Land Registration District** Otago  
**Date Issued** 03 February 1992

**Prior References**

OIC 796160 GN 351014

**Type** Fee Simple  
**Area** 9.1391 hectares more or less  
**Legal Description** Section 3-4 Survey Office Plan 23610

**Proprietors**

Jennifer Anne Mitchell as to a 1/2 share  
Dale Clifford Mitchell as to a 1/2 share

Subject to Part IV A Conservation Act 1987  
Subject to Section 11 Crown Minerals Act 1991  
9944846.3 Mortgage to Southland Building Society - 28.1.2015 at 3:14 pm

*The information provided on this report forms a guideline only. As a result, Custom Software Limited cannot and does not provide any warranties or assurances of any kind in relation to the accuracy of the information provided through this report, the Site and Service. Custom Software Limited will not be liable for any claims in relation to the content of this report, the site and this service.*

## QuickMap Title Details Historic Information



Information last updated as at 05 Aug 2018

### COMPUTER FREEHOLD REGISTER DERIVED FROM LAND INFORMATION NEW ZEALAND

**Identifier** OT14B/689  
**Land Registration District** Otago  
**Date Issued** 03 February 1992

---

#### Historic Memorials

Subject to Part IV A Conservation Act 1987

Subject to Section 11 Crown Minerals Act 1991

9944846.2 Transfer to Jennifer Anne Mitchell (1/2 share) and Dale Clifford Mitchell (1/2 share) - 28.1.2015 at 3:14 pm

9944846.3 Mortgage to Southland Building Society - 28.1.2015 at 3:14 pm

---

#### Historic Owners

CONTACT ENERGY LIMITED

*The information provided on this report forms a guideline only. As a result, Custom Software Limited cannot and does not provide any warranties or assurances of any kind in relation to the accuracy of the information provided through this report, the Site and Service. Custom Software Limited will not be liable for any claims in relation to the content of this report, the site and this service.*

# Quickmap Title Details



Information last updated as at 17-Feb-2019

## RECORD OF TITLE DERIVED FROM LAND INFORMATION NEW ZEALAND FREEHOLD

**Identifier** OT14B/673  
**Land Registration District** Otago  
**Date Issued** 03 February 1992

**Prior References**  
 OIC 796160

---

<b>Type</b>	Fee Simple
<b>Area</b>	9.6000 hectares more or less
<b>Legal Description</b>	Section 1 and Section 4 Survey Office Plan 23609

**Registered Owners**

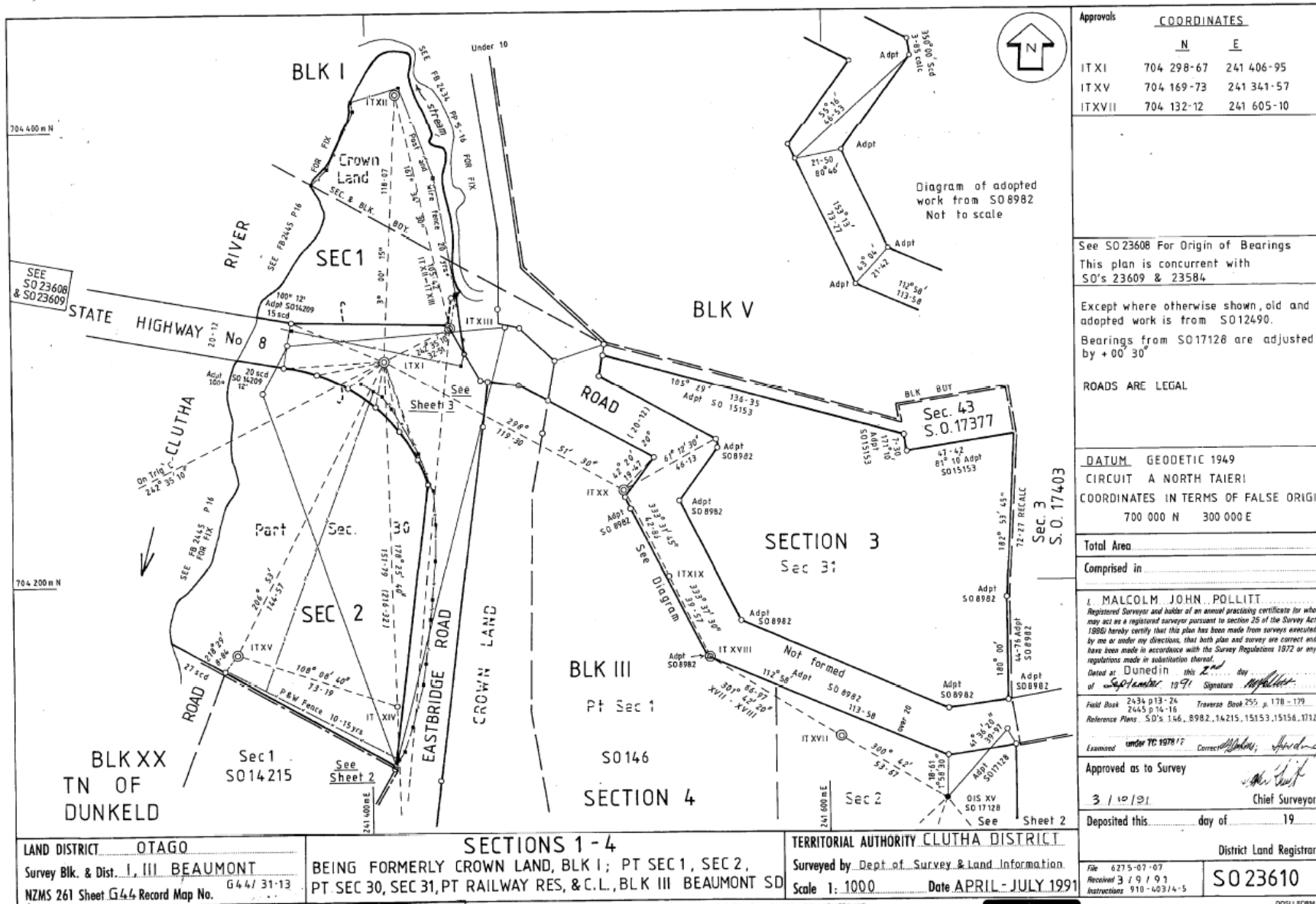
Karen Anne Peters as to a 1/3 share  
 Fairfield Trustees No 3 Limited, Alexander Trevor Peters and Karen Anne Peters as to a 1/3 share  
 Alexander Trevor Peters as to a 1/3 share

---

The bed of the Clutha River is excluded from Section 1 SO Plan 23609  
 Subject to Part IV A Conservation Act 1987  
 Subject to Section 11 Crown Minerals Act 1991  
 10293471.1 Mortgage to ASB Bank Limited - 23.12.2015 at 4:38 pm

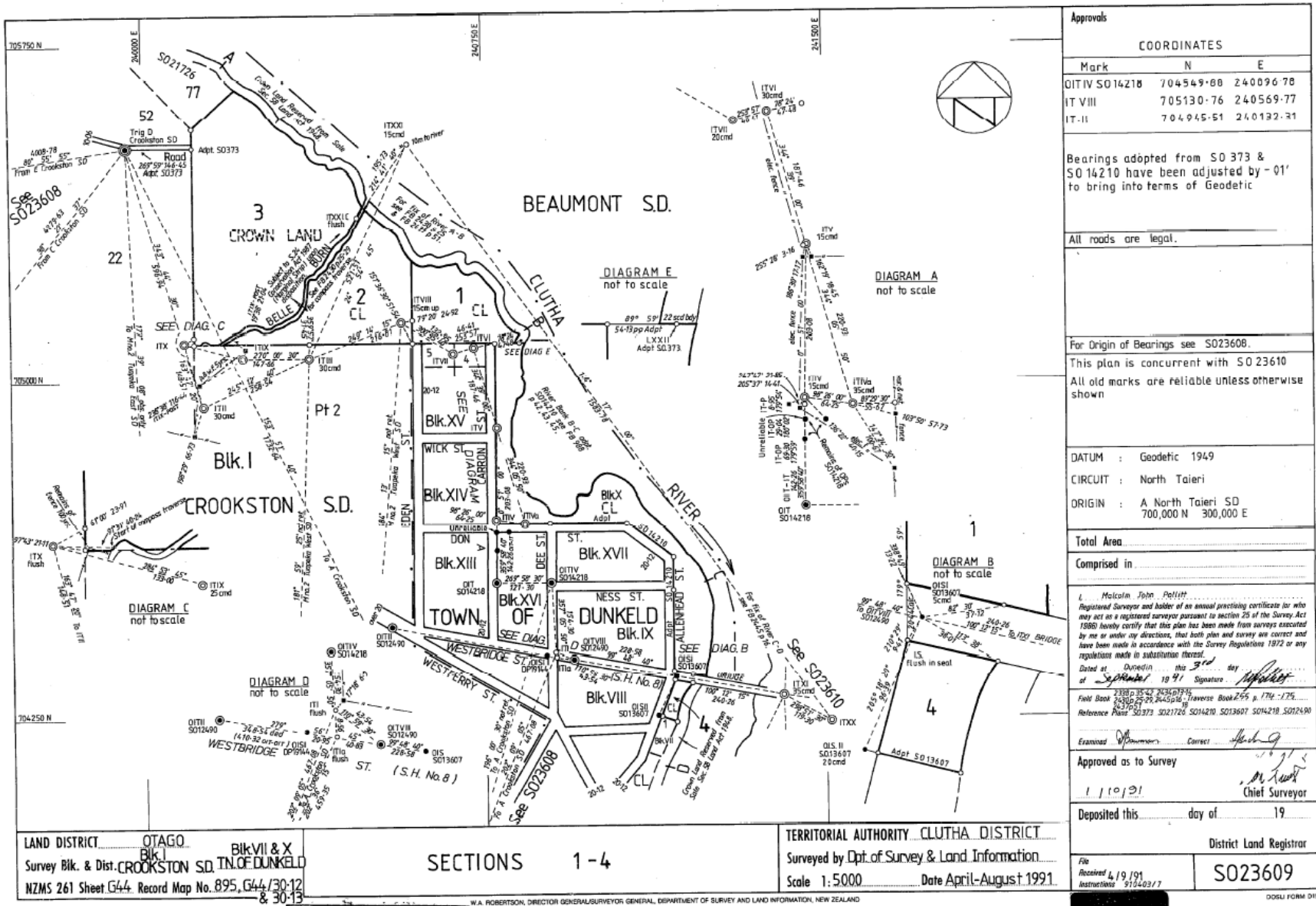
*The information provided on this report forms a guideline only. As a result, Custom Software Limited cannot and does not provide any warranties or assurances of any kind in relation to the accuracy of the information provided through this report, the Site and Service. Custom Software Limited will not be liable for any claims in relation to the content of this report, the site and this service.*





Approvals	COORDINATES	
	N	E
ITXI	704 298-67	241 406-95
ITXV	704 169-73	241 341-57
ITXVII	704 132-12	241 605-10
See SO 23608 For Origin of Bearings This plan is concurrent with SO's 23609 & 23584		
Except where otherwise shown, old and adopted work is from SO12490. Bearings from SO17128 are adjusted by +00' 30"		
ROADS ARE LEGAL		
DATUM GEODETTIC 1949 CIRCUIT A NORTH TAIERI COORDINATES IN TERMS OF FALSE ORIGIN 700 000 N 300 000 E		
Total Area		
Comprised in		
I. MALCOLM JOHN POLLITT Registered Surveyor and holder of an annual practicing certificate for who may act as a registered surveyor pursuant to section 25 of the Survey Act 1980) hereby certify that this plan has been made from surveys executed by me or under my direction, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof. Dated at Dunedin this 2nd day of September 1991 Signature <i>[Signature]</i>		
Field Book 2434 p13-24 Traverse Book 255 p. 178-179 2445 p.14-16 Reference Plans SO's 146, 8982, 14215, 15153, 15156, 17128		
Examined under TC 1978/12 Corrected <i>[Signature]</i>		
Approved as to Survey 3 / 9 / 91 Chief Surveyor <i>[Signature]</i>		
Deposited this _____ day of _____ 19 _____		
District Land Registrar		

LAND DISTRICT OTAGO	SECTIONS 1-4	TERRITORIAL AUTHORITY CLUTHA DISTRICT
Survey Blk. & Dist. I, III BEAUMONT	BEING FORMERLY CROWN LAND, BLK I; PT SEC 1, SEC 2, PT SEC 30, SEC 31, PT RAILWAY RES, & C.L., BLK III BEAUMONT SD	Surveyed by Dept of Survey & Land Information
NZMS 261 Sheet G44 Record Map No. G44/31-13	Scale 1:1000 Date APRIL - JULY 1991	File 6275-07-07 Received 3 / 9 / 91 Instructions 910-403/4-5
RM 898	Simplified Land Appellation	SO 23610



Approvals		
COORDINATES		
Mark	N	E
OITIV S014210	704549.00	240096.78
IT VIII	705130.76	240569.77
IT-II	704945.51	240132.21
Bearings adopted from S0 373 & S0 14210 have been adjusted by -01' to bring into terms of Geodetic		
All roads are legal.		
For Origin of Bearings see S023608.		
This plan is concurrent with S0 23610		
All old marks are reliable unless otherwise shown		
DATUM : Geodetic 1949		
CIRCUIT : North Taieri		
ORIGIN : A North Taieri SD 700,000 N 300,000 E		
Total Area		
Comprised in		
I. Malcolm John Pettitt Registered Surveyor and holder of an annual practicing certificate for who may act as a registered surveyor pursuant to section 25 of the Survey Act 1980 hereby certify that this plan has been made from surveys executed by me or under my direction, that both plan and survey are correct and have been made in accordance with the Survey Regulations 1972 or any regulations made in substitution thereof. Dated at Dunedin this 3rd day of September 1991 Signature <i>M. J. Pettitt</i>		
Field Book 2388 p. 35-42 24-26-0191 24-30-25-28, 24-52-16; Traverse Book 265 p. 174-175 Reference Plans S0373 S021726 S014210 S013607 S014218 S012490		
Examined <i>[Signature]</i> Correct <i>[Signature]</i>		
Approved as to Survey 11/09/91 <i>[Signature]</i> Chief Surveyor		
Deposited this _____ day of _____ 19 _____		
		District Land Registrar
File Received 4/19/91 Instructions 910403/7	S023609	

LAND DISTRICT OTAGO  
Survey Bk. & Dist. CROOKSTON S.D. IN OF DUNKELD  
NZMS 261 Sheet G44 Record Map No. 895, G44/30-12 & 30-13

SECTIONS 1-4

TERRITORIAL AUTHORITY CLUTHA DISTRICT  
Surveyed by Dpt. of Survey & Land Information  
Scale 1:5000 Date April-August 1991

Simplified Land Appellation

W.A. ROBERTSON, DIRECTOR GENERAL/SURVEYOR GENERAL, DEPARTMENT OF SURVEY AND LAND INFORMATION, NEW ZEALAND

DSOL FORM 016



10 August 2018

Dear Beth,

Thank you for your enquiry regarding information that the Otago Regional Council may hold regarding potential soil contamination at the properties indicated below:

Legal Description / Title / Valuation Number
Section 4 Survey Office Plan 23609, Title No. OB/673T, valuation no. 28607-01100
Section 2 Survey Office Plan 23610, Title No. OT14B/688, valuation no. 28603-00100
Section 4 Survey Office Plan 23610, Title No. OT14B/689, valuation no. 28603-01800

The Otago Regional Council maintains a database of properties where information is held regarding current or past land-uses that have the potential to contaminated land. Land-uses that have the potential to contaminate land are outlined in the [Ministry for the Environment's Hazardous Activities and Industries List \(HAIL\)](#).

Where investigation has been completed, results have been compared to relevant soil guideline values. The database is continually under development, and should not be regarded as a complete record of all properties in Otago. The absence of available information does not necessarily mean that the property is uncontaminated; rather no information exists on the database. You may also wish to examine the property file at the relevant City or District Council to check if there is any evidence that activities occurring on the HAIL have taken place.

I can confirm that:

The above land does not currently appear on the database.

If your enquiry relates to a rural property, please note that many current and past activities undertaken on farms may not be listed on the database, as they can be more difficult to identify. Activities such as use, storage, formulation, and disposal of pesticides, offal pits, landfills, animal dips, and fuel tanks have the potential to contaminated land.

Similarly, the long-term use of lead-based paints on buildings can, in some cases, cases cause soil contamination. The use of lead-based paint is generally not recorded on the database.

Please feel free to contact me if you have any other enquires, or you would like to discuss the matter further,

Regards,


A handwritten signature in black ink, appearing to read "S. Beardmore".

Simon Beardmore  
Senior Environmental Officer

The enclosed/attached information is derived from the Otago Regional contaminated land register and is being disclosed to you pursuant to the Local Government Official Information and Meetings Act 1987. This information reflects the Otago Regional Council's current understanding of this site, which is based solely on the information obtained by the Council and held on record. It is disclosed only as a copy of those records and is not intended to provide a full, complete or entirely accurate assessment of the site. Accordingly, the Otago Regional Council is not in a position to warrant that the information is complete or without error and accepts no liability for any

# Appendix C: Natural Hazard Report



 <p><b>Otago Regional Council</b></p>	<p><b>Natural Hazards Database Report</b></p> <p>The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).</p> <p>CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.</p>	<p>Friday, 10 August 2018</p>
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**Valuation Information**

<b>Valuation Number</b>
2860301800

**Parcel Information**

LINZ Parcel Information

Parcel Id	Appellation	Affected Surveys	Survey Area	Calculated Area
3131244	Section 4 SO 23610	SO 23610	76289	76487
3031503	Section 3 SO 23610	SO 23610	15102	15061

**Title Information**

LINZ Title Information

Title No	Status	Type	Land District	Issue Date	Guarantee Status	Estate Description	Owners
OT14B/689	LIVE	Freehold	Otago		Guarantee	Fee Simple, 1/1, Section 3-4 Survey Office Plan 23610, 91,391 m <sup>2</sup>	2

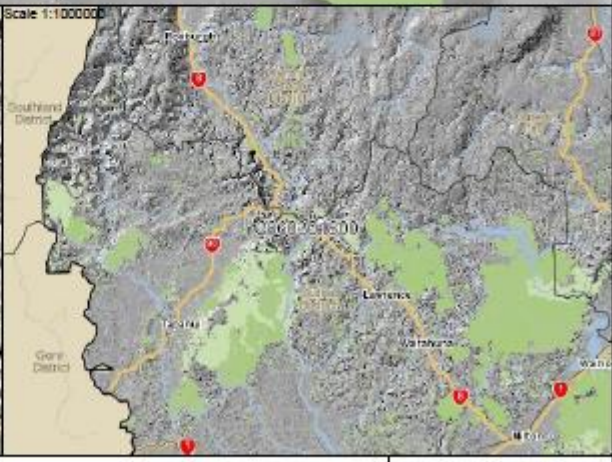
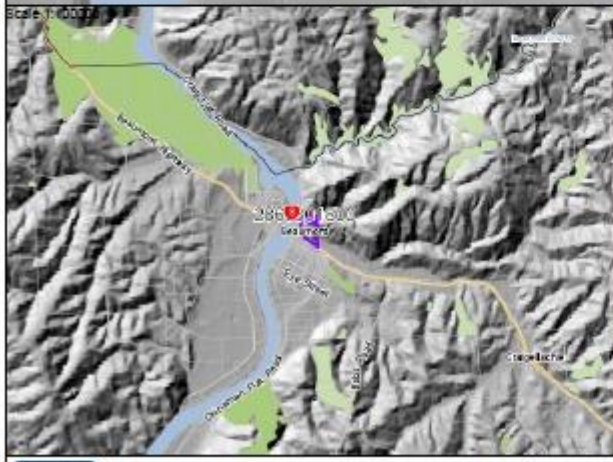




**Aerial Photo Map**  
 The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).  
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**NORTH**  
 Scale 1:3000  
 Friday, 10 August 2018  
 Original Sheet Size 210x297mm





**Location Maps**  
 The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from land information New Zealand's (LINZ) Core Record System Database (CRS).  
 CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.


**NORTH**

Friday, 10 August 2018

Original Sheet Size 210x297mm






 <p>Otago Regional Council</p>	<p><b>Flooding Data</b>                  The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).                  CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.</p>	<p>Friday, 10 August 2018</p>
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**Flooding Information**

Flooding Information

Source Report	Flood Hazard Updated	Limitations	Description	Disclaimer
Clutha District Floodplain Report (July 1999)	July 1999	Accuracy of flood hazard margin indicative only		This Natural Hazards Database provides information about known occurrences of hazards. The hazard information is generally relevant over a reasonably wide area. As such, the information contained within this database is not a substitute for a Land Information Memoranda (LIM), which will provide relevant hazard information relating to specific parcels of land. A LIM may be obtained from the relevant local authority (District or City Council).




	<p><b>Seismic Liquefaction Data</b></p> <p>The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).</p> <p>CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.</p>	<p>Friday, 10 August 2018</p>
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**Liquefaction Information**

Liquefaction Information

Source Report	Susceptibility	Description	Material Description	Disclaimer
Seismic Risk in the Otago Region (Mar 2005)	Possibly Susceptible	Very loose to medium dense sediments, liquefaction and settlement are possible with seismic shaking of sufficient intensity.	Peat, Mud, Swamp, Tailings, Reclamation, Fill, and Loose/Soft to Medium Dense: Alluvium, Lake Deposits, Beach Gravels & Sands, Scree, Alluvial Fans, Sand Dunes, Till.	This Natural Hazards Database provides information about known occurrences of hazards. The hazard information is generally relevant over a reasonably wide area. As such, the information contained within this database is not a substitute for a Land Information Memoranda (LIM), which will provide relevant hazard information relating to specific parcels of land. A LIM may be obtained from the relevant local authority (District or City Council).



	<p><b>Documents</b></p> <p>The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).</p> <p>CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.</p>	<p>Friday, 10 August 2018</p>
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**1. Flood Reports**

List of Flood Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Flood Response Handbook (June 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=6">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=6</a>	M	39203
The Natural Hazards of South Dunedin report - July 2016 Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=607">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=607</a>		2016/07/01
Coastal Otago flood event 3 June 2015 (2015) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=606">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=606</a>		2015/10/01
Flood event 24 - 29 May 2010 (June 2010) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=75">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=75</a>	H	2010/06/01
July Floods 07 (Aug 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=65">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=65</a>	H	2007/08/06
Flood Procedures Summary Document (Nov 2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=64">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=64</a>		2006/11/20
Otago Flood Event 25th and 26th April 2006 (May 2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=71">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=71</a>	H	2006/05/25
Floodplain development and flooding risk in Otago (Sep 2005) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=90">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=90</a>		2005/09/08
Flood in the Clutha Catchment (Oct 2002) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=84">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=84</a>		2002/10/02
Flood in Waipahi, Lower Pomahaka and Catlins (May 2002) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=86">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=86</a>		2002/05/27
Flooding of early January 2002 (Jan 2002) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=88">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=88</a>	H	2002/01/21
The Project Seeking Practicable Solutions For Clutha River System Flooding (June 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=97">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=97</a>		2000/06/01
Clutha Hydro Dams - PMF Update (May 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=127">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=127</a>		2000/05/01
Clutha River Catchment November 1999 Flood Report (March 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=23">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=23</a>		2000/03/01
Clutha River Catchment Updated Flood Frequency Analyses (March 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=25">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=25</a>		2000/03/01
Clutha District Floodplain Report (July 1999) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=18">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=18</a>		1999/07/01
Clutha District Floodplain Report (Nov 1998) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=140">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=140</a>		1998/01/11
Clutha Flood Report for Flood of 14 December 1995 (March 1996) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=20">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=20</a>		1996/03/01
October 1978 Clutha Flood Report (November 1995) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=28">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=28</a>		1995/11/01
Clutha River Flood Audit For Flood of 9 to 10 January 1994 (Jan 1994) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=108">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=108</a>		1994/01/28
Report on floodplains within the Clutha District (October 1991) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=30">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=30</a>		1991/10/01
Clyde Power Project - Clyde Dam Break Analysis (Dec 1989) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=132">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=132</a>		1989/12/31
Flood Forecasting on the Lower Clutha Catchment (Feb 1985) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=130">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=130</a>		1985/02/01
Otago Catchment Board Flood Report 1980 - A Collection of Diary Notes, Reports, Data and Press Clippings (1980) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=17">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=17</a>		1980/12/12

Document Title	Relevance Category	Date Publication
Clutha Flood of October 1978 (Dec 1978) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=123">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=123</a>		1978/12/31
The 100 Year Flood - 1978 (1978) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=116">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=116</a>	L	1978/12/31
Flood Disaster 1978 (Nov 1978) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=117">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=117</a>		1978/11/30
The Great Flood of '78 (Aug 1978) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=118">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=118</a>		1978/08/01
Clutha Power Development - Flows and Design Floods (Mar 1977) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=114">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=114</a>		1977/03/01
Flood and Storm in Central Otago 1878 (1966) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=139">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=139</a>	L	1966/01/01
Supplement to Floods in New Zealand 1920-53 - District Maps (1957) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=120">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=120</a>		1957/12/31

## 2. Flood Protection Reports

List of Flood Protection Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Flood Protection Management Bylaw (2012) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=575">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=575</a>		2012/09/01
Flood Protection Management Bylaw (Sep 2012) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=556">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=556</a>	H	2012/01/09
Clutha Flood November 1999 Operational Audit Clyde, Roxburgh and Hawea Dams (May 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=494">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=494</a>	L	2000/05/01

## 3. Alluvial Fan Reports

List of Alluvial Fan Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Otago Alluvial Fans Project Supplementary Investigation (Apr 2009) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=267">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=267</a>	H	39904
Otago Alluvial Fans Project Regional Review (Mar 2009) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=266">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=266</a>	H	39873
Otago Alluvial Fans Project - Interim Report (May 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=268">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=268</a>	L	39203
Assessment of debris flow potential on alluvial fans in Otago, New Zealand, using morphometry (June 2010) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=276">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=276</a>	L	2010/06/01
Otago Alluvial Fans Hazards (April 2009) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=271">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=271</a>	H	2009/04/06
Otago Alluvial Fans Hazard Identification (June 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=270">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=270</a>	M	2007/06/01

## 4. Seismic Reports

List of Seismic Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Seismic Risk in the Otago Region (Mar 2005) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=281">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=281</a>	H	38412
Earthquake Hazards in the Otago Region (Aug 1995) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=282">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=282</a>	M	34912
Evaluation of projected earthquake induced losses to underground water services assets, Clutha District (2012) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=571">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=571</a>		2012/01/01
Report received Seismic Risk in the Otago Region (May 2005) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=285">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=285</a>	M	2005/05/27
Strain Accumulation and Episodicity of Fault Movements in Otago (June 2004) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=289">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=289</a>	L	2004/06/01

Document Title	Relevance Category	Date Publication
Otago Regional Council issues associated with the 22 August earthquake (Aug 2003) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=284">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=284</a>	L	2003/08/25
Planning for Development of Land on or Close to Active Faults (July 2003) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=578">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=578</a>		2003/07/01
Seismic Risk in Otago (May 2003) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=286">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=286</a>	M	2003/05/21
Probability of Rupture of the Alpine Fault Allowing for Uncertainties (Sep 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=287">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=287</a>	L	2000/09/01
Probability and Consequences of the next Alpine Fault Earthquake (Mar 1998) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=295">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=295</a>	L	1998/03/31
Seismotectonic Evaluation of Fault Structures in East Otago (1991) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=291">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=291</a>	L	1991/12/31

### 5. Tsunami Reports

No Tsunami Reports available

### 6. Coastal Reports (including Storm Surge)

No Coastal Reports (including Storm Surge) available

### 7. Landslide Reports

List of Landslide Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Regional Landslip Risk and Inventory Project (July 2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=369">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=369</a>	H	2006/07/19
Regional Landslip Risk and Inventory Project Report (IID) (2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=584">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=584</a>		2006/07/11
Geology of the Murihiku Area (2003) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=553">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=553</a>	H	2003/01/01
Geology of the Wakatipu Area (2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=546">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=546</a>	H	2000/01/01
Geology of Dunedin Area (1996) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=549">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=549</a>	H	1996/01/01

### 8. General Natural Hazard Reports

List of General Natural Hazard Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Trends and Variability of Temperature Extremes in Southern New Zealand (Nov 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=485">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=485</a>	L	2007/11/08
Emergency Management (Aug 2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=483">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=483</a>	L	2006/08/01
Precipitation Variability in the South Island of New Zealand (Dec 2005) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=491">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=491</a>	L	2005/12/01
Safeguarding Otago's Water Resources a State of the Environment Report (April 2001) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=504">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=504</a>	L	2001/01/04
Clutha Catchment Monitoring Report (Nov 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=506">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=506</a>	L	2000/01/11
The effects of the 1999 Drought on Otago's Rivers (Jan 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=570">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=570</a>		2000/01/01
The Climate and Weather of the Otago Region (1968) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=502">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=502</a>	L	1968/12/31
Rivers Commission Reports on Clutha River (1878 to 1920) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=496">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=496</a>	L	1920/12/31

### 9. Gravel and Sedimentation Reports

List of Gravel and Sedimentation Hazard Reports for the Otago Region


Document Title	Relevance Category	Date Publication
Clutha River Sediment Budget (Nov 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=462">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=462</a>		2000/11/01

#### 10. Snow Reports

List of Snow Reports for the Otago Region

Document Title	Relevance Category	Date Publication
The Potential Impact of Climate Change on Seasonal Snow Condition in NZ (Nov 2010) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=420">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=420</a>	L	2010/01/11
Natural Hazards 2006 - The Canterbury Snowstorm (Mar 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=418">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=418</a>	L	2007/03/01



	<b>Natural Hazards Database Report</b> The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS). CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.	Friday, 10 August 2018
	Valuation Information	

<b>Valuation Number</b> 2860301800
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**Parcel Information**

LINZ Parcel Information

Parcel Id	Appellation	Affected Surveys	Survey Area	Calculated Area
3131244	Section 4 SO 23610	SO 23610	76289	76487
3031503	Section 3 SO 23610	SO 23610	15102	15061

**Title Information**

LINZ Title Information

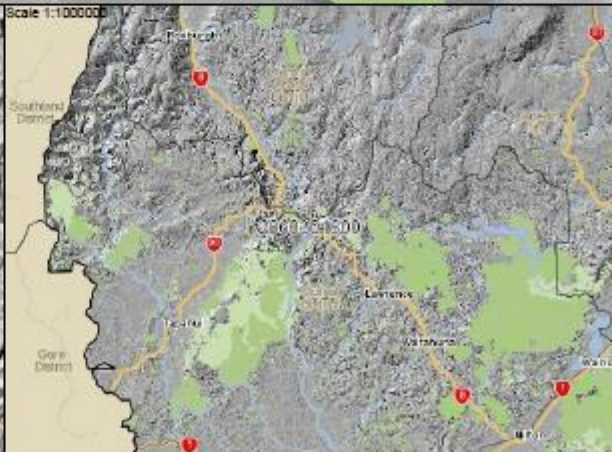
Title No	Status	Type	Land District	Issue Date	Guarantee Status	Estate Description	Owners
OT14B/689	LIVE	Freehold	Otago		Guarantee	Fee Simple, 1/1, Section 3-4 Survey Office Plan 23610, 91,391 m <sup>2</sup>	2

Scenario	Description
Rural / lifestyle block	<p>Rural residential land use, including home-grown produce consumption (25 per cent). Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land.</p> <p>Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home-grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site-specific basis.</p>
Residential	Standard residential lot, for single dwelling sites with gardens, including home-grown produce consumption (10 per cent).
High-density residential	Urban residential with limited soil contact, including small ornamental gardens but no vegetable garden (no home-grown produce consumption); applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens, but not high-rise apartments.
Parks / recreational	Public and private green areas and reserves used for active sports and recreation. This scenario is intended to cover playing fields and suburban reserves where children play frequently. It can also reasonably cover secondary school playing fields but not primary school playing fields.
Commercial / industrial outdoor worker (unpaved)	Commercial / industrial site with varying degrees of exposed soil. Exposure of outdoor workers to near-surface soil during routine maintenance and gardening activities with occasional excavation as part of maintaining subsurface utilities (ie, a caretaker or site maintenance personnel). Also conservatively applicable to outdoor workers on a largely unpaved site.



	<p><b>Aerial Photo Map</b></p> <p>The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).</p> <p>CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.</p>	<p><b>NORTH</b></p> <p>Scale 1:3000</p> <p>Friday, 10 August 2018</p> <p>Original Sheet Size 210x297mm</p>
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**Location Maps**

The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).

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Friday, 10 August 2018

Original Sheet Size 210x297mm






	<p><b>Flooding Data</b></p> <p>The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).</p> <p>CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.</p>	<p>Friday, 10 August 2018</p>
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**Flooding Information**

Flooding Information

Source Report	Flood Hazard Updated	Limitations	Description	Disclaimer
Clutha District Floodplain Report (July 1999)	July 1999	Accuracy of flood hazard margin indicative only		<p>This Natural Hazards Database provides information about known occurrences of hazards. The hazard information is generally relevant over a reasonably wide area. As such, the information contained within this database is not a substitute for a Land Information Memoranda (LIM), which will provide relevant hazard information relating to specific parcels of land. A LIM may be obtained from the relevant local authority (District or City Council).</p>




 <p>Otago Regional Council</p>	<p><b>Seismic Liquefaction Data</b></p> <p>The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).</p> <p>CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.</p>	<p>Friday, 10 August 2018</p>
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**Liquefaction Information**

Liquefaction Information

Source Report	Susceptibility	Description	Material Description	Disclaimer
Seismic Risk in the Otago Region (Mar 2005)	Possibly Susceptible	Very loose to medium dense sediments, liquefaction and settlement are possible with seismic shaking of sufficient intensity.	Peat, Mud, Swamp, Tailings, Reclamation, Fill, and Loose/Soft to Medium Dense: Alluvium, Lake Deposits, Beach Gravels & Sands, Scree, Alluvial Fans, Sand Dunes, Till.	This Natural Hazards Database provides information about known occurrences of hazards. The hazard information is generally relevant over a reasonably wide area. As such, the information contained within this database is not a substitute for a Land Information Memoranda (LIM), which will provide relevant hazard information relating to specific parcels of land. A LIM may be obtained from the relevant local authority (District or City Council).



	<p><b>Documents</b></p> <p>The information displayed is schematic only and serves as a guide. It has been compiled from Otago Regional Council's records and is made available in good faith but its accuracy or completeness is not guaranteed. Cadastral information has been derived from Land Information New Zealand's (LINZ) Core Record System Database (CRS).</p> <p>CROWN COPYRIGHT RESERVED. © Copyright Otago Regional Council.</p>	<p>Friday, 10 August 2018</p>
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**1. Flood Reports**

List of Flood Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Flood Response Handbook (June 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=6">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=6</a>	M	39203
The Natural Hazards of South Dunedin report - July 2016 Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=607">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=607</a>		2016/07/01
Coastal Otago flood event 3 June 2015 (2015) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=606">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=606</a>		2015/10/01
Flood event 24 - 29 May 2010 (June 2010) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=75">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=75</a>	H	2010/06/01
July Floods 07 (Aug 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=65">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=65</a>	H	2007/08/06
Flood Procedures Summary Document (Nov 2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=64">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=64</a>		2006/11/20
Otago Flood Event 25th and 26th April 2006 (May 2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=71">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=71</a>	H	2006/05/25
Floodplain development and flooding risk in Otago (Sep 2005) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=90">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=90</a>		2005/09/08
Flood in the Clutha Catchment (Oct 2002) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=84">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=84</a>		2002/10/02
Flood in Waipahi, Lower Pomahaka and Catlins (May 2002) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=86">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=86</a>		2002/05/27
Flooding of early January 2002 (Jan 2002) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=88">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=88</a>	H	2002/01/21
The Project Seeking Practicable Solutions For Clutha River System Flooding (June 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=97">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=97</a>		2000/06/01
Clutha Hydro Dams - PMF Update (May 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=127">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=127</a>		2000/05/01
Clutha River Catchment November 1999 Flood Report (March 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=23">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=23</a>		2000/03/01
Clutha River Catchment Updated Flood Frequency Analyses (March 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=25">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=25</a>		2000/03/01
Clutha District Floodplain Report (July 1999) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=18">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=18</a>		1999/07/01
Clutha District Floodplain Report (Nov 1998) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=140">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=140</a>		1998/01/11
Clutha Flood Report for Flood of 14 December 1995 (March 1996) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=20">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=20</a>		1996/03/01
October 1978 Clutha Flood Report (November 1995) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=28">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=28</a>		1995/11/01
Clutha River Flood Audit For Flood of 9 to 10 January 1994 (Jan 1994) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=108">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=108</a>		1994/01/28
Report on floodplains within the Clutha District (October 1991) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=30">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=30</a>		1991/10/01
Clyde Power Project - Clyde Dam Break Analysis (Dec 1989) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=132">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=132</a>		1989/12/31
Flood Forecasting on the Lower Clutha Catchment (Feb 1985) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=130">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=130</a>		1985/02/01
Otago Catchment Board Flood Report 1980 - A Collection of Diary Notes, Reports, Data and Press Clippings (1980) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=17">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=17</a>		1980/12/12

Document Title	Relevance Category	Date Publication
Clutha Flood of October 1978 (Dec 1978) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=123">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=123</a>		1978/12/31
The 100 Year Flood - 1978 (1978) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=116">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=116</a>	L	1978/12/31
Flood Disaster 1978 (Nov 1978) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=117">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=117</a>		1978/11/30
The Great Flood of '78 (Aug 1978) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=118">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=118</a>		1978/08/01
Clutha Power Development - Flows and Design Floods (Mar 1977) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=114">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=114</a>		1977/03/01
Flood and Storm in Central Otago 1878 (1966) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=139">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=139</a>	L	1966/01/01
Supplement to Floods in New Zealand 1920-53 - District Maps (1957) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=120">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=120</a>		1957/12/31

## 2. Flood Protection Reports

List of Flood Protection Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Flood Protection Management Bylaw (2012) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=575">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=575</a>		2012/09/01
Flood Protection Management Bylaw (Sep 2012) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=556">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=556</a>	H	2012/01/09
Clutha Flood November 1999 Operational Audit Clyde, Roxburgh and Hawea Dams (May 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=494">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=494</a>	L	2000/05/01

## 3. Alluvial Fan Reports

List of Alluvial Fan Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Otago Alluvial Fans Project Supplementary Investigation (Apr 2009) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=267">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=267</a>	H	39904
Otago Alluvial Fans Project Regional Review (Mar 2009) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=266">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=266</a>	H	39873
Otago Alluvial Fans Project - Interim Report (May 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=268">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=268</a>	L	39203
Assessment of debris flow potential on alluvial fans in Otago, New Zealand, using morphometry (June 2010) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=276">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=276</a>	L	2010/06/01
Otago Alluvial Fans Hazards (April 2009) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=271">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=271</a>	H	2009/04/06
Otago Alluvial Fans Hazard Identification (June 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=270">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=270</a>	M	2007/06/01

## 4. Seismic Reports

List of Seismic Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Seismic Risk in the Otago Region (Mar 2005) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=281">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=281</a>	H	38412
Earthquake Hazards in the Otago Region (Aug 1995) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=282">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=282</a>	M	34912
Evaluation of projected earthquake induced losses to underground water services assets, Clutha District (2012) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=571">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=571</a>		2012/01/01
Report received Seismic Risk in the Otago Region (May 2005) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=285">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=285</a>	M	2005/05/27
Strain Accumulation and Episodicity of Fault Movements in Otago (June 2004) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=289">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=289</a>	L	2004/06/01

Document Title	Relevance Category	Date Publication
Otago Regional Council issues associated with the 22 August earthquake (Aug 2003) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=284">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=284</a>	L	2003/08/25
Planning for Development of Land on or Close to Active Faults (July 2003) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=578">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=578</a>		2003/07/01
Seismic Risk in Otago (May 2003) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=286">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=286</a>	M	2003/05/21
Probability of Rupture of the Alpine Fault Allowing for Uncertainties (Sep 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=287">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=287</a>	L	2000/09/01
Probability and Consequences of the next Alpine Fault Earthquake (Mar 1998) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=295">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=295</a>	L	1998/03/31
Seismotectonic Evaluation of Fault Structures in East Otago (1991) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=291">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=291</a>	L	1991/12/31

### 5. Tsunami Reports

No Tsunami Reports available

### 6. Coastal Reports (including Storm Surge)

No Coastal Reports (including Storm Surge) available

### 7. Landslide Reports

List of Landslide Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Regional Landslip Risk and Inventory Project (July 2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=369">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=369</a>	H	2006/07/19
Regional Landslip Risk and Inventory Project Report (IID) (2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=584">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=584</a>		2006/07/11
Geology of the Murihiku Area (2003) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=553">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=553</a>	H	2003/01/01
Geology of the Wakatipu Area (2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=546">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=546</a>	H	2000/01/01
Geology of Dunedin Area (1996) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=549">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=549</a>	H	1996/01/01

### 8. General Natural Hazard Reports

List of General Natural Hazard Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Trends and Variability of Temperature Extremes in Southern New Zealand (Nov 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=485">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=485</a>	L	2007/11/08
Emergency Management (Aug 2006) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=483">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=483</a>	L	2006/08/01
Precipitation Variability in the South Island of New Zealand (Dec 2005) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=491">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=491</a>	L	2005/12/01
Safeguarding Otago's Water Resources a State of the Environment Report (April 2001) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=504">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=504</a>	L	2001/01/04
Clutha Catchment Monitoring Report (Nov 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=506">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=506</a>	L	2000/01/11
The effects of the 1999 Drought on Otago's Rivers (Jan 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=570">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=570</a>		2000/01/01
The Climate and Weather of the Otago Region (1968) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=502">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=502</a>	L	1968/12/31
Rivers Commission Reports on Clutha River (1878 to 1920) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=496">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=496</a>	L	1920/12/31

### 9. Gravel and Sedimentation Reports

List of Gravel and Sedimentation Hazard Reports for the Otago Region

Document Title	Relevance Category	Date Publication
Clutha River Sediment Budget (Nov 2000) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=462">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=462</a>		2000/11/01

**10. Snow Reports**

List of Snow Reports for the Otago Region

Document Title	Relevance Category	Date Publication
The Potential Impact of Climate Change on Seasonal Snow Condition in NZ (Nov 2010) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=420">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=420</a>	L	2010/01/11
Natural Hazards 2006 - The Canterbury Snowstorm (Mar 2007) Link to Document: <a href="http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=418">http://hazards.orc.govt.nz/intramaps/DMSNZ/NHDB/showPDF.aspx?did=418</a>	L	2007/03/01



# Appendix D: Site Layout Plan



Key

- Approximate site boundary
- Possible Sheep dip
- car parking area
- Railway line

# Appendix E: Site Photographs





Photo 1: Eastern paddock on true left of SH8



Photo 2: Eastern Bank paddock on true right of SH8





Photo 3: Sheep dip/drenching run in eastern bank paddock



Photo 4: Eastern abutment of existing bridge





Photo 5: Western bank viewed from eastern bank



Photo 6: Eastern bank and existing bridge viewed from western bank





Photo 7: Eastern bank viewed from western bank



Photo 8: Rest area / boat ramp on western bank





Photo 9: Access road to rest area/ boat ramp



Photo 10: SH8 western side towards existing bridge



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