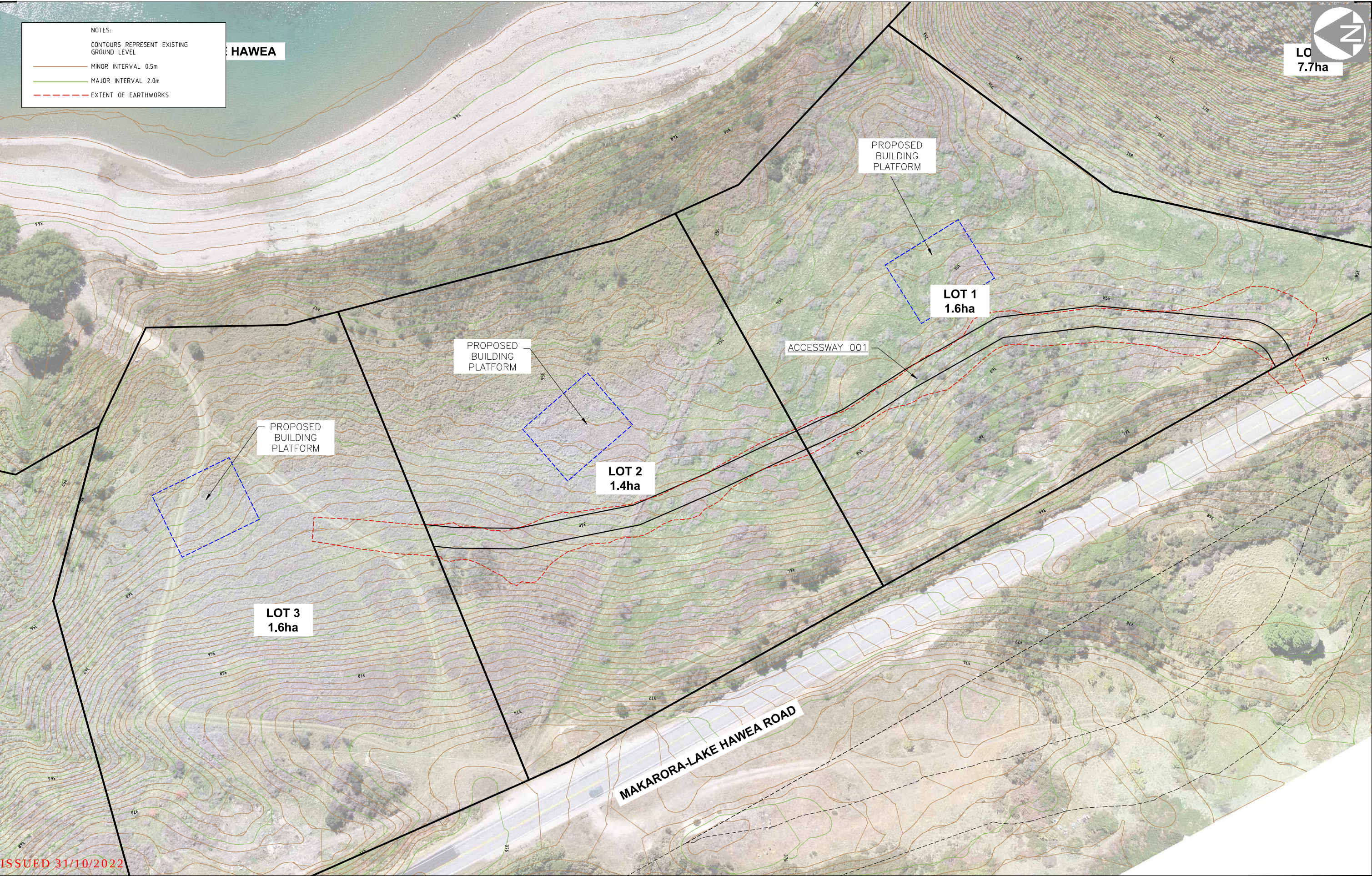




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14 MERSEY STREET

QUEENSTOWN
CHRISTCHURCH
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GORE

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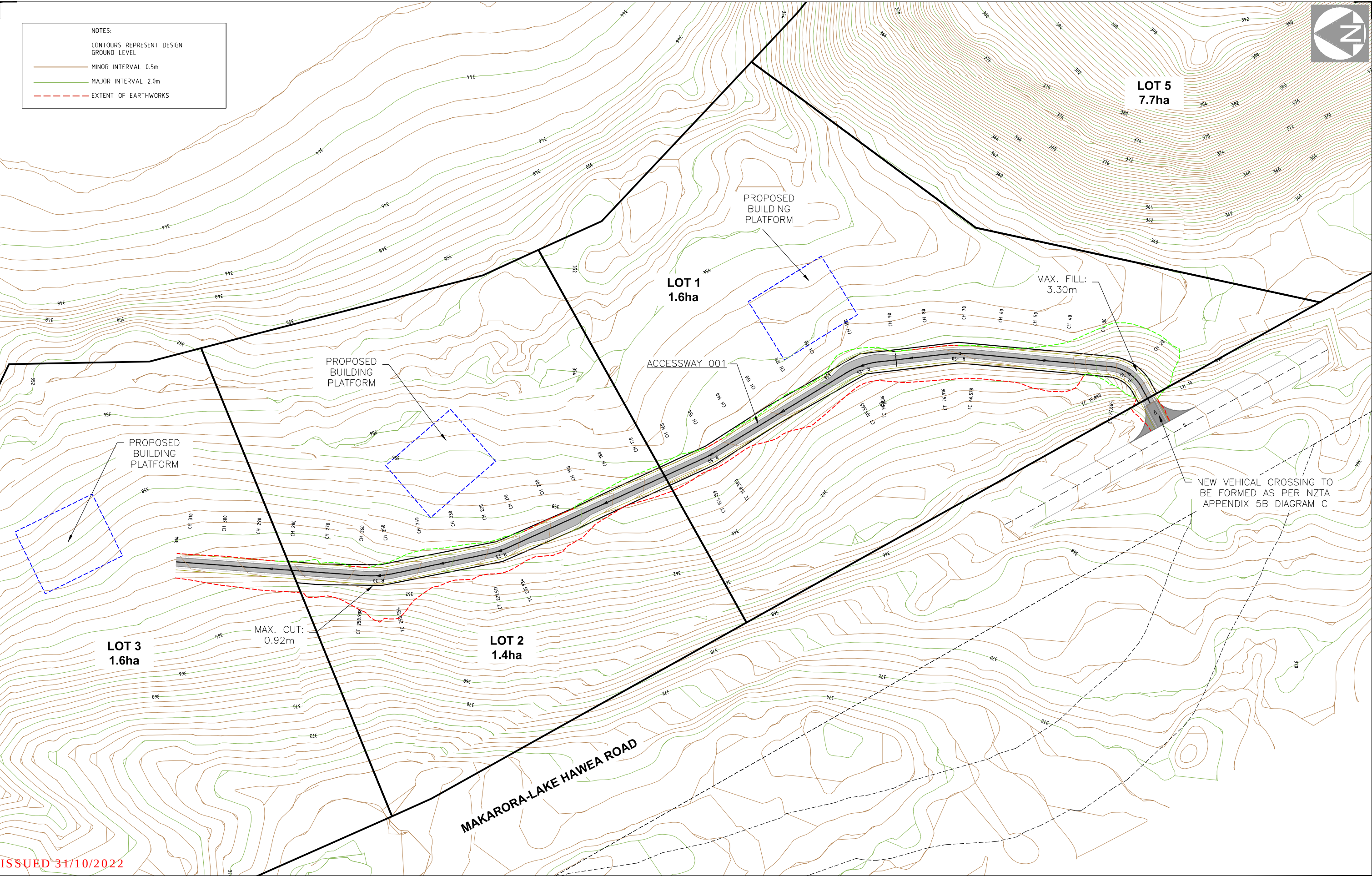
EMAIL: admin@cfma.co.nz

Rev.	Date	Revision Details	By
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LOTS 1 - 5 BEING A PROPOSED SUBDIVISION OF
LOT 1 DP 396356 - THE DENE, HAWEA
SITE DETAIL & NATURAL GROUND LEVELS

Client	J BURDON	SURVEYED	HK	Job No.	14803	Drawing No.	E001
DESIGNED	PT	10.2022		Scale	14 @ A1	SHEET	002
DRAWN	PT	10.2022		Datum & Level	1:1000 @ A3		
CHECKED	-	-		Rev.	LINDIS PEAK 2000	-	
APPROVED	-	-					

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NOTES:
CONTOURS REPRESENT DESIGN
GROUND LEVEL
MINOR INTERVAL 0.5m
MAJOR INTERVAL 2.0m
EXTENT OF EARTHWORKS



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Rev.	Date	Revision Details	By

LOTS 1 - 5 BEING A PROPOSED SUBDIVISION OF
LOT 1 DP 396356 - THE DENE, HAWEA
PROPOSED ACCESSWAY LOCATION

Client		SURVEYED		HK	Job No.		Drawing No.	
J BURDON		DESIGNED		PT	10.2022	14803	E001	
NOTES: ALL DIMENSIONS SHOWN ARE IN METERS UNLESS SHOWN OTHERWISE. ANY PERSON USING CLARK FORTUNE McDONALD DRAWINGS AND OTHER DATA ACCEPTS THE RISK OF: - USING THE DRAWINGS AND OTHER DATA IN ELECTRONIC FORM WITHOUT REQUESTING AND CHECKING THEM FOR ACCURACY AGAINST THE ORIGINAL HARD COPY VERSIONS. - COPYWRITE ON THIS DRAWING IS RESERVED.		DRAWN		PT	10.2022	Scale	14 @ A1 1:1000 @ A3	
		CHECKED		-	-	Datum & Level	Rev.	
		APPROVED		-	-	LINDIS PEAK 2000	—	



NOTES:

CONTOURS REPRESENT DESIGN
GROUND LEVEL

MINOR INTERVAL 0.5m

MAJOR INTERVAL 2.0m

EXTENT OF EARTHWORKS

LEGEND	
CUT	0.5m - 1.0m
	0.0m - 0.5m
FILL	0.0m - 0.5m
	0.5m - 1.0m
	1.0m - 1.5m
	1.5m - 2.0m
	2.0m - 2.5m
	2.5m - 3.0m
EARTHWORKS VOLUMES	
CUT:	660m ³
FILL:	710m ³
BALANCE:	50m ³ (FILL)
AREA:	3216m ²

LOT 3
1.6ha

MAX. CUT:
0.92m

LOT 2
1.4ha

LOT 1
1.6ha

LOT 5
7.7ha

PROPOSED
BUILDING
PLATFORM

PROPOSED
BUILDING
PLATFORM

PROPOSED
BUILDING
PLATFORM

ACCESSWAY 001

MAX. FILL:
3.30m

NEW VEHICAL CROSSING TO
BE FORMED AS PER NZTA
APPENDIX 5B DIAGRAM C

MAKARORA-LAKE HAWEA ROAD

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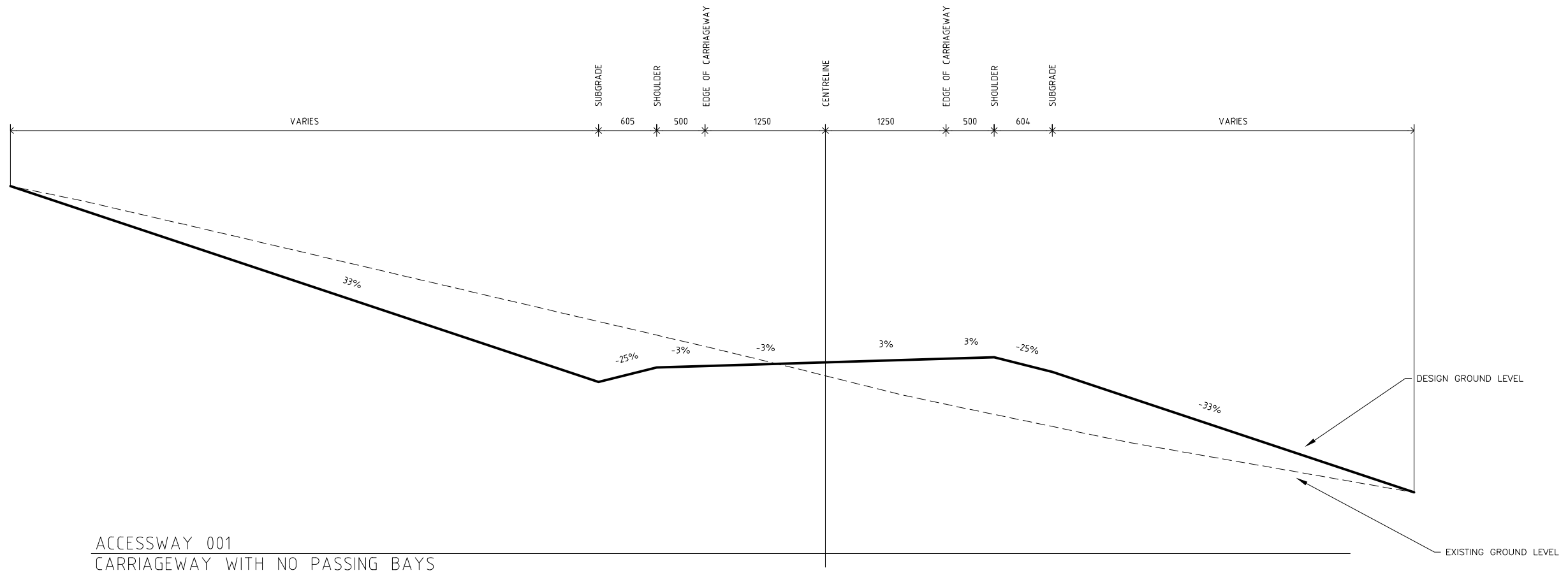
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Rev. Date Revision Details By

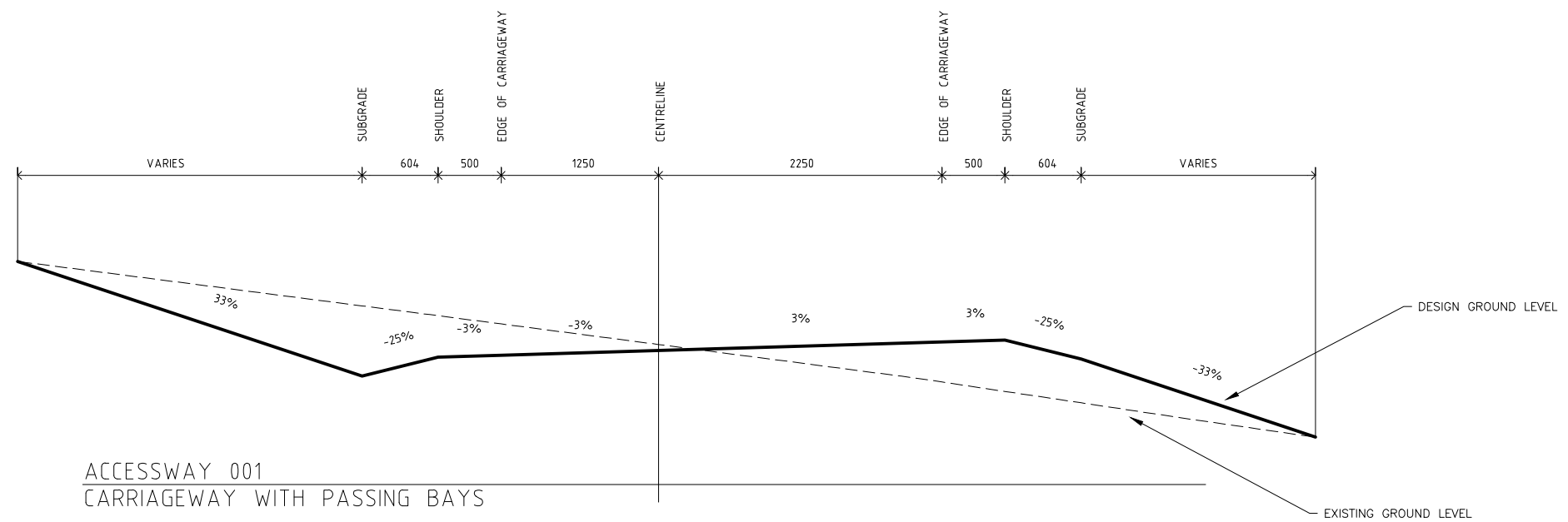
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LOTS 1 - 5 BEING A PROPOSED SUBDIVISION OF
LOT 1 DP 396356 - THE DENE, HAWEA
CUT/FILL HEAT MAP

Client	J BURDON			SURVEYED	HK	-	Job No.	14803	Drawing No.	E001
				DESIGNED	PT	10.2022			SHEET 004	
NOTES:				DRAWN	PT	10.2022	Scale	14 @ A1 1:1000 @ A3		
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ACCESSWAY 001
CARRIAGEWAY WITH NO PASSING BAYS



ACCESSWAY 001
CARRIAGEWAY WITH PASSING BAYS

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Rev.

Date

Revision Details

By

LOTS 1 - 5 BEING A PROPOSED SUBDIVISION OF
LOT 1 DP 396356 - THE DENE, HAWEA
TICAL CROSS-SECTIONS

Client

J BURDON

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PT

DRAWN

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10.2022

10.2022

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-

Job No.

14803

Drawing No.

E001

Scale

1 @ A1
1:50 @ A3

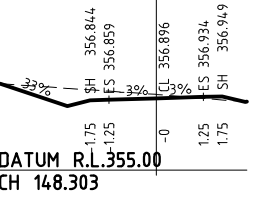
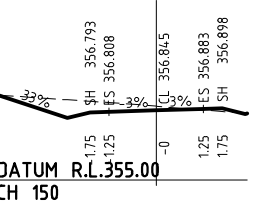
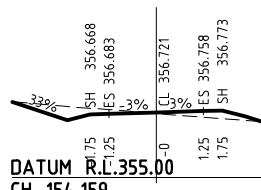
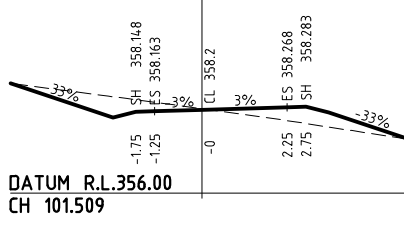
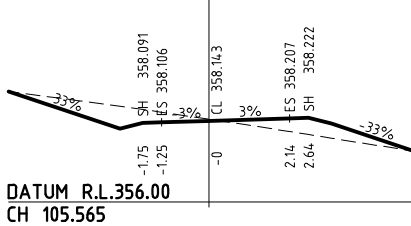
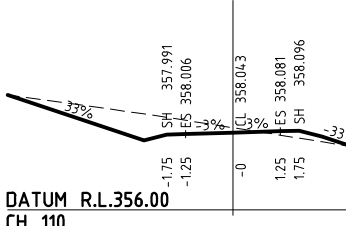
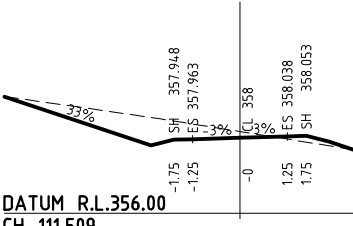
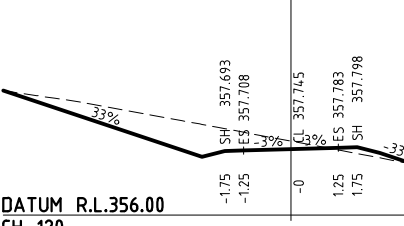
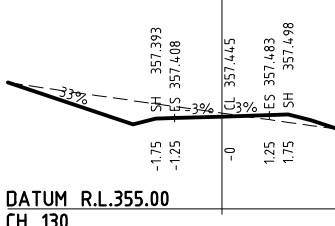
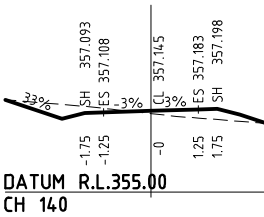
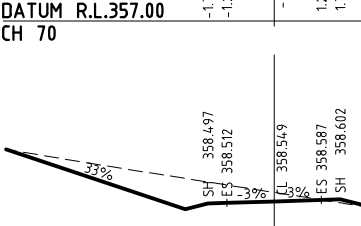
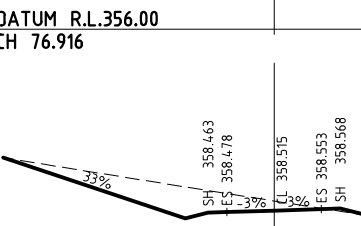
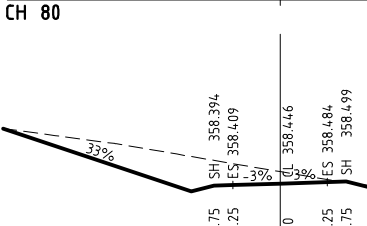
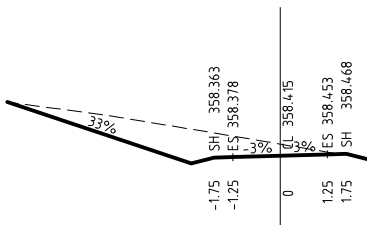
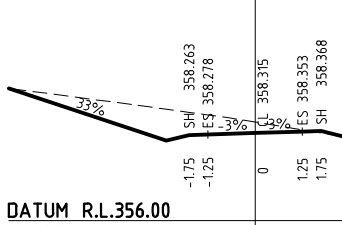
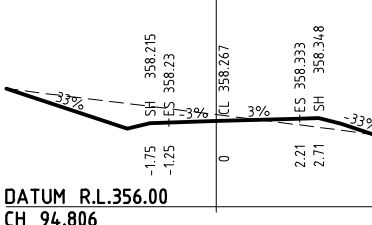
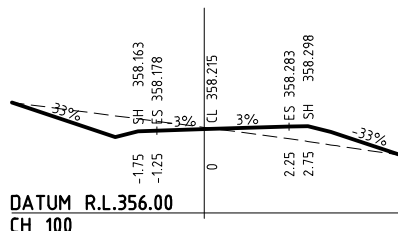
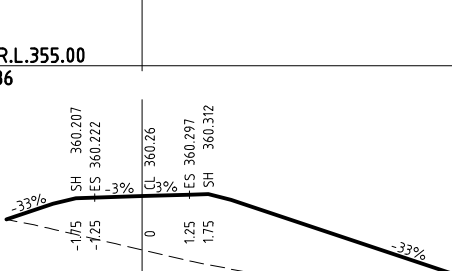
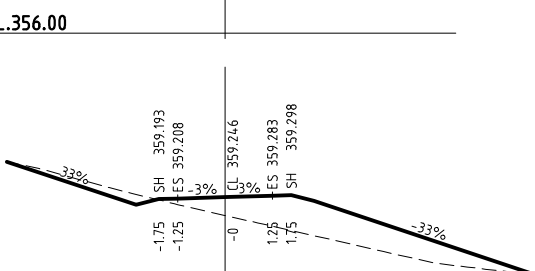
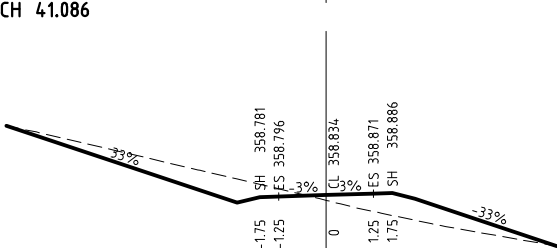
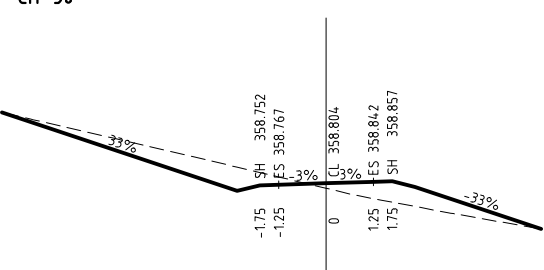
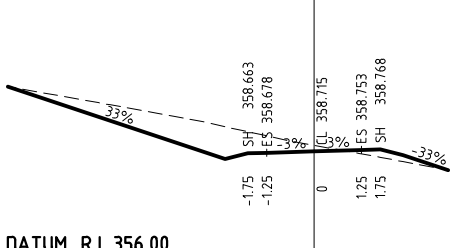
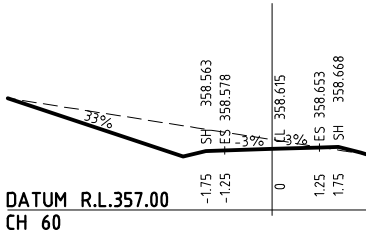
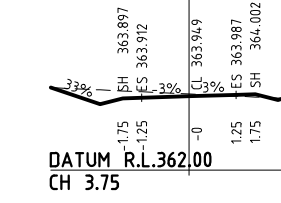
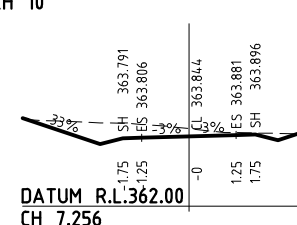
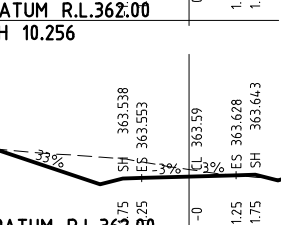
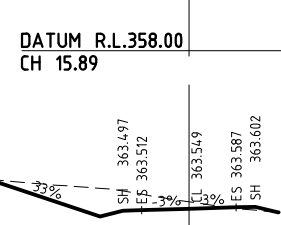
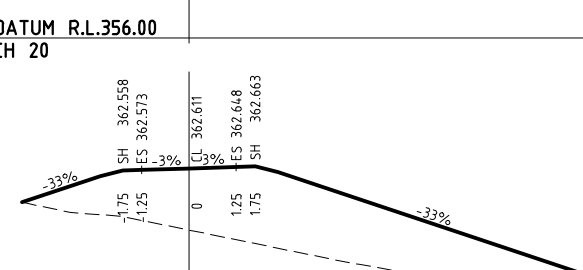
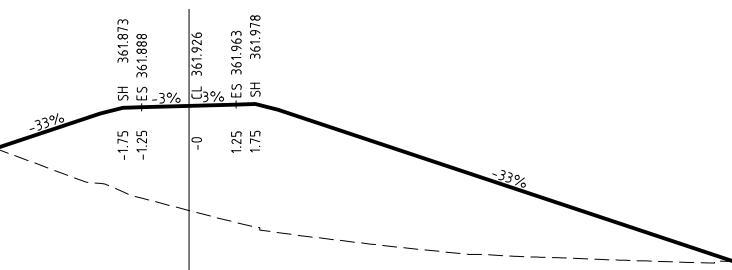
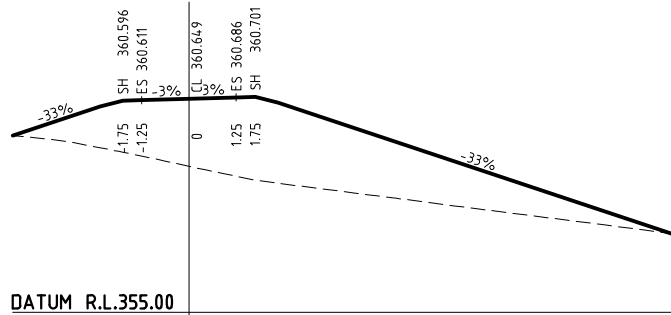
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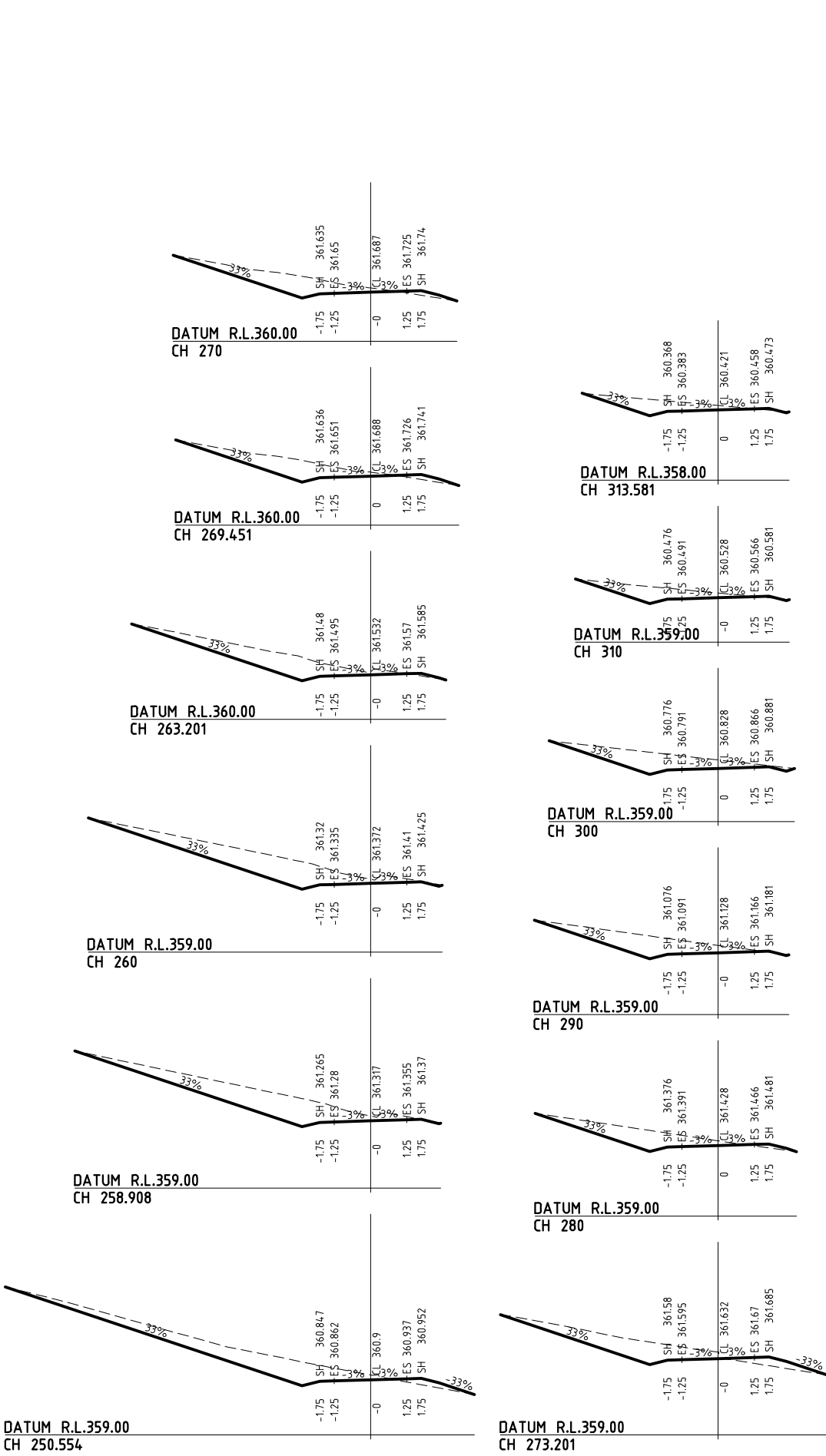
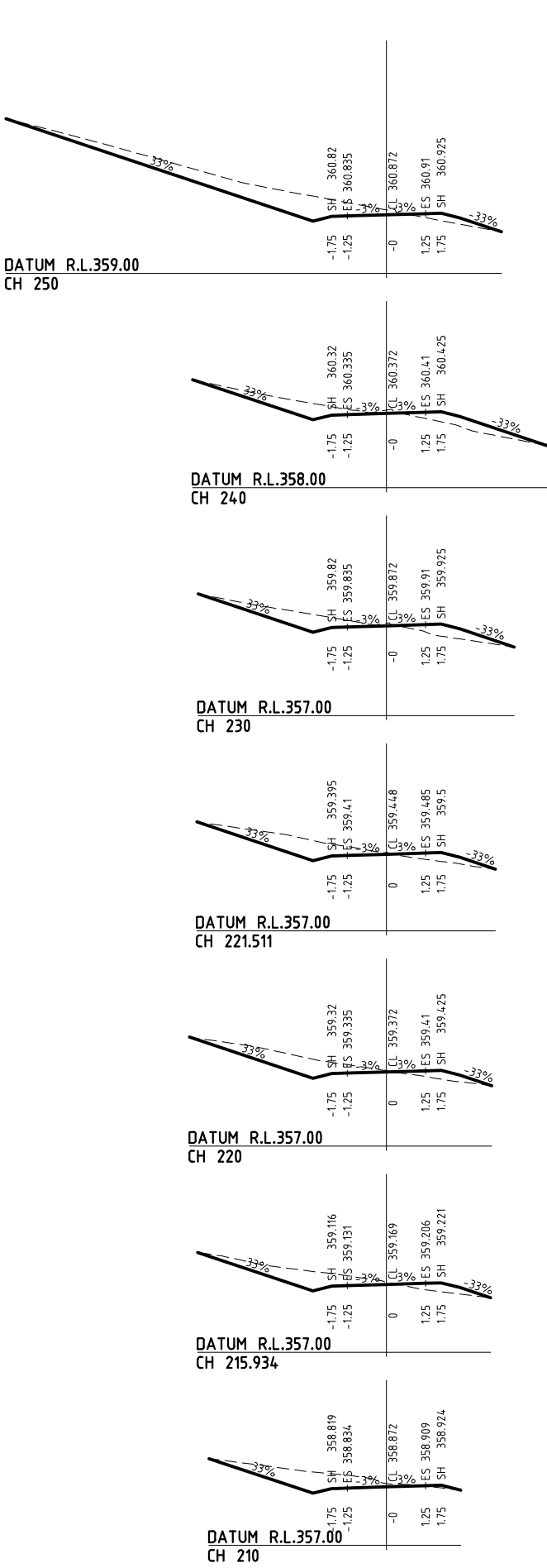
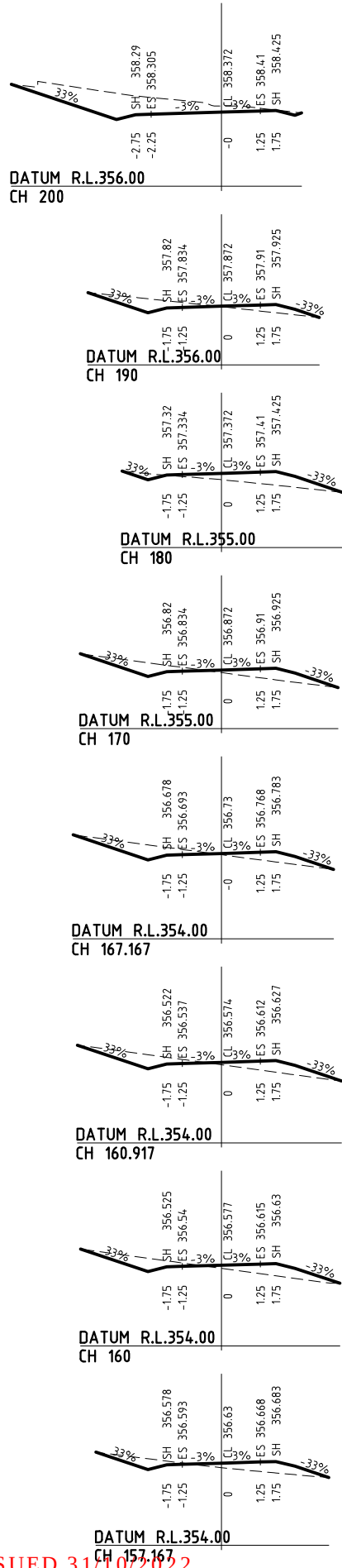
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LOTS 1 - 5 BEING A PROPOSED SUBDIVISION OF
LOT 1 DP 396356 - THE DENE, HAWEA
ACCESSWAY CROSS-SECTIONS

Client	J BURDON	SURVEYED	HK	Job No.	14803	Drawing No.	E001
DESIGNED	PT	10.2022		Scale	17 @ A1 1:200 @ A3	SHEET	007
DRAWN	PT	10.2022		Datum & Level	LINDIS PEAK 2000	Rev.	-
CHECKED	-	-					
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LOTS 1 - 5 BEING A PROPOSED SUBDIVISION OF
LOT 1 DP 396356 - THE DENE, HAWEA
ACCESSWAY CROSS-SECTIONS

Client J BURDON NOTES: ALL DIMENSIONS SHOWN ARE IN METERS UNLESS SHOWN OTHERWISE ANY PERSON USING CLARK FORTUNE McDONALD DRAWINGS AND OTHER DATA ACCEPTS THE RISK OF: - USING THE DRAWINGS AND OTHER DATA IN ELECTRONIC FORM WITHOUT REQUESTING AND CHECKING THEM FOR ACCURACY AGAINST THE ORIGINAL HARD COPY VERSIONS. - COPYWRITE ON THIS DRAWING IS RESERVED.	SURVEYED	HK		Job No. 14803	Drawing No. E001 SHEET 008
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	DRAWN	PT	10.2022	Datum & Level LINDIS PEAK 2000	Rev. -
	CHECKED	-	-		
	APPROVED	-	-		

Appendix E

Email Correspondence



Leanne Wong

From: Julie McMinn <Julie.McMinn@nzta.govt.nz>
Sent: Wednesday, 26 October 2022 11:03 am
To: Morgan Shepherd
Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Hi Morgan

Thanks for the reminder. I was checking the comment about not closing one of the CP's and not sure where it has got to with the team. I will chase up and try and get it out to you this week as it seems to have fallen of the radar.

Apologies
Julie

Julie McMinn | Consultant Planner
Poutiaki Taiao | Environmental Planning
DDI 64 3 955 2926
E julie.mcminn@nzta.govt.nz / W nzta.govt.nz
Dunedin Office / AA Centre, 450 Moray Place,
PO Box 5245, Dunedin 9058, New Zealand
NOTE: I only work 9-3pm Monday -Thursday



From: Morgan Shepherd <Morgan@brownandcompany.co.nz>
Sent: Friday, 21 October 2022 12:17 PM
To: Julie McMinn <Julie.McMinn@nzta.govt.nz>
Cc: Dan Batchelor <dan@danbatch.nz>
Subject: RE: FW: Lots 4 and 5 Proposed Access Location

CAUTION: The sender of this email is from outside Waka Kotahi. Do not click links, attachments, or reply unless you recognise the sender's email address and know the content is safe.

Hi Julie,

Just touching base to make sure you've seen the below and maybe an update on when we can expect a letter from Waka Kotahi?

Have a great weekend!

Kind Regards,
Morgan Shepherd
Resource Management Planner

T [+64 3 409 2258](tel:+6434092258)
M [+64 21 246 7597](tel:+64212467597)

From: Morgan Shepherd

Sent: Tuesday, 27 September 2022 1:39 pm

To: Hayden Knight <hknight@cfma.co.nz>; Julie McMinn <Julie.McMinn@nzta.govt.nz>; Dan Batchelor <dan@danbatch.nz>

Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Thanks Hayden,

Julie – in relation to the draft conditions, can we please ensure the permanent/physical closure of CP25 is not required as it will need to be maintained for stock access and other farming related activities.

Kind Regards,

Morgan Shepherd

Resource Management Planner

T [+64 3 409 2258](tel:+6434092258)

M [+64 21 246 7597](tel:+64212467597)

From: Hayden Knight <hknight@cfma.co.nz>

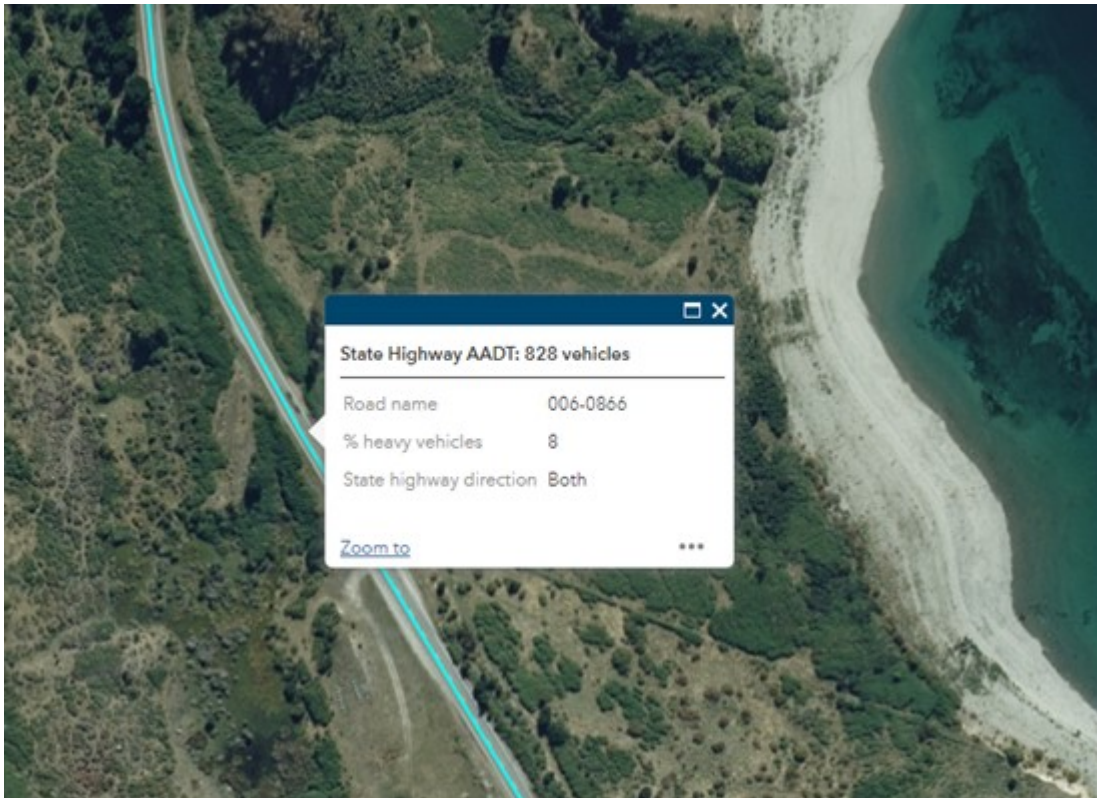
Sent: Wednesday, 21 September 2022 2:30 pm

To: Morgan Shepherd <Morgan@brownandcompany.co.nz>; Julie McMinn <Julie.McMinn@nzta.govt.nz>; Dan Batchelor <dan@danbatch.nz>

Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Hi Morgan,

The Waka Kotahi State highway traffic monitoring map shows 828 annual average daily traffic vehicles for the Makarora – Lake Hawea Road (SH 8) adjacent to our proposed entry.



We propose to access three lots of the accessway. Allowing for 8 equivalent car movements per lot this will give is 24 movements per day.

Reading Appendix 5b from the NZTA Planning Policy Manual we would require a Diagram C standard crossing.

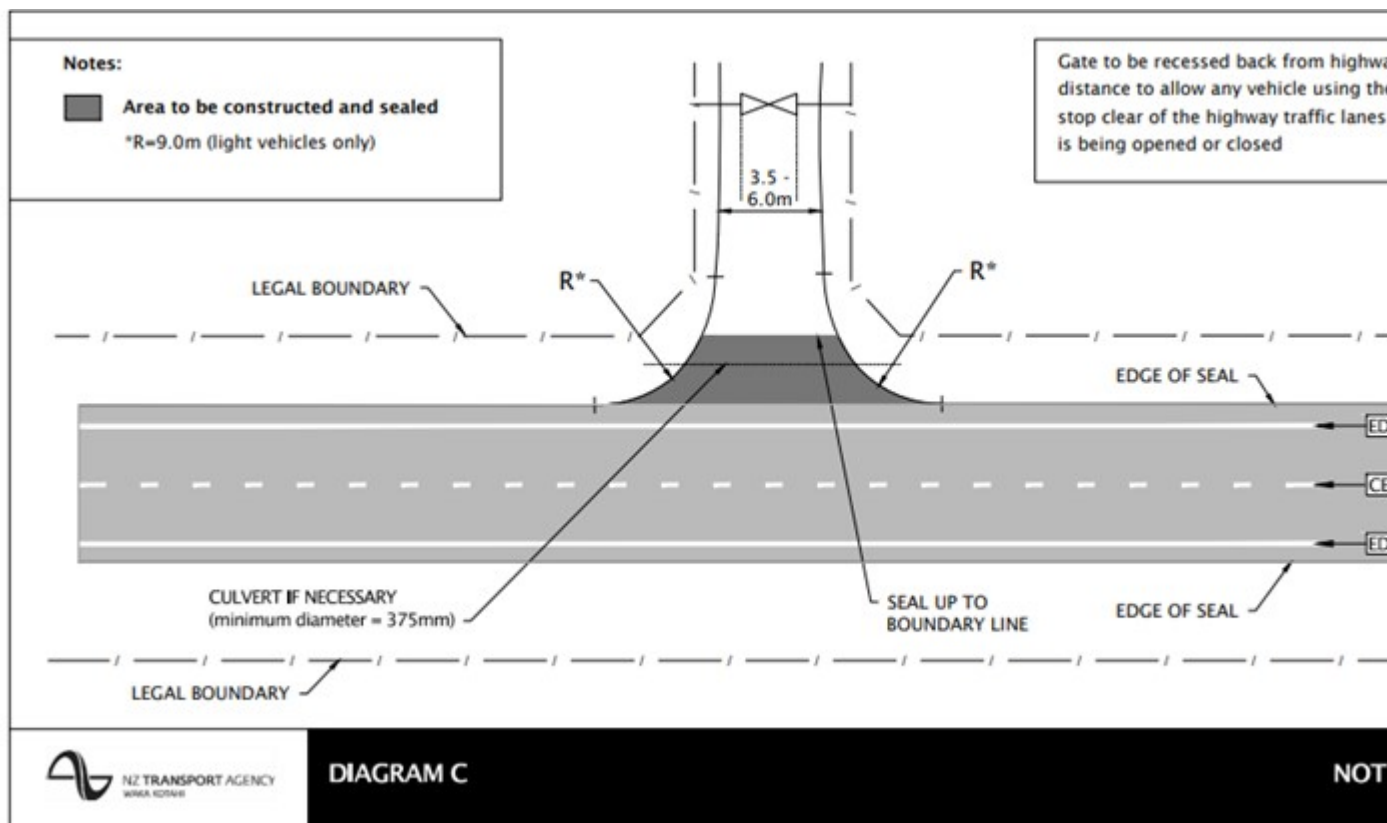
Appendix 5B – Accessway standards and guidelines

Table App5B/4 – Accessway types

Type of traffic using accessway (more than one slow, heavy or long vehicle movements per week?)	Volume of traffic using accessway (ecm/day ⁵)	Volume of traffic using state highway (vpd)	Accessway type
No	1-30	< 10,000	Diagram and Perspective C
		>=10,000	Diagram and Perspective D
	31-100	< 10,000	Diagram and Perspective D
		>=10,000	Diagram and Perspective E
Yes	1-30	All	Diagram and Perspective D
	31-100	All	Diagram and Perspective E

Other
accessway
geometric
design detail

Guidance on other aspects of accessway geometric design, such as the requirements where culverts are likely to be needed to accommodate a watercourse or drain, may be found in Transit’s Geometric Design Manual available on www.transit.govt.nz.



It would be good to have Waka Kotahi conform this as they are will stipulate the type of crossing required.

Kind regards,

Hayden

From: Morgan Shepherd <Morgan@brownandcompany.co.nz>

Sent: Wednesday, 21 September 2022 8:11 AM

To: Julie McMinn <Julie.McMinn@nzta.govt.nz>; Dan Batchelor <dan@danbatch.nz>

Cc: Hayden Knight <hknight@cfma.co.nz>

Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Hi Julie,

Thanks for your email, that is great news!

Hayden – can you please confirm whether the access will be a Diagram C?

It would be great if we could receive a letter/written approval from Waka Kotahi to support the resource consent application, which we are aiming to lodge with Council towards the end of next month.

Kind Regards,

Morgan Shepherd

Resource Management Planner

T [+64 3 409 2258](tel:+6434092258)

M [+64 21 246 7597](tel:+64212467597)

From: Julie McMinn <Julie.McMinn@nzta.govt.nz>

Sent: Tuesday, September 20, 2022 5:56 PM

To: Dan Batchelor <dan@danbatch.nz>; Morgan Shepherd <Morgan@brownandcompany.co.nz>

Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Hi

We are finally getting somewhere. I have had the following comments back from the safety engineer and the network manager summarised as follows:

I am happy with the new access shown 296 from CP26. The existing CP25 and CP26 will need to be closed.



I have no fundamental problem with the location of the proposed location of the access – will this be a diagram C ? If so all that we would request is a schematic of the proposed layout of the access for Aspiring Highways to review for suitability before construction.

Please note this email is not a written approval under the RMA. However I wanted to update you on progress and ask where in the resource consent application process you are. That is, are you asking for written approval from Waka Kotahi or has this been pre application consultation? If you are seeking written approval I will prepare some conditions for your consideration.

Thanks and kind regards
Julie

Julie McMinn | Consultant Planner
Poutiaki Taiao | Environmental Planning

DDI 64 3 955 2926

E julie.mcminn@nzta.govt.nz / w nzta.govt.nz

Dunedin Office / AA Centre, 450 Moray Place,
PO Box 5245, Dunedin 9058, New Zealand

NOTE: I only work 9-3pm Monday -Thursday

From: Dan Batchelor <dan@danbatch.nz>
Sent: Sunday, 28 August 2022 10:15 AM
To: Morgan Shepherd <Morgan@brownandcompany.co.nz>; Julie McMinn <Julie.McMinn@nzta.govt.nz>
Subject: RE: FW: Lots 4 and 5 Proposed Access Location

CAUTION: The sender of this email is from outside Waka Kotahi. Do not click links, attachments, or reply unless you recognise the sender's email address and know the content is safe.

Hi Morgan

I hope your time away is going well.

I spoke with Julie apx 2 weeks ago, then we telephone tagged last week. Our request is in their system, currently with the safety engineers. Julie left a message on Friday it is looking positive, but she is awaiting official confirmation.

Regards

Dan Batchelor

0274 352827

From: Morgan Shepherd <Morgan@brownandcompany.co.nz>
Sent: Saturday, 27 August 2022 3:30 AM
To: Julie McMinn <Julie.McMinn@nzta.govt.nz>
Cc: Dan Batchelor <dan@danbatch.nz>
Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Hi Julie – just following up on my email below, if you are not the correct person to respond, can you please point me in the right direction?

Kind Regards,

Morgan Shepherd

Resource Management Planner

T [+64 3 409 2258](tel:+6434092258)

M [+64 21 246 7597](tel:+64212467597)

 BROWN & COMPANY
PLANNING GROUP

 facebook  LinkedIn

I will be on annual leave from 2 August – 1 September 2022.

From: Morgan Shepherd
Sent: Thursday, 28 July 2022 10:38 am
To: Julie McMinn <Julie.McMinn@nzta.govt.nz>
Cc: Dan Batchelor <dan@danbatch.nz>
Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Hi Julie,

I hope this email finds you well!

Since our last correspondence in 2020, the Burdon's have revised their proposed subdivision – please see **attached** Scheme Plan for your information.

The proposal now includes three new lots for residential activity (Lots 1 – 3) and a new access way closer toward the Hawea Township than the previously proposed access points. The existing access (CP24) will be maintained for the

existing dwelling/proposed Lot 4. Can you please consider the revised plan and provide an updated letter of support?

Happy to discuss as required, noting I will be on leave from 2 August – 1 September. Dan Batchelor (cc'd into this email) is the contact for the Burdon's in relation to this matter, in my absence.

Kind Regards,

Morgan Shepherd

Resource Management Planner

T [+64 3 409 2258](tel:+6434092258) (Queenstown)

M [+64 21 246 7597](tel:+64212467597) (Wanaka)



I work in Queenstown on Monday – Wednesday and Wanaka on Thursday & Friday.

From: Julie McMinn [<mailto:Julie.McMinn@nzta.govt.nz>]

Sent: Monday, 27 July 2020 2:14 p.m.

To: Alyson Hutton <alyson@brownandcompany.co.nz>

Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Hi Alyson

Please find attached the Waka Kotahi comments to the proposal presented do far.

Kind regards

Julie

Julie McMinn /Consultant Planner

Planning and Investment

DDI 64 3 955 2926

E julie.mcminn@nzta.govt.nz / w nzta.govt.nz

Dunedin Office / AA Centre, 450 Moray Place,
PO Box 5245, Dunedin 9058, New Zealand

NOTE: I only work 9-3pm Monday -Thursday



From: Alyson Hutton <alyson@brownandcompany.co.nz>

Sent: Tuesday, 21 July 2020 9:23 AM

To: Julie McMinn <Julie.McMinn@nzta.govt.nz>

Subject: FW: FW: Lots 4 and 5 Proposed Access Location

Hi Julie,

Please see attached and let me know if you require anything else.

Kind regards

Alyson

Alyson Hutton

Brown & Company Planning Group

+64 21 715 572

From: Michelle Snodgrass [<mailto:michelle@msla.co.nz>]

Sent: Monday, 20 July 2020 5:23 p.m.

To: Alyson Hutton <alyson@brownandcompany.co.nz>

Subject: RE: FW: Lots 4 and 5 Proposed Access Location

Hi Aly,

Hopefully, the attached is what NZTA needs. I have simply measured the distance between the existing gateway and the new entrance and drawn it on the surveyor's plan. The photos I have attached are the existing gates/entrance and both viewpoints are looking north.

Let me know if more is needed.

Cheers,
Michelle

From: Julie McMinn <Julie.McMinn@nzta.govt.nz>

Sent: Monday, 13 July 2020 3:23 pm

To: Alyson Hutton <alyson@brownandcompany.co.nz>

Subject: Lots 4 and 5 Proposed Access Location

Hi Alyson

We are doing some works behind the scene for this subdivision and there is a discussion exactly where the proposed access to lot 4 and 5 will be located. There is a general understanding that the new access will be approximately 95m south of the existing access.

However, what would be appreciated is could we have the proposed access located on a better scale plan with an accurate measured distance from the existing access so we can pin point this on the highway.

Thanks
Julie

Julie McMinn /Consultant Planner
Planning and Investment

DDI 64 3 955 2926

E julie.mcminn@nzta.govt.nz / w nzta.govt.nz

Dunedin Office / AA Centre, 450 Moray Place,
PO Box 5245, Dunedin 9058, New Zealand

NOTE: I only work 9-3pm Monday -Thursday



From: Alyson Hutton <alyson@brownandcompany.co.nz>
Sent: Monday, 13 July 2020 2:53 PM
To: Julie McMinn <Julie.McMinn@nzta.govt.nz>
Subject: Burdon - Hawea

Hi Julie,

Thanks for your call last week.

We would be happy for you to secure a discussion with Roy when he is back in the office in the week of the 20th.
Happy for a zoom call or whatever works best.

Many thanks
Alyson

Alyson Hutton
Brown & Company Planning Group
+64 21 715 572

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association of
consulting and
engineering



Natural Hazards Assessment

Glen Dene Station Subdivision,
LOT 1 DP 396356, Lake Hawea

Report prepared for:

Lesley & Jerry Burdon

Report prepared by:

GeoSolve Limited

Distribution:

Lesley & Jerry Burdon

Brown & Company Planning
Group

GeoSolve Limited (File)

December 2022

GeoSolve Ref: 150557.02

Revision	Issue Date	Purpose	Author	Reviewed
1	28/02/2020	Client issue	JAS	FAW
2	13/12/2022	Client issue for updated scheme plan	JAS	FAW



GEOTECHNICAL



**WATER
RESOURCES**



PAVEMENTS



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1 Introduction

1.1 General

This report presents the results of a natural hazards assessment completed by GeoSolve Ltd for the Glen Dene Station Subdivision, Lake Hawea. The objective of the report is to assess the suitability of proposed building platforms, with respect to natural hazards, for residential development. This report is intended to support subdivision consent applications and has been revised to include an updated scheme plan.



Photo 1. Site photo looking north from the southern end of the proposed subdivision. Lake Hawea is on the right of image.

1.2 Development

It is proposed to subdivide the existing property (LOT 1 DP 396356) into three rural lifestyle blocks. Three separate building platforms (BP1-3) will be established on each of the new lots and have been reviewed as part of this assessment. A single driveway will be established to the building platforms via an access point off the Makarora-Lake Hawea Road (State Highway 6). An earthworks plan showing proposed cut and fills for the driveway access have been supplied by Clark Fortune McDonald & Associates and is attached as Figure 4, Appendix A. No earthworks plans are currently available for the building platforms.

The proposed subdivision scheme plan is outlined on Appendix A, Figures 1, 2 & 3.

2 Site Description

2.1 General

The subject property, legally described as LOT 1 DP 396356, is located between State Highway 6 and the western shores of Lake Hawea, as shown on Figure 1 below.



Figure 1. Site location plan showing the location of the proposed subdivision relative to Lake Hawea Township.

The proposed building platforms will be accessed from the Makarora-Lake Hawea Road (SH6) south of the Glen Dene Station homestead.

The subdivision area is currently undeveloped and is being farmed with livestock. Vegetation cover comprises pasture, light scrub and scattered pine and eucalyptus trees (refer Photo 1).

The property is bounded to the west by State Highway 6, undeveloped farmland to the north and south and Lake Hawea to the east.

2.2 Topography and Surface Drainage

Topography in the vicinity of the building platforms slopes gently eastward towards the shores of Lake Hawea at an average gradient of around 5-10°. West of State Highway 6 the terrain rises steeply up the range front at an average gradient of about 30°. A glacial depression, elongated north-south, is present between the base of the range and State Highway 6 west of the building platforms. North of the subdivision a series of sub-vertical faces, formed within glacial deposits, are being actively eroded alongside the shores of Lake Hawea.

Several small streams and ephemeral gullies flow eastward off the range front and dissect a series of intervening glacial terraces north of the building platforms. Streams within the site are spring fed by emergent slope runoff and accordingly do not vary much throughout the year. The glacial depression against the range front is swampy and acts as



a natural repository to retain upslope flows. The median annual rainfall at the site is about 800 mm but is significantly higher in the contributing hill catchments.

Topographic contour data for the subdivision is presented on Appendix A, Figure 3.

3 Geotechnical Investigations

GeoSolve has already undertaken a preliminary natural hazards assessment for the property, ref No. 150557, as part of a proposed District Plan change. However, a more definitive hazards assessment specific to the proposed building platforms was required in order to support subdivision consent applications.

An engineering geologist visited the site on 27th of January 2020 to undertake a detailed site inspection comprising visual survey and mapping to assess the site geology and catchment geomorphology as relevant to natural hazards and the subdivision plan.

No confirmatory subsurface investigations have been undertaken as part of this report and will be required at the detailed design phase for any future dwelling.

Engineering geological field mapping is presented in Appendix A and is overlaid with the updated subdivision plan and building platform locations.

4 Subsurface Conditions

4.1 Geological Setting

The site is located within the Haast Schist belt that underlies Central Otago. The western shores of Lake Hawea consist of glacial terraces comprising glacial till and outwash gravels which are in turn overlain by younger alluvial fan deposits. The alluvial fans have developed eastward from the bounding range front during post glacial times and beach gravels have developed along the shoreline from erosion of the glacial deposits. Schist bedrock is present at shallow to moderate depths. Post glacial windblown silt and sand (loess) commonly blankets the ground surface in the vicinity of Otago's glacial lakes.

The Cardrona-Hawea Fault and the Grandview Fault are considered active, and their inferred trace runs beneath the waters of Lake Hawea within 2-4 km east of the subdivision. However, due to the estimated recurrence intervals of >20,000 years for earthquakes on these faults the risk posed by these seismic features is considered low. The Alpine Fault, located along the western foothills of the Southern Alps is likely to present a more significant seismic risk in the short term. There is a high probability that a major earthquake of Magnitude 8 or more will occur along the Alpine Fault within the next 50 years and such a rupture is likely to result in strong and prolonged ground shaking in the vicinity of Lake Hawea.



5 Natural Hazards Assessment

5.1 General

The current QLDC and ORC hazard mapping databases do not identify any natural hazards within the site area itself; however, it is noted that this may be because the area has possibly not been studied, and therefore does not confirm a lack of or absence of natural hazards. A site-specific natural hazards assessment has therefore been undertaken in consideration of the building platforms.

Owing to the terrain and the site location, it is appropriate to assess for a range of natural hazards including flooding, erosion, debris flow/alluvial fan, landslide and rockfall, liquefaction and lateral spreading.

Natural hazard mapping is presented in Appendix A and is overlaid with the proposed development and other relevant features.

5.2 Flooding

The individual catchment areas of the gullies above (west of) the site are quite small, with the largest being about 95 hectares. Much of the runoff is absorbed by the glacial deposits. Several small streams north of the building platforms are spring fed by emergent runoff and accordingly do not fluctuate greatly throughout the year.

During an extreme flood event, particularly if accompanied by substantial sediment movement, potential exists for watercourses to avulse from their primary channel. However, such an event would be of low probability and the building platforms are situated on locally high ground (glacial terraces) further south of the main channels (refer Appendix A, Figures 2 & 3). Furthermore, the watercourse immediately north of BP3 is contained within a well-incised gully which drains east into Lake Hawea.

Landscape bunding or cut-off drains are sufficient to mitigate any shallow sheet flooding (stormwater flow) risk to building platforms, particularly from upslope run-off generated during heavy rainfall, pending final bund heights and alignments.

The proposed building platforms are well elevated above the shoreline to the east and there is no risk of flooding from Lake Hawea.

5.3 Debris Flow/Alluvial Fan

The subdivision area (Lots 1-3) is not exposed to debris flow activity. There is no geological or geomorphological evidence to suggest the building platforms have been exposed to debris flow hazard in the past. There is only one alluvial fan in the immediate vicinity of the subdivision which has developed eastward from the un-named creek below topographic spot height 1135 m (refer Appendix A, Figures 1 & 2). The alluvial fan is comparatively small compared to others in the local area and appears to be ancient, with alluvium overlain by well-developed topsoil and vegetation. Furthermore, most of the fan is confined to the western side of State Highway 6. Only the distal margins of the fan encroach into the subdivision area northwest of BP3. One area of debris flow deposits has been identified



downslope of SH6 but is localised north of the building platforms. At this point, roadcut exposures show mostly fluvial gravel with some bouldery debris flow material. Below the highway the slope is gentle and there is no evidence of debris flow morphology, apart from a few surface boulders which are possibly glacial in origin. There is no existing evidence of recent alluvial fan activity within the subdivision area.

Additionally, the glacial depression west of the building platforms has not been infilled with alluvial fan material or slope debris despite being situated at the base of the range. The ancient alluvial fan and one of its overflow paths is situated at the northern end of the depression. Numerous bedrock exposures and glacial morphology can still be observed along the base of the range and within the subdivision area. Therefore, there appears to have been little precedent for alluvial fan development in the vicinity of the site since deglaciation.

An extreme rainfall event, particularly if preceded by an Alpine Fault earthquake, could potentially remobilise landsliding in the catchment areas and contribute material for debris flows. However, risk to the building platforms will be low and likely confined to the small area of existing fan and channelised drainage paths north of the platforms. All the current building platforms are optimally located to avoid areas of potential debris flow risk.

5.4 Landslide and Rockfall Hazard

For the most part, the proposed subdivision is not exposed to landslide and rockfall hazards. As discussed in Section 5.3 slowly creeping schist debris landslides are evident within the catchment area upslope of the ancient fan, however these are located well beyond the development area. These landslide features are also identified on the QLDC and ORC natural hazard databases.

Some potential for localised rockfall exists at the southern end of the subdivision from the schist slopes above BP1. Foliation within the schist face dips steeply into the slope and localised toppling failures are possible. However, owing to the 35-40 m runout distance from the base of the slope to the building platform, the relatively flat topography below the schist slope and the lack of previous rockfall evidence, the risk of rockfall posed to BP1 is considered negligible.

5.4.1 Slope Instability

The sub-vertical faces at the northern end of the subdivision are approximately 10-15 m high and will be prone to localised failure under intense seismic shaking. The faces have formed within glacial deposits and are being actively eroded alongside the shores of Lake Hawea. However, the building platforms are located further south and will not be affected by any slope instability.

5.5 Liquefaction and Lateral Spreading

Seismic liquefaction occurs when excess pore pressures are generated in loose, saturated, generally cohesionless soil during earthquake shaking, causing the soil to undergo a partial to complete loss of shear strength. Such a loss of shear strength can result in settlement and/or horizontal movement (lateral spreading) of the soil mass. The occurrence of



liquefaction is dependent on several factors, including the intensity and duration of ground shaking, soil density, particle size distribution, and elevation of the groundwater table.

Within the subdivision, the potential for liquefaction under seismic shaking is considered low. The vulnerable combination of fine sandy/silty soils with a shallow groundwater table is unlikely at building platform locations. Building platforms are set well back from the lakeshore on glacial terrace deposits, with a high relative density, which are typically not prone to liquefaction. Groundwater levels are likely to be in the order 10-20 m below the building platforms. The relative density of glacial till and outwash deposits is typically in the order of SPT N=20 to 50. One small exposure of potentially vulnerable lake sediment was observed within one of the gullies in a track cutting, but this is not located near the designated building platform locations.

Likewise lateral spreading potential, if any, is likely to be confined to lakeside margins where a specific combination of vulnerable soils, shallow groundwater, and significant surface gradients all lie within the same area. Again, the designated building platforms are not located near areas susceptible to lateral spreading.

6 Building and Earthworks Geotechnical Considerations

Standard geotechnical investigations to confirm foundation bearing capacity, soil parameters, retaining parameters and basic geotechnical considerations are recommended during detailed design of future dwellings constructed on the proposed building platforms.

Earthworks plans indicate maximum cut heights of 0.9 m and maximum fill depths of 3.3 m for the driveway access to Lots 1-3. Cut and fill batters either side of the driveway have been modelled at 33% or around 3.0: 1.0 (horizontal to vertical). Field mapping has identified medium dense to dense glacial till and outwash soils in the vicinity of the driveway, therefore these batter slopes are considered appropriate. However, geotechnical investigations should be completed along the driveway alignment during detailed design to confirm pavement and engineered fill subgrade undercut requirements.

All engineered fill utilised as bearing for dwelling foundations or the driveway should be placed and compacted in accordance with the recommendations of NZS 4431:2022 and certification provided to that effect (during good weather and in accordance with an earthfill specification).

7 Conclusions and Recommendations

Based on the current assessment, the proposed subdivision scheme and building platform locations are technically feasible and sited in locations not prone to natural hazards.

We conclude that, from a natural hazard's perspective, the proposed building platform locations are suitable for residential development; noting that site-specific ground investigations will be required at the detailed design phase of any future dwelling.



8 Applicability

This report has been prepared for the benefit of Lesley & Jerry Burdon with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Building specific geotechnical investigations and reporting will be required at the detailed design phase for future dwellings. It is important that we be contacted if there is any variation in subsoil conditions from those which are currently inferred within this report.

Report prepared by:

.....
James Stewart
Engineering Geologist

Reviewed for GeoSolve Ltd by:

.....
Fraser Wilson
Senior Engineering Geologist

Appendix A: Site Plans and Earthworks Plan



Alluvial Fan (ancient)
Gently sloping.
Fluvial dominated below SH6
but some debris flow boulders.
Good topsoil development.

Schist
Foliation dipping
steeply into slope

Schist ridge
(Roche Moutonnee)

Spring fed
creeks

Landslides
Slowly creeping
schist debris

Lake Sediments
exposed in track
cutting

Glacial till & Outwash
Gently-moderately sloping
terraces down to lakeshore

Schist ridge
(Roche Moutonnee)

Key

 = Approximate building platform locations

 = Drainage paths

 = Schist bedrock

 = Glacial till & Outwash

Scale 1:6700
0 50 100 150 200 250 (m)

CADFILE:	Site Plan.xar	DRAWN	JXH	12/2022
SCALE: (AT A3 SIZE)	AS SHOWN	DRAFTING CHECKED	JAS	12/2022
PROJECT No.:	150557.02	APPROVED	FAW	12/2022



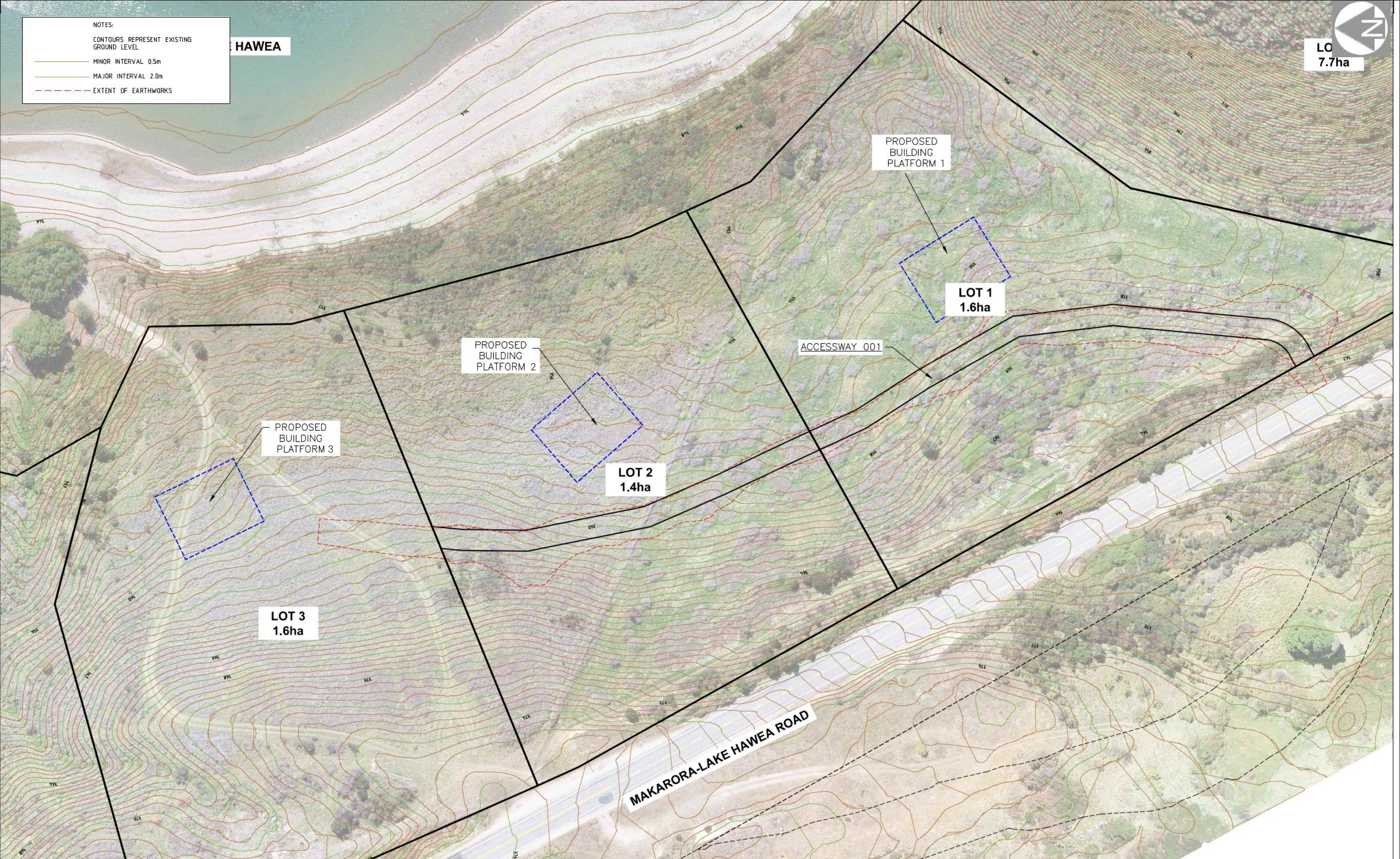
Lesley & Jerry Burdon
Glen Dene Station Subdivision
Geotechnical Investigation
Site Plan

FIG No:
Appendix A, Figure 1

REV.



Key → = Drainage Path — = Subdivision Lot Boundaries	1 = Building Platform Locations Scale 1:6500 0 100 200 300 400(m)	DRAWN	JXH	12/22
		DRAFTING CHECKED	JAS	12/22
		APPROVED	FAW	12/22
		FILE : PDF		
SCALE: (AT A3 SIZE)		As Shown		
PROJECT No. 150557.02		FIG No.		Appendix A - Figure 2
				REV. 0



Key

= Building Platform Locations

Scale 1:1000

0 10 20 30 40 50 (m)

CADFILE:	Site Plan.xar	DRAWN	JXH	12/2022
SCALE: (AT A3 SIZE)	AS SHOWN	DRAFTING CHECKED	JAS	12/2022
PROJECT No.:	150557.02	APPROVED	FAW	12/2022
			GEOTECHNICAL	
			WATER RESOURCES	
			PAVEMENTS	

Lesley and Gerry Burdon
Glen Dene Station Subdivision
Geotechnical Investigation
Topographic Contour Plan

FIG No:
Appendix A, Figure 3

REV.
1



ISSUED 31/10/2022

Appendix A, Figure 4

Clark Fortune McDonald & Associates
 Licensed Cadastral Surveyors - Land Development - Planning Consultants

309 LOWER SHOTOVER ROAD
 3 LOWE STREET, ADDINGTON
 60 TENNYSON STREET
 14 MERSEY STREET

QUEENSTOWN
 CHRISTCHURCH
 DUNEDIN
 GORE

TEL. (03)441-6044
 TEL. (03)348-1025
 TEL. (03)470-1582
 TEL. (03)208-6474

EMAIL: admin@cfma.co.nz

Rev.	Date	Revision Details	By

**LOTS 1 - 5 BEING A PROPOSED SUBDIVISION OF
 LOT 1 DP 396356 - THE DENE, HAWEA
 CUT/FILL HEAT MAP**

Client	J BURDON		
SURVEYED	HK		
DESIGNED	PT	10.2022	
DRAWN	PT	10.2022	
CHECKED	-		
APPROVED	-		

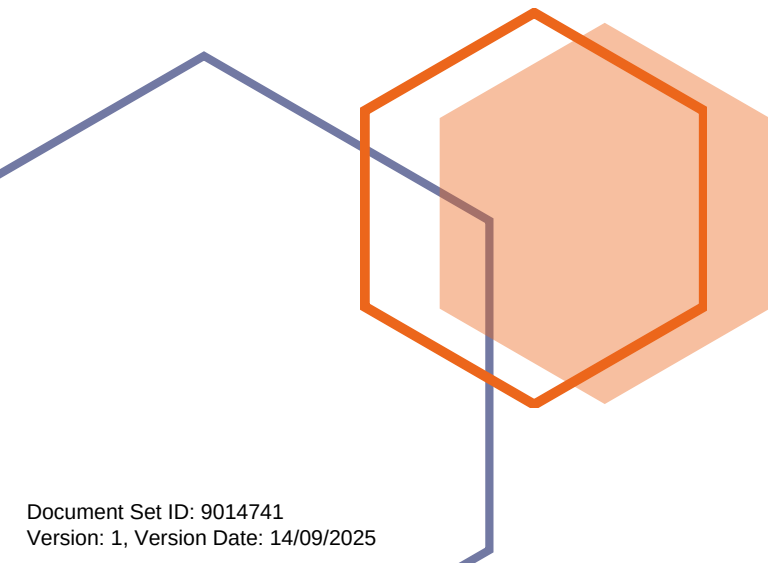
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Datum & Level	LINDIS PEAK 2000		
Rev.	-		



Environmental Management Plan (Rev A)

The Dene
March 2023



Document Control	
Title	The Dene - Environmental Management Plan
Address	Lot 1 DP 396356
Consent Number	TBC
Client	Jerry Burdon, The Dene
Our Reference	23040
Prepared by	  Tom Grandiek (BAppSc, CEnvP) Senior Environmental Consultant

Document Control			
Revision	Revision Date	Revision Details	Prepared by
A	23/03/2023	EMP prepared for resource consent application	TG

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Appendix 7	Complaints Register
Appendix 8	Environmental Non-Conformance Register
Appendix 9	Water Quality Monitoring Results Form
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Disclaimer

Enviroscope has exercised due skill, care, and attention in preparing this EMP on the basis of their understanding of the subject site through their own site visits as well as information provided by the client and its consultants. Enviroscope has no control over the physical actions, detailed design, equipment, services, and methodologies undertaken by the client or other third parties tasked with implementing Enviroscope's instructions or recommendations. Enviroscope does not accept any responsibility for any environmental incidents or other defects of control measures if there is any departure or variance from the measures detailed in this EMP and any supporting documentation.

Emergency Contacts

Contact made with any of the following shall be undertaken with due consultation of the Environmental Representative or Project Manager.

Element	Emergency Contact	Details
Pollution incident	Otago Regional Council (ORC) Spill Hotline	0800 800 033 compliance@orc.govt.nz
Environmental complaint	Environmental Representative	TBC upon confirmation of contractor
Discovery of contaminated land	Environmental Representative	
Unexpected heritage finds	Environmental Representative	
Human remains	New Zealand Police	111
Fire including bushfire	Fire and Emergency New Zealand (FENZ)	111
Public utilities	Queenstown Lakes District Council (QLDC)	(03) 441 0499 rcmonitoring@qldc.govt.nz
Internal contacts	Project Manager	Dan Batchelor 0274352827
Internal contacts	Environmental Consultant	Tom Grandiek 027 2633 113

1.0 INTRODUCTION

1.1 Purpose and Scope

On behalf of Jerry Burdon Enviroscope has prepared this Environmental Management Plan (EMP) relating to the construction of an access. This EMP aims to reduce the effects of the project's construction activities on the environment and sensitive receptors.

This EMP is prepared according to the Queenstown Lakes District Council (QLDC) *QLDC Guidelines for Environmental Management Plans, June 2019* (EMP Guidelines). It is considered to have a 'Medium' environmental risk level as per the risk categories outlined in the EMP Guidelines.

This document will also ensure that the project aligns with the objectives and policies of the Otago Regional Council's (ORC) Plan Change 8, specifically *Topic 7: Part G: Sediment from earthworks for residential development*.

The purpose of this EMP is to be an effective and practical reference manual for construction personnel that applies to all project activities during the construction phase and includes the following:

- Strategies to manage environmental aspects and risks, based on associated best practice.
- Provides for contingency planning.
- Provides a framework for monitoring, reporting, review and continual improvement.
- Defines roles and responsibilities.
- Procedures to investigate and resolve environmental non-conformances and initiate corrective and preventative actions.

An overview of the project and sequencing can be found in the construction methodology at Section 2.0.

1.2 Site Overview

The site is located between State Highway 6 and the western shores of Lake Hawea, approximately three kilometres north of the Hawea Township. A single driveway access will be established to three building platforms via an access point off the Makarora-Lake Hawea Road (State Highway 6). This is shown in **Figure 1** below.



Figure 1: Location of the site (Source: QLDC GIS)

1.2.1 Soils and Geotechnical Summary

A geotechnical report has been prepared by Geosolve dated December 2022 which details site investigations and reports on the geotechnical conditions. The report notes that “Topography in the vicinity of the building platforms slopes gently eastward towards the shores of Lake Hawea at an average gradient of around 5-10°. West of State Highway 6 the terrain rises steeply up the range front at an average gradient of about 30°. A glacial depression, elongated north-south, is present between the base of the range and State Highway 6 west of the building platforms. North of the subdivision a series of sub-vertical faces, formed within glacial deposits, are being actively eroded alongside the shores of Lake Hawea.

The western shores of Lake Hawea consist of glacial terraces comprising glacial till and outwash gravels which are in turn overlain by younger alluvial fan deposits. The alluvial fans have developed eastward from the bounding range front during post glacial times and beach gravels have developed along the shoreline from erosion of the glacial deposits.

1.2.2 Summary of Earthworks

A total of approximately 1370 m³ of material will be excavated with close to a cut to fill balance across the access. The maximum area exposed indicated on survey plans demonstrate 3,116 m². The extent of earthworks is depicted on the Erosion and Sediment Control (ESCP) drawing in [Appendix 1](#).

1.3 Associated Resource Consents

This EMP has been prepared to ensure that all relevant conditions of associated resource consents are addressed. Provided the project undertakes its operations in accordance with this EMP, it will comply with the relevant conditions. The resource consents associated with this project are given in **Table 1**.

Table 1: Associated resource consents

Resource Consent Number	Related Council	Activity Description	Date of Decision Issue
TBC	QLDC		

1.4 Suitably Qualified and Experienced Professional

This EMP has been prepared by Tom Grandiek of Enviroscope Limited. Tom is a certified Environmental Professional (CEnvP) and holds a Bachelor of Applied Sciences degree, majoring in Environmental Management. He spent five years working in RMA compliance with local government. Tom has extensive experience in the preparation and monitoring of EMPs and ESCPs.

Tom meets the criteria of a Suitably Qualified and Experienced Professional (SQEP) for the purposes of preparing this EMP and overseeing the environmental aspects of this project.

2.0 CONSTRUCTION METHODOLOGY

2.1 Sequencing of Works

The following sequencing will ensure the earthworks are undertaken efficiently while ensuring good environmental outcomes. This is a preliminary staging methodology and may be subject to change based on site conditions encountered during construction. This methodology shall be read in conjunction with the Erosion and Sediment Control Plan (ESCP) attached as **Appendix 1**.

Preliminary works and site establishment (prior to as-built confirmation)

- Ensure the current EMP is available onsite.
- Complete site induction with Environmental Representative.
- Establish site laydown.
- Install erosion and sediment controls.

Access earthworks

- Form clean water diversion bund above access by utilising vegetated topsoil and pushing up above access footprint.
- Excavate access progressively and form DWDC as works progress.
- Once access base is formed, stabilise access surface with aggregate base.

Landscaping and revegetation

- Undertake final landscaping and revegetation of any remaining exposed areas.

Decommissioning

- Remove erosion and sediment control devices once stabilisation has occurred across the entire site. This is generally defined as 80% vegetative cover.

2.2 Hours of Operation

Construction activities and the associated hours of operation shall comply with *NZS 6803:1999 Acoustics - Construction Noise Guidelines*. Site works may be undertaken between 0730 and 1800 hours, Monday to Saturday. No works are to be undertaken on Sundays or Public Holidays. However, this does not preclude any emergency works or works required for incident investigation or response. Additional detail relating to noise-producing activities are to be undertaken in accordance with Section 7.0 of this EMP.

3.0 EMP IMPLEMENTATION

3.1 Environmental Roles and Responsibilities

3.1.1 Project Manager

The Project Manager is responsible for the effective implementation of the EMP and has overall responsibility for the environmental performance of the project. Duties include:

- Ensuring adequate resources are in place to implement the EMP.
- Ensuring all staff and sub-contractors operate within the guidelines of the EMP.
- Ensuring that an EMP is prepared and that environmental standards, processes and procedures meet relevant resource consent conditions.
- Overseeing the successful implementation, monitoring and review of the EMP.
- Ensuring that inspections are carried out in accordance with the relevant EMP.
- Restricting or stopping any activity that has the potential to or has caused adverse environmental effects.
- Providing notification and reporting of Environmental Incidents to Council and other environmental reports as required by The Guidelines.
- Delegating authority of the above responsibilities.

3.1.2 Environmental Representative

The Environmental Representative supports the Project Manager in the day-to-day implementation of the EMP. Duties include:

- Ensuring the installation of environmental controls as per the EMP.
- Undertaking environmental site inspections.
- Overseeing the maintenance and improvement of defective environmental controls.
- Providing environmental inductions to all staff and sub-contractors.
- Assisting the project leadership in attending to Environmental Incidents and Complaints.

The Environmental Representative shall be familiar with environmental risks associated with the project, the EMP and best practice erosion and sediment control principles and practices.

3.1.3 Environmental Consultant

The Environmental Consultant (SQEP) will provide technical environmental management advice as required. The SQEP can provide as-built confirmation and the initial environmental induction for staff on site.

3.1.4 All Staff and Sub-Contractors

All staff and sub-contractors have a responsibility to undertake all activities in accordance with the requirements of this EMP. This includes reporting any activity that has the potential to or has resulted in an Environmental Incident to the Project Manager or Environmental Representative.

3.2 Site Environmental Induction

All staff and subcontractors shall attend an Environmental Induction to ensure they are aware of the project's environmental risks as well as their responsibilities to help manage these risks. Prior to ground-disturbing activities, the Environmental Representative will deliver the induction to core staff. During the project, the Environmental Representative will induct subcontractors and new staff.

The site induction handout is attached as **Appendix 3** and all persons inducted will be recorded on the Induction Register attached as **Appendix 4**.

3.3 Environmental Inspections

Table 3 outlines the regular environmental inspections to be undertaken.

Table 3: Environmental inspections

Environmental Inspection	Timing	Purpose
Weekly Inspection	Every seven days	A comprehensive environmental inspection will: • Confirm that all environmental controls are present, functional, and adequate. • Identify any activities that may cause an environmental incident or actual or potential environmental effects. • Identify maintenance requirements for implemented management measures. All weekly inspections shall be recorded on the Weekly Site Inspection form attached as Appendix 5.
Pre-Event Inspection	Prior to a significant rain event ¹	To ensure that erosion and sediment controls are present, functional, and adequate for forecast rain event. This inspection will inform any preventative work required and may result in the Rapid Response Procedure being implemented (see Section 4.6).

¹ A significant rain event is defined as any rain event that can generate overland flow, noting that this varies seasonally.

Environmental Inspection	Timing	Purpose
Rain Event Monitoring	During a significant rain event	To ensure that: • Erosion and sediment control devices continue to function correctly and inform any necessary emergency responses. • Sediment retention devices are functioning effectively and have capacity available. • No dirty² water is crossing the boundary of the site. Observations and remediation measures taken will be recorded in a daily job diary.
Post-Event Inspection	Immediately following a significant rain event	Any observations and corrective actions should be recorded in a daily job diary.

3.4 Environmental Incident Management

Environmental incidents shall be responded to as soon as the project team becomes aware of them occurring. The response will generally involve oversight by the Environmental Consultant and will involve:

- Immediate cessation of the activity that caused the incident.
- Investigation into the cause of the incident.
- Initial response to bring the incident under control.
- Implement any remediation works.

The Project Manager shall notify QLDC of the details of any Environmental Incident within 12 hours of becoming aware of the incident. Notification will be through a phone call to Council monitoring staff (see Emergency Contacts on page four).

The Project Team shall provide an Environmental Incident Report within ten working days of the incident occurring. The Incident Report form is attached as [Appendix 6](#).

3.5 Records and Registers

The records listed below will be collated onsite. If a request is made by a QLDC official, the records shall be made available to the official within 24 hours of the request being made.

- Environmental Induction Register - [Appendix 4](#).
- Weekly Environmental Inspection Form - [Appendix 5](#).

² 'Dirty water' is defined as water that exceeds the maximum allowable water quality value outlined in the Discharge Criteria at Section 5.2.

- Environmental Incident Reports - **Appendix 6**.
- Complaints Register - **Appendix 7**.
- EMP Non-Conformance Register - **Appendix 8**.
- Water Quality Monitoring Results - **Appendix 9**.

3.6 Complaints Procedure

Any complaint received will be recorded and an investigation will be carried out. The complainant will be provided with a response acknowledging receipt of the complaint and outlining corrective actions to be implemented. After the investigation, any necessary corrective actions will be carried out and a follow-up of the original complaint is to be conducted to ensure the actions implemented have been effective.

All complaints will be recorded on the Complaints Register attached as **Appendix 7**.

3.7 EMP Non-Conformance and Corrective Actions

EMP non-conformances found during site inspections, monitoring or as a result of environmental incidents or complaints shall be recorded in the EMP Non-Conformance Register. The non-conformance register attached as **Appendix 8** will detail when corrective actions are due, how they are to be carried out and the close out date.

The non-conformance register ensures that issues do not escalate or are missed, as well as, providing a clear record of evidence that can be used to defend any potential complaint or formal enforcement action.

3.8 EMP Updates

The EMP will be regularly reviewed throughout the project to ensure the document remains fit for purpose and to drive continual improvement. This may be initiated by:

- Significant changes to the construction methodology.
- Improvements identified as a result of an Environmental Incident or Corrective Action.
- Where directed by QLDC's Monitoring and Enforcement team.

All EMP updates will be managed through the document control table on page one and shall be submitted to QLDC for acceptance.

4.0 EROSION AND SEDIMENT CONTROL MEASURES

4.1 Performance Criteria

Design, install and maintain erosion and sediment controls in accordance with industry best practices. Generally, *Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region 2016* (Auckland Council Guideline Document GD2016/005).

4.2 Erosion and Sediment Control Principles

Erosion and sediment control ('ESC') devices shall be installed, maintained and decommissioned in accordance with the following principles:

- Erosion and sediment controls are integrated with construction planning.
- A 'treatment train' approach so that the sediment retention devices operate as efficiently and effectively as possible.
- Separation of 'clean' and 'dirty' water with clean water to be diverted around the site to minimise the volume of dirty water needing management onsite.
- The extent and duration of soil exposure is minimised.
- Controls are always maintained in proper working order.
- Progressively stabilise and revegetate disturbed or completed areas.
- The site is monitored, and erosion and sediment control practices are adjusted to maintain the required performance standard.
- Soil erosion is minimised as far as reasonable and practical.
- Avoidance of sediment discharge off-site and protection of receiving environments.

4.3 Guidance on Erosion and Sediment Control Devices

The effective control of surface water shall be achieved through the utilisation of carefully selected erosion and sediment control devices to achieve a specific purpose. These guidelines for the devices employed on this project shall be read in conjunction with the ESCP attached as **Appendix 1** of this document.

4.3.1 Site Definition

At the commencement of the project, the following components onsite will be clearly defined as detailed in **Table 5**.

Table 5: Site definition specifications

Site component	Method of Demarcation
Designated site access	Installation of stabilised access/signs
Internal 'no-go' areas (protected or sensitive areas)	Bunting or flagging tape with waratahs

4.3.2 Stabilised Entranceway

The stabilised access will be located via the existing farm track access as indicated on ESCP-001 attached as **Appendix 1**. The stabilised entranceway will be constructed in accordance with the schematic diagram in, **Appendix 1** (complete guidelines on pages 60-65 of GD05).

4.3.3 “Clean Water” Diversion Bunds

A clean water diversion bund will be used to capture and divert clean water from the undisturbed surfaces above the exposed works site. The purpose of these devices is to separate clean and dirty water and minimise the size of the contributing catchment. During initial topsoil strip of the access, the vegetated topsoil medium is to be pushed above the access on contour to capture any upslope clean water sheet flows. Minimal flows are anticipated due to the small, moderately sloping and densely vegetated upslope catchment. Makakrora – Lake Hawea Road above the site has roadside swales that convey clean water flows to surrounding streams and flow paths, outside of the site, considerably reducing possible clean water flows.

These devices shall be constructed in accordance with the specifications noted in the schematic diagram in ESCP-002, **Appendix 1** (complete guidelines on pages 38-42 of GD05). Full calculations are included in **Appendix 2**.

4.3.4 “Dirty Water” Diversion Channels and Bunds

A dirty water diversion channels (DWDC) will be installed to capture and carry potential sediment-laden stormwater from the access road surface to the drop out pit and decanting earth bund. DWDCs will be constructed in accordance with the schematic diagram in ESCP-004, **Appendix 1** (complete guidelines on pages 43-46 of GD05). Full calculations are included in **Appendix 2**.

4.3.5 Drop-Out Pits

One drop-out pit will be used at the end of the driveway access to capture any sediments off the small portion of the access that cannot be effectively captured by the decanting earth bund.

Drop-out pits will be constructed in accordance with the image reference in ESCP-005, **Appendix 1** (complete guidelines on page 45 of GD05).

4.3.6 Culvert

A culvert may be required to convey the existing roadside swale of Makarora – Lake Hawea Road past the proposed driveway access point. This is expected to be provided in formal engineer design if required. Connecting the access to the road will be the last phase of construction and the swale is expected to be maintained throughout construction, negating the requirement for a temporary culvert.

4.3.7 Decanting Earth Bund

One decanting earth bund (DEB) will be used to capture flows from the DWDC and allow sediment to settle out of the water column. A DEB decants off the cleaner water at the top of the water column i.e. the live storage range.

Full design specifications based on GD05 including depth, width and length are given in **Appendix 2**. The DEB will be constructed in accordance with the schematic diagram in ESCP-006, **Appendix 1** (complete guidelines on pages 106-112 of GD05).

4.3.8 Standard Silt Fence

A standard silt fence will be used to capture potential sheet flows from the fill area adjacent to an overland flow path. The silt fence will be installed in accordance with the schematic diagram in ESCP-007, **Appendix 1** (complete guidelines on pages 112-119 of GD05).

4.3.9 Temporary Stockpiles

A temporary topsoil stockpiles may be formed as part of earthworks. Stockpiles shall be constructed in accordance with the schematic diagram in, **Appendix 1**.

4.3.10 Progressive Rehabilitation

Progressive stabilisation of earthworks is to occur promptly as areas are finished to minimise the area of exposed soil and thus the generation of sediment-laden water. Prior to final landscaping, this can comprise temporary grassing, turfing or clean aggregate.

4.4 As-Built Verification

The Environmental Consultant can provide the Council with as-built confirmation to verify that the erosion and sediment controls have been installed in accordance with the approved ESCP.

4.5 Maintenance of Erosion and Sediment Control Devices

Ongoing maintenance of the site shall be undertaken as follows:

- Clean out sediment of erosion and sediment control as soon as 20% capacity has been reached.
- Any mucked-out sediment shall be stockpiled, dried and reused as planting media for revegetation.

4.6 Rapid Response Procedure for Significant Rain Events

The Environmental Representative will stay vigilant of weather forecasts. If a significant rain event is imminent, all works will cease in sufficient time for staff to inspect and maintain erosion and sediment control devices and undertake any stabilisation required. Observations will continue through the rain event to ensure the functioning of erosion and sediment control devices.

4.7 Decommissioning and Removal

Erosion and sediment control devices will remain in place until 'stabilisation' of the site has been achieved. This is generally defined as 80% vegetative cover as depicted in **Figure 2**.

It is noted that the removal of controls may result in minor soil exposure. Any soils exposed during decommissioning will be stabilised with either grass, mulch or other appropriate erosion control.

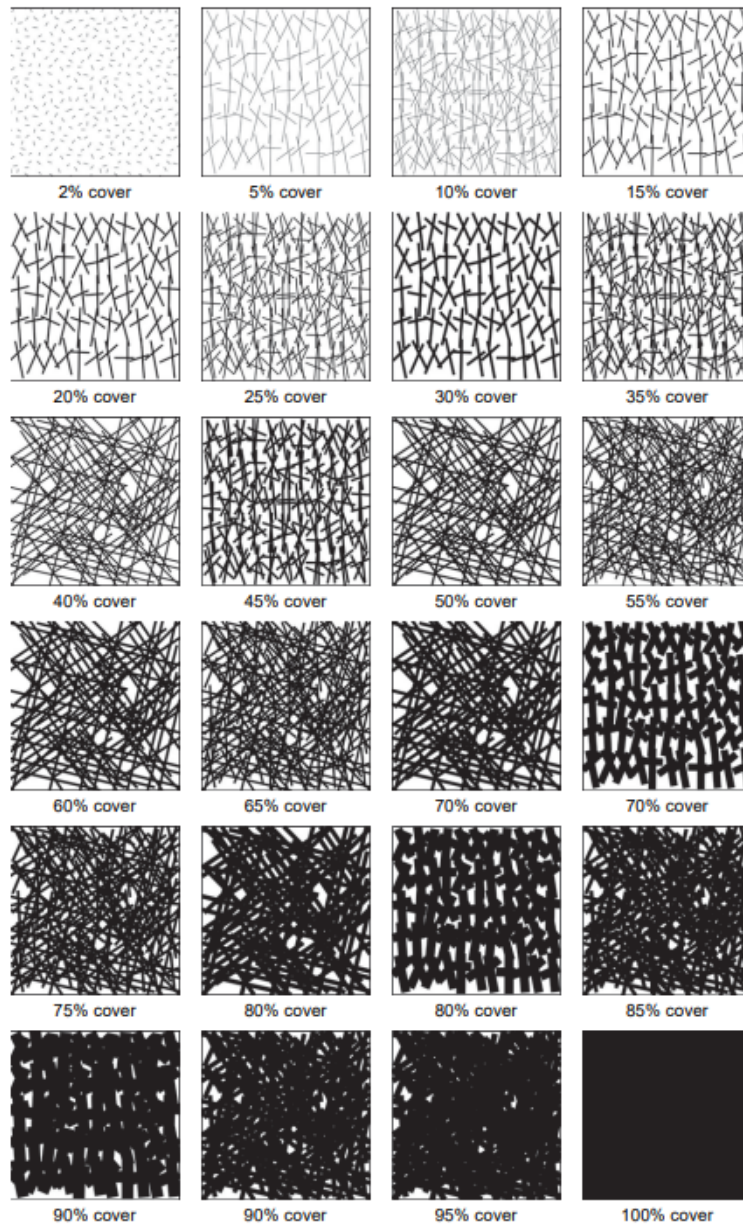


Figure 2: Visual cover estimation (Source: Catchments and Creeks Pty Ltd)

4.8 Inspections and Monitoring

Details of inspections and monitoring are stated in Section 3.3.

4.9 Contingency Measures

The following contingency measures in **Table 6** shall be deployed as required.

Table 6: Erosion and sediment control contingency measures

Issue	Contingency Measure
Sediment-laden stormwater flowing across the site boundary	Undertake measures to stop the flow immediately. Ensure controls are installed according to the ESCP. Contact the Environmental Consultant (SQEP) who will initiate the incident response.
Controls do not appear to be working as intended	Contact Environmental Consultant (SQEP) to inspect, advise and revise ESCP as required.
The site is inappropriately exposed prior to imminent rain event	Cease works and shift effort to checking erosion and sediment controls and stabilisation via the Rapid Response Procedure outlined in Section 4.6
Sediment retention devices are near capacity and more rain is forecast	Contact the Environmental Consultant (SQEP) immediately for advice.
Abatement notice issued by Council	Contact the Environmental Consultant (SQEP) immediately to advise on methods to meeting abatement notice requirements within the time stated by the abatement notice.

4.10 Erosion and Sediment Control Incident

An erosion or sediment control incident is considered to have occurred where performance criteria outlined in Section 4.1 is not met. The incident procedures outlined in Section 3.4 shall commence.

5.0 WATER QUALITY MANAGEMENT

Surface water bodies (rivers, streams, lakes and wetlands) provide important habitats for many species of plants, fish, birds and animals, some of which are endemic and/or threatened. To protect these values, water quality must be safeguarded, and the natural flow of the watercourse maintained to the greatest possible extent. Where flow must be reduced or diverted, mitigation is required to ensure the values of the watercourse are not degraded.

5.1 Receiving Waterbodies

There are no identified waterways within the proposed access works area. Lake Hawea is located 120 metres to the east, subject to fluctuations in Lake levels.

An ecological assessment completed by Dr David Norton of Biodiversity Solutions Ltd, dated 25th November 2022, noted two minor Wetland areas. Noting that ‘the wetland adjacent to SH6 has likely formed after road construction, the second wetland can be considered a ‘natural wetland’ under the Freshwater Management NPS. However, it is <0.05 ha and does not contain any threatened species. The current ecological value of this wetland is limited, and it is unlikely to be considered significant’.

Both identified wetland areas are located well outside of the proximity of the proposed access, with no ability for any overland flows from the access to be able to practically reach them.

An unnamed small stream located to the north of Lot 3 terminates to Lake Hawea, from part of the upslope Mt Maude catchment. This is located some distance outside of the proposed earthworks catchment, as indicated in [Figure 3](#) below.



Figure 3: Waterways within proximity to the access

5.2.3 Regional Plan: Water for Otago

The schedules, maps and associated values or controls that are stipulated in the Water Plan for the area in around the site, include:

- **Schedule 1A – Natural Values.** Lake Hawea provides for scenic values within the wider landscape context of the surrounding mountains, particularly colour of the water. The lake is also recognised as being an outstanding natural feature or landscape given its fishery, scenic characteristics (clear blue water, river deltas and beaches), scientific value (water clarity and bryophyte community), recreational use (i.e., boating), historical values and for tikanga Māori.
- **Schedule 1D – Kai Tahu Values.** Mana whenua interests identified as being associated with Lake Hawea include kaitiakitanga, mauri, waahi tapu and/or waiwhakaheke and waahi taoka. Access and customary use interests associated with Lake Hawea include: mahika kai (places where food is procured and produced); kōhanga (important nursery, spawning areas or breeding grounds for native fish or birds); trails (part of traditional routes, including landing places for canoes); and, cultural materials (source of traditional weaving materials or medicines).

5.2 Performance Criteria

Any waters flowing across the site boundaries will meet the criteria in **Table 7**.

Table 7: Water quality discharge criteria

Parameter	Discharge Criteria
Turbidity	≤ 100 NTU ³
<i>Or...</i>	
Comparative Visual Clarity (mm) ⁴	TBC
<i>If turbidity or visual clarity is exceeded, test for...</i>	
Total Suspended Sediment (TSS)	≤ 50 mg/L
pH ⁵	5.5 – 8.5
Hydrocarbons or tannins	No visible trace
Waste	No waste or litter is visible

5.3 Management Measures

The following measures will be deployed to ensure the protection of water quality:

- Erosion and sediment controls will be implemented and maintained in accordance with the Erosion and Sediment Control Measures in Section 4.0.
- Refuelling, servicing and storage of hydrocarbons will be in accordance with the relevant procedures in the Chemicals and Fuels Management in Section 10.0.
- All plant and equipment onsite will be inspected regularly to ensure they are of an acceptable standard.

³ Turbidity can be instantly measured using a nephelometer. This is considered desirable as opposed to testing TSS which requires laboratory testing and can take several days. Turbidity can be inferred from the relationship with TSS via linear regression. If the specified turbidity value is not met, a water sample will be collected and sent for TSS laboratory testing.

⁴ In the absence of a turbidity measure, visual clarity can be inferred from the relationship with turbidity via linear regression. If the specified visual clarity value is not met, a water sample will be collected and sent for TSS laboratory testing.

⁵ pH to be tested only when chemical treatment is undertaken.

- Stockpiling of any organic, erodible or hazardous material onsite is not to be placed within close proximity of a watercourse/major drainage line, unless appropriate controls are in place.

5.4 Monitoring

Water quality will be monitored in accordance with **Table 8**.

Table 8: Water quality monitoring measures

Sampling Scope	
Objective	To confirm that all controlled and uncontrolled water flowing from the site meets the Discharge Criteria referred to in Section 5.2.
Spatial boundaries	All water that enters and exits the site from rainfall or overland flow.
Frequency	At the time water flows cross the boundary of the site. Where a Significant Rain Event occurs through the night, monitoring shall be undertaken the following morning.
Sampling Design	
Water Quality Criteria	As outlined in the Discharge Criteria referred to in Section 5.2.
Sampling Locations	At boundaries of the site where any water is flowing, specifically the following point discharges:
Sampling Method	• TSS – Registered laboratory • Turbidity (NTU) – Nephelometer • pH – pH meter – only if utilising chemical treatment • Gross pollutants – visual observations • Tannins – visual observations (any unusual darkening of waters?) • Hydrocarbons – visual observations (is there any oily film⁶ on surface or smell?)
Quality Control	Any water quality meter will be calibrated according to manufacturer instructions. All observations will be recorded and analysed.
Recording	
Recording Results	All results will be entered into a spreadsheet and kept onsite (form attached as Appendix 9).

⁶ Some bacteria produce a naturally occurring film on the water surface. Bacteria films breaks apart in angular shapes when disturbed whereas hydrocarbon film separates as globules.

Actions	
Non-conformances	Any exceedances observed will be reported to the Project Manager/ Environmental Consultant who will investigate and ensure appropriate corrective actions are implemented immediately.

5.5 Contingency Measures

The following contingency measures in **Table 9** shall be adopted if required.

Table 9: Water quality contingency measures

Issue	Contingency Measure
Exceedance of water quality criteria	• Contact the Project Manager and Environmental Consultant (SQEP) immediately. • Works will cease or be modified to remove further risk of contamination. • QLDC will be verbally notified. • The Environmental Incident procedure will commence. • Remedial measures will be implemented, and the Environmental Incident will be closed out by the Environmental Consultant (SQEP), with a copy of an Environmental Incident report to the Project Manager, QLDC.

5.6 Water Quality Incidents

A water quality incident is considered to have occurred where the water quality performance criteria outlined in Section 5.2 is breached. The incident procedures outlined at Section 3.4 shall commence.

6.0 DUST MANAGEMENT

Dust from construction activities, vehicle movements and stockpiles can contribute to sediment runoff and create a nuisance to the public, neighbouring properties, adjoining roads and service infrastructure. The key risks associated with dust occur during the bulk earthworks phase of the project.

There are a range of activities that may produce dust onsite including:

- General disturbance of soil (particularly during drier months).
- Sediment-tracking onto surrounding roads.
- Stockpiling of topsoil or subsoil.
- Slow or ineffective revegetation procedures.

6.1 Sensitive Receptors

Key sensitive receptors to protect from the effects of dust include vehicle users and or pedestrians on Makarora-Lake Hawea Highway. Contractors shall remain vigilant for variations in wind conditions.

6.2 Performance Criteria

The project must ensure that reasonable and practical measures are taken to avoid dust moving across the boundaries of the site at all times.

6.3 Management Measures

The following measures will be deployed to ensure dust generation onsite is minimised:

- Stage works where possible to minimise soil exposure extents and timeframes.
- Revegetate disturbed areas progressively throughout construction.
- Dust suppression of exposed areas and stockpiles by water trucks or other methods (e.g., k-lines) approved by the Environmental Representative.⁷
- If dust activities cannot be controlled during high winds, works will cease until favourable conditions return.
- Only designated access points are to be used.
- Site access to be constructed in accordance with GD05 (detail at Section 4.3.1).
- All site access and surrounding roads to be swept clean regularly.
- To avoid spillage risks, trucks will not be overloaded.
- All trucks must have tail gates up and swept or cleaned prior to entering external roads.
- Stockpile heights are to be minimised where possible (< two metres) unless they are covered (e.g. an erosion blanket, chemical sealant, temporary cover crop or mulched).

⁷ Ensure a consented water take permit is approved by the local authority. If taking water from lakes and or rivers, ensure that the permitted volume of water is taken.

- Long-standing stockpiles (greater than six weeks) shall be appropriately stabilised to provide both wind and erosion protection.
- Within two weeks of completion, all earth worked areas will be sown out with grass, landscaped or otherwise stabilised by an appropriate erosion control.

6.4 Monitoring

Site staff will maintain continual vigilance for any increases in wind to ensure measures are deployed prior to dust crossing site boundaries. Weekly Environmental Inspections will also ensure that the management measures described above are sufficient and performing effectively.

6.5 Contingency Measures

The contingency measures in **Table 10** shall be adopted if required.

Table 10: Dust contingency measures

Issue	Contingency Measure
Excessive dust creation from soil disturbance	• Spray down excavation areas and activities where excavator bucket is operating. • Cease excavation during high winds, particularly if wind direction is likely to impact sensitive receivers.
Excessive dust creation from hauling operations	• Cover or spray down loads causing dust impacts. • Apply skim of aggregate over the haul road surface.
Excessive dust creation from stockpiles	• Spray stockpiles with water or apply a temporary polymer. • Hydro-mulch, seed or stabilise stockpiles, cover stockpiles with geofabric. • Locate stockpiles further away from sensitive receptors.
Abatement notice issued by Council	Contact the Environmental Consultant (SQEP) immediately to advise on methods to meeting abatement notice requirements within the time stated by the abatement notice.

6.6 Dust Incident

A dust incident is considered to have occurred where:

- Dust is observed crossing the boundary into sensitive receptors or,
- A justified complaint is received regarding dust emissions across the boundary of the site.

The incident procedures outlined at Section 3.4 shall commence.

7.0 NOISE AND VIBRATION MANAGEMENT

Noise and vibration generated during construction has the potential to impact sensitive receivers by reducing comfort, impeding communication, causing cosmetic damage to structures and damaging household possessions.

The following assessment and management measures are intended for standard construction equipment that is not expected to induce noise or vibration beyond the maximum limits in the QLDC District Plan. Where upper noise and vibration levels of district plans will be breached, an Acoustic Specialist may need to be engaged to assist with the management of these nuisance effects.

Potential noise and/or vibration effects may be generated by the following:

- Excavation and earth moving plant
- Light vehicles near sensitive receptors
- Ancillary plant and equipment
- Compaction equipment
- Reversing alarms

7.1 Sensitive Receptors

There are no nearby sensitive receptors considered likely to be impacted by noise and vibration associated with the proposed access works.

7.2 Performance Criteria

1. Construction activities shall meet relevant noise limits specified under Rule 36.5.13 of the Queenstown Lakes Proposed District Plan. This rule requires Construction sound at any point within the site must comply with the limits specified in Tables 2 and 3 of *NZS 6803:1999 Acoustics - Construction Noise*, when measured and assessed in accordance with that standard (see **Table 11** below).
2. Construction activities shall meet relevant vibration limits specified under Rule 36.5.10 of the Queenstown Lakes Proposed District Plan. This rule requires vibration from any activity must not exceed the guideline values given in *DIN 4150-3:1999 Effects of vibration on structures* on any structures or buildings on any other site.
3. Construction activities shall be undertaken in accordance with the permitted hours of operation outlined at Section 2.2 above.

Table 11: Upper limits in dB(A) for construction work noise in residential areas for less than 20 weeks

Time of Week	Time Period	L _{Aeq(t)}	L _{Afmax}
Weekdays	0630 – 0730	60 dB	75 dB
	0730 – 1800	75 dB	90 dB
	1800 – 2000	70 dB	85 dB

Saturdays	0630 – 0730	45 dB	75 dB
	0730 – 1800	75 dB	90 dB

Table 12: Vibration Thresholds for Structural Damage (PPV mm/s)

	Short Term			Long-Term	
	At Foundation			Uppermost Floor	Uppermost Floor
Types of Structures	0 to 10 HZ	10 to 50 Hz	50 to 100 HZ	All Frequencies	All Frequencies
Commercial/Industrial	20	20 to 40	40 to 50	40	10
Residential	5	5 to 15	15 to 20	15	5
Sensitive/Historic	3	3 to 8	8 to 10	8	2.5

Note: When a range of velocities is given, the limit increases linearly over the frequency range.

7.3 Management Measures

The following measures will be deployed to ensure noise and/or vibration associated with the project are appropriately mitigated:

- Notify surrounding sensitive receptors prior to commencing particularly noisy or vibration inducing activities.
- Where practicable, select lower noise producing equipment or use lower noise generating alternatives.
- Regularly service equipment to ensure plant is running optimally.
- Plant and equipment to be fitted with noise control/attenuation devices as appropriate and maintained and operated in accordance with manufacturer's specifications.
- Revving of engines will be limited. All plant and vehicles will be turned off when not in use and if safe to do so.
- The use of audible alarms on mobile equipment will be limited, and two-way communication will be used.
- Undertake activities that may lead to noise or vibration effects, during reasonable and practical hours.

7.4 Monitoring

All earthworks activity will be closely monitored by the operator to ensure that noise and vibration remains within the required limits. If monitoring finds the activity cannot comply with performance criteria, an Acoustic Specialist may need to be engaged to assess the project and provide appropriate mitigation measures and monitoring. Weekly Environmental Inspections shall include an assessment of the site to determine the effectiveness of noise and vibration management controls.

7.5 Contingency Measures

The following contingency measures in **Table 13** shall be adopted if required.

Table 13: Noise and vibration contingency measures

Issue	Contingency Measure
Noise and/or vibration complaint received	Manage the complaint in accordance with the Environmental Complaints procedure in Section 3.6.
Exceedance of performance requirement criteria	The Environmental Consultant (SQEP), in consultation with the Environmental Representative, will investigate and implement actions to reduce noise and/or vibration levels to below criteria levels.
Ongoing noise and/or vibration issues	Where noise or vibration emissions consistently exceed the performance criteria despite the site staff's best efforts, an Acoustic Specialist will be engaged to assist.
Abatement notice issued by Council	Contact the Environmental Consultant (SQEP) immediately to advise on methods to meeting abatement notice requirements within the time stated by the abatement notice.

7.6 Noise and Vibration Incident

A noise or vibration incident is considered to have occurred when a justified complaint is received and on investigation is found to exceed the performance criteria. The environmental incident procedures outlined in Section 3.4 shall commence.

8.0 CULTURAL HERITAGE MANAGEMENT

The loss or damage of cultural heritage items could be caused by construction activities. The damage or loss of artefacts can lead to the loss of culturally or historically significant items and information.

Examples of cultural heritage items include:

- Koiwi tangata (human skeletal remains).
- Waahi taoka (resources of importance).
- Waahi tapu (places or features of special significance).
- Māori artefact material.
- A feature or archaeological material predating 1900.
- Unidentified archaeological or heritage site.

8.1 Location of Known Cultural Heritage Significance

A search of QLDC's database indicates the site is located within Wāhi Tūpuna Hāwea (Lake Hāwea), Paetarariki & Timaru (Slopes and lake margins around southern Lake Hāwea). There are no known protected archaeological sites or heritage protection orders within the site boundaries.

Figure 4 describes the identified areas of cultural significance.

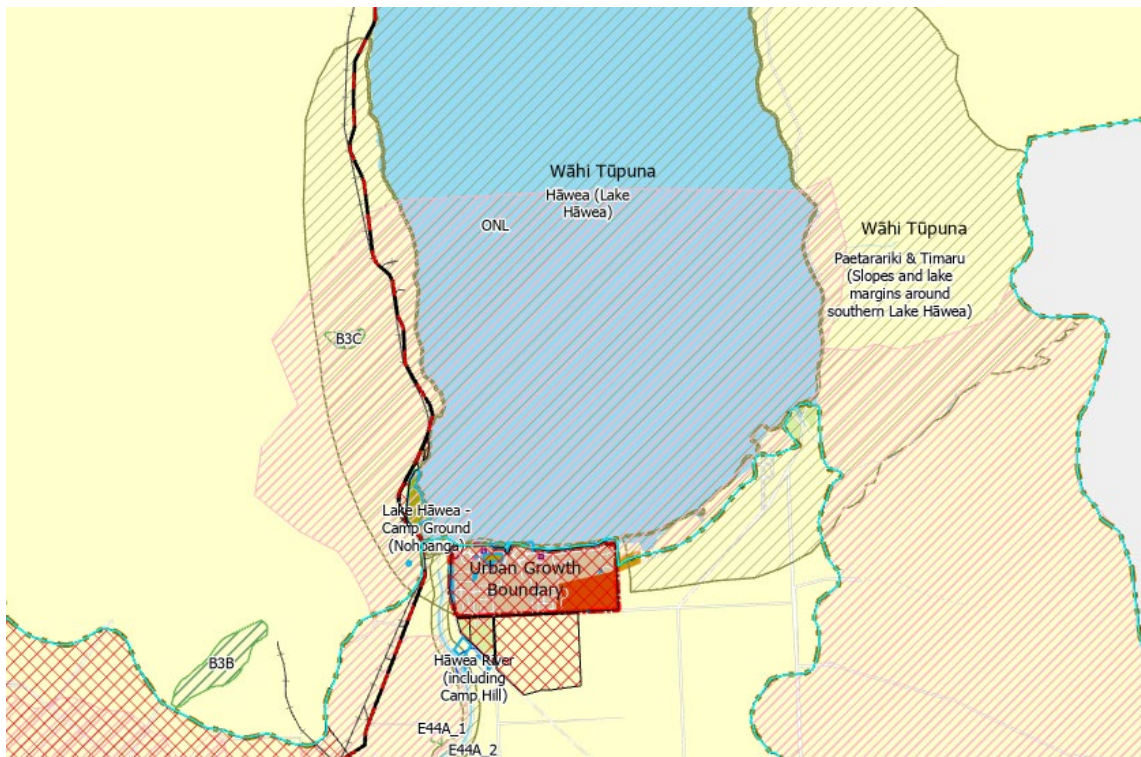


Figure 4: Locations of areas with cultural significance (Source: QLDC District Plan Map)

8.2 Performance Criteria

- The protection of cultural heritage artefacts and places in accordance with the *Heritage New Zealand Pouhere Taonga Act, 2014*.
- Strict adherence to Heritage New Zealand's *Archaeological Discovery Protocol* (attached as [Appendix 10](#)) in the case of unexpected finds.

8.3 Management Measures

All works on this project will be undertaken in accordance with the obligations of the *Heritage New Zealand Pouhere Taonga Act, 2014*.

8.4 Monitoring

Weekly inspections shall include a visual assessment of the site to ensure that no new significant artefacts have been encountered. However, operators must remain vigilant for such encounters as they occur.

8.5 Accidental Finds

If any unknown artefacts are uncovered, the project will work to Heritage New Zealand's *Archaeological Discovery Protocol* (attached as [Appendix 10](#)).

9.0 VEGETATION MANAGEMENT

9.1 Sensitive Receptors

An ecological assessment has been completed by Dr David Norton of Biodiversity Solutions Ltd, dated 25th November 2022. The vegetation across the site is described in detail and summarised by noting that the current vegetation is dominated by three plant communities – pasture, bracken fernland with regenerating shrubs and sprayed bracken fernland. In addition, there are small areas of rock outcrops.

Thirty-one species of native vascular plant were recorded from the site including four ferns, 16 shrubs, trees and climbers, three herbs, and eight grasses, sedges and related plants. The extent of the access is a relatively small earthworks footprint with the majority of this occurring within existing pasture and sprayed bracken.

Any existing indigenous vegetation will be demarcated as ‘no-go zones’ (also demarcated for erosion and sediment control purposes).

9.2 Performance Criteria

- Demarcate protected areas outside of the works areas as no go zones.
- Avoid the clearance of indigenous or protected vegetation where possible during excavation works.
- Avoid the spread of noxious weeds onsite or to other sites.

9.3 Management Measures

The following measures will be deployed to manage vegetation:

- Demarcate protected vegetation areas as no go zones.
- Treating weeds prior to disturbance of the natural surface.
- Maintain existing indigenous and or any protected vegetation.
- Weed free topsoil will be retained for reuse in site rehabilitation.
- All vehicles, plant and equipment working in weed infested areas shall be inspected and cleaned prior to demobilisation.

9.4 Monitoring

Weekly Environmental Inspections shall include a visual assessment of the site to determine the effectiveness of vegetation management controls.

9.6 Vegetation Incident

A vegetation incident is considered to have occurred where:

- Protected vegetation is damaged or removed.
- A no-go zone is breached.

The environmental incident procedures outlined at Section 3.4 shall commence.

10.0 CHEMICALS AND FUELS MANAGEMENT

Hazardous substances can endanger both human health and the environment. Used incorrectly they can cause catastrophic accidents, such as fires and explosions, and serious harm to people who are exposed to them.

10.1 Sensitive Receptors

Key sensitive environmental receptors include staff members working on the site, overland flow paths and Lake Hawea are also receptors to be aware of.

10.2 Performance Criteria

- Chemicals and fuels are stored and used in a manner that avoids contamination of site and surrounding environment.
- All spills are cleaned up immediately and the contaminated soils/waters disposed of appropriately.

10.3 Management Measures

The following measures will be deployed to ensure chemicals and fuels associated with the project are appropriately managed.

- All hazardous substances to be stored, transported and used according to the safety data sheet requirements.
- Storage of chemicals and fuels shall be located as far as practicably possible from waterways and concentrated flows.
- Refuelling of vehicles and plant onsite will occur in the designated laydown area.
- One 240 L Oil and Hydrocarbon spill kit and one 240 L Chemical spill kit will be located in close proximity to the location of liquid hazardous materials storage and refuelling areas.
- The volumes of the hazardous substances listed in **Table 14** will not be exceeded.

Table 14: Maximum volumes of chemicals and fuels

Chemicals and Fuels	Maximum Volume	Storage Location
Diesel	500 L	Fuel tank or Jerry cans in lockable container
Unleaded Fuel	100 L	Jerry cans in lockable container
Oil	10 L	Packaging in lockable container
Lubricant (WD40 or similar)	Two Cans	Packaging in lockable container
Grease	5 L	Packaging in lockable container
Spot marking paint	2 L	Packaging in lockable container

10.4 Monitoring

Weekly Environmental Inspections shall include a visual assessment of the site to determine the effectiveness of chemicals and fuels management.

10.5 Contingency Measures

The following contingency measures in **Table 15** shall be adopted if required.

Table 15: Chemicals and fuels contingency measures

Issue	Contingency Measure
Spills response	• Stop works in proximity to the spill and assess the safety of all personnel. • Take immediate action to contain the spill to prevent discharge into stormwater drains or natural waterways. • Use spill kits to contain and treat the spill. • Notify Environmental Consultant to advise on next steps. • If necessary, notify the Regional Council spill response unit. • Remove contaminated material to a suitable contained location for remediation/disposal (require any necessary approvals/permits from ORC). • The spill kits shall be replaced by an approved supplier.
Inappropriate storage	• Upgrade facility. • Clean-up of storage area. • Notify and train staff.
Inappropriate handling/transport	• Notify and train staff through toolbox meetings on the appropriate handling and transport methods.
Inadequate spill kit materials	• Order more materials. • Investigate types of chemicals onsite and consult a supplier for advice on appropriate equipment. • Develop or revise spill material monitoring and ordering system.
Inappropriate disposal of chemicals or fuels	• Provide appropriate disposal facilities or service providers. • Notify and train staff.
Inaccurate or insufficient records	• Advise staff and update records. • Monitor through inspections.

10.6 Chemicals and Fuels Incident

A chemicals and fuels incident is considered to have occurred where:

- A spill more than five litres has occurred.
- A situation is discovered where a spill of more than five litres would likely have occurred before it happens where the management measures listed above have not been followed.

The environmental incident procedures outlined at Section 3.4 shall commence.

11.0 WASTE MANAGEMENT

Waste from construction activities can create a nuisance to the public, neighbouring properties, and adversely affect flora and fauna.

11.1 Sensitive Receptors

Key sensitive environmental receptors include staff members working on the site, overland flow paths and Lake Hawea are also receptors to be aware of.

11.2 Performance Criteria

- Non-recyclable waste generation is minimised, and the site and surrounds are kept free from waste at all times.
- Wastes shall be stored safely and in an organised manner until recycling, reuse, or disposal.

11.3 Management Measures

The following measures will be deployed to ensure waste management associated with the project is appropriately mitigated:

- The Waste Management Hierarchy philosophy will be implemented, as illustrated in **Figure 5**.

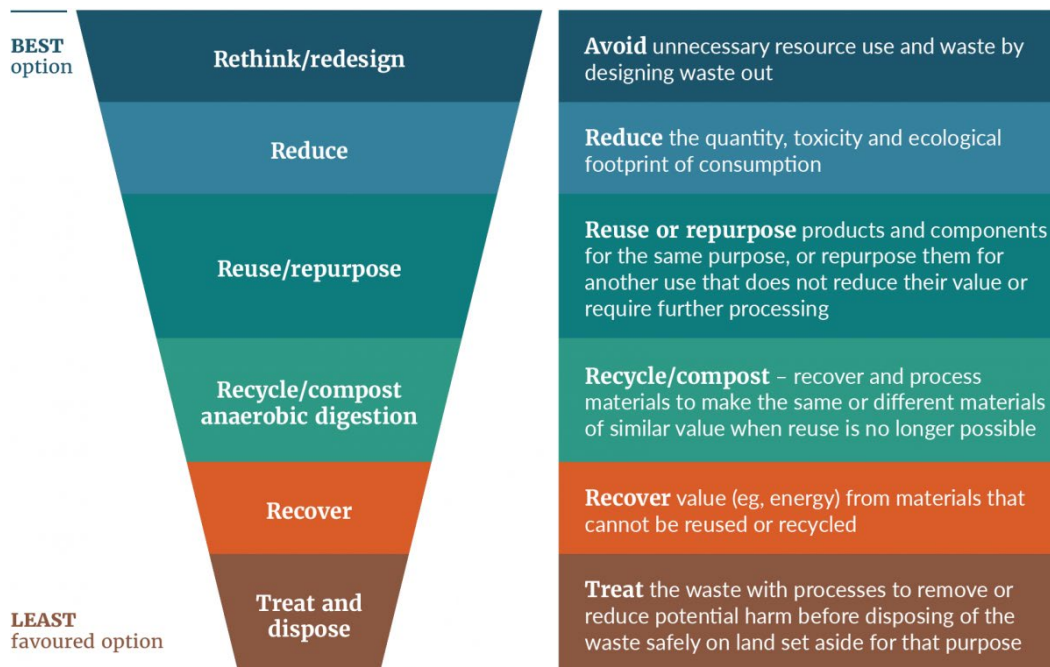


Figure 5: The Waste Hierarchy (Source: Ministry for the Environment).

- Measures will be implemented to ensure the site is maintained in a safe, clean and tidy state.
- Where possible, waste shall be segregated into labelled bins with lids: General, Hazardous and Recyclables.

- Wastes onsite shall be suitably contained and prevented from migrating offsite.
- The waste is to be contained so it doesn't contaminate soil, surface or ground water, create unpleasant odours or attract vermin.
- Any material dropped in or adjacent to open drains shall be recovered immediately after it occurs.
- Waste storage is not permitted in or near drainage paths.
- The burning of waste is strictly prohibited.
- No wastes shall be disposed of onsite.
- Wastes shall be removed from site regularly and at completion of works.

11.4 Monitoring

Site staff will be briefed on waste processes prior to works commencing and shall maintain continual vigilance for excess waste around the site and following appropriate disposal procedures. Weekly Environmental Inspections shall include a visual assessment of the site to determine the effectiveness of waste management controls.

11.5 Contingency Measures

If waste items are accumulating or are stockpiled, the following contingency measures will be adopted:

- Arrange for collection by approved licensed contractor.
- Provide additional bins with lids if available.
- Remove waste offsite as soon as possible.

11.6 Waste Incident

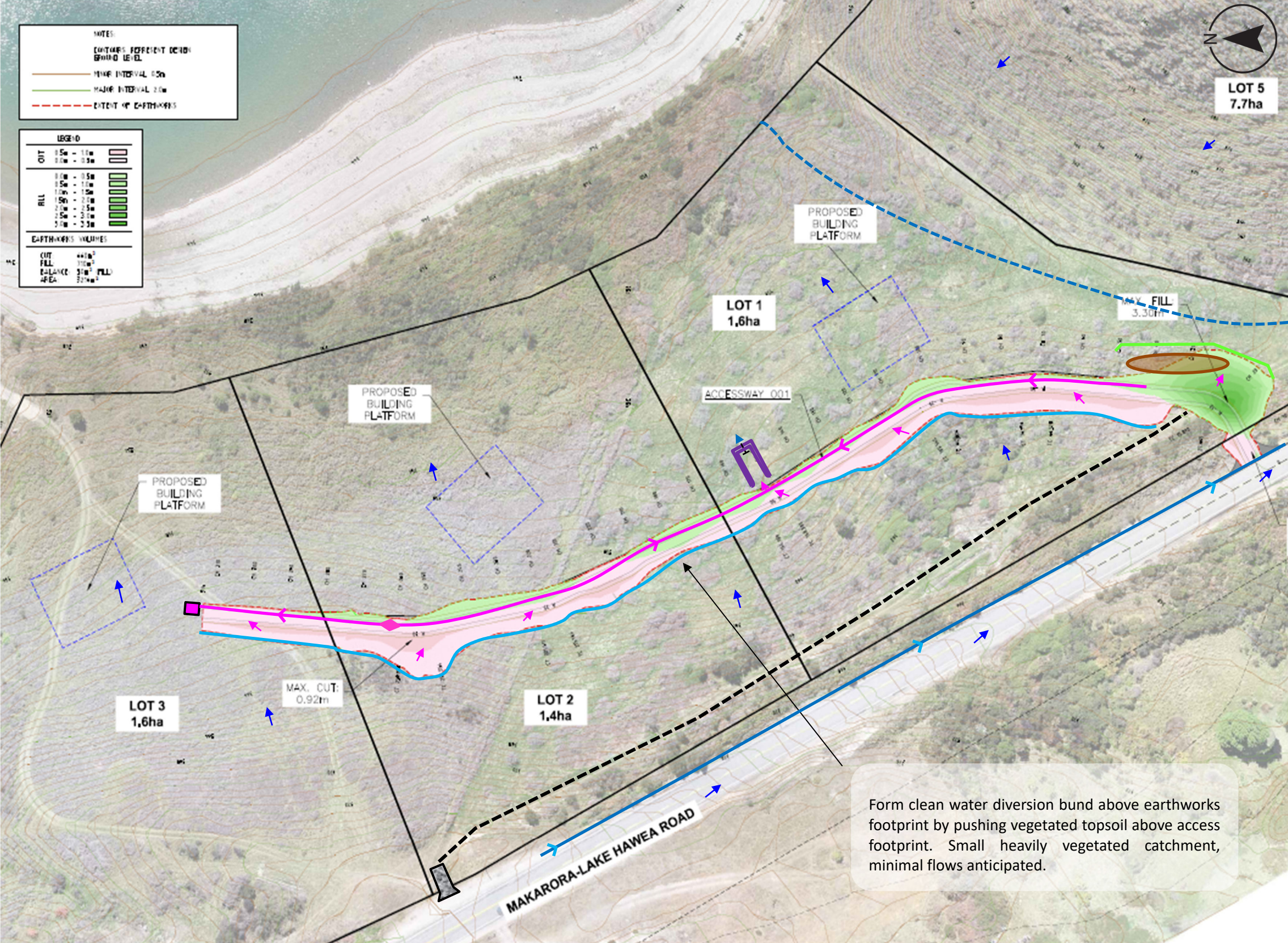
A waste incident is considered to have occurred where:

- Waste from the site is found within a sensitive environment or where it may reasonably migrate to a sensitive environment,
- A complaint is received regarding inappropriate management of waste and on investigation is warranted.

The environmental incident procedures outlined at Section 3.4 shall commence.

APPENDIX 1

Erosion and Sediment Control Plan Drawing



Legend

	Stabilised access
	Clean water overland flow
	Dirty water overland flow
	Clean water diversion bund
	Dirty water diversion channel
	Roadside swale
	Overland flow path
	Laydown area
	Silt Fence
	Existing farm track access
	Drop out pit
	Topsoil stockpile
	Decanting earth bund

Notes

1. This plan is to be read in conjunction with the Environmental Management Plan document prepared by Enviroscope.
2. All locations of erosion and sediment control (ESC) devices are indicative and exact placement to be confirmed onsite.
3. ESC devices to be installed and maintained in accordance with Auckland Council's 'Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05) and manufacturer's instructions where relevant.
4. All devices are to be inspected daily and pre and post-rain event to ensure they are fully functional.



Project: The Dene, Driveway Access
Description: Erosion and Sediment Control Plan Drawing

Drawn	Approved	Date	Drawing No.	Revision
TG	TG	23/03/2023	ECSP - 001	A

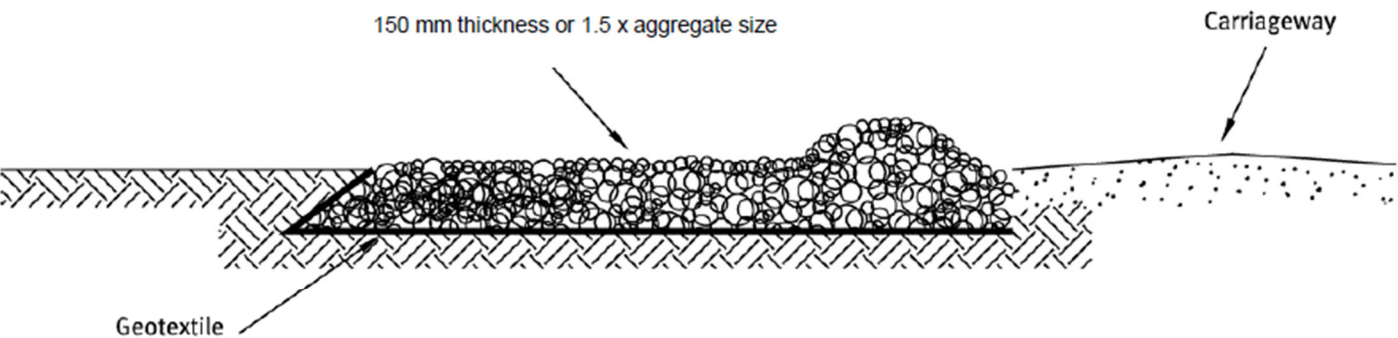
SITE PHOTOS



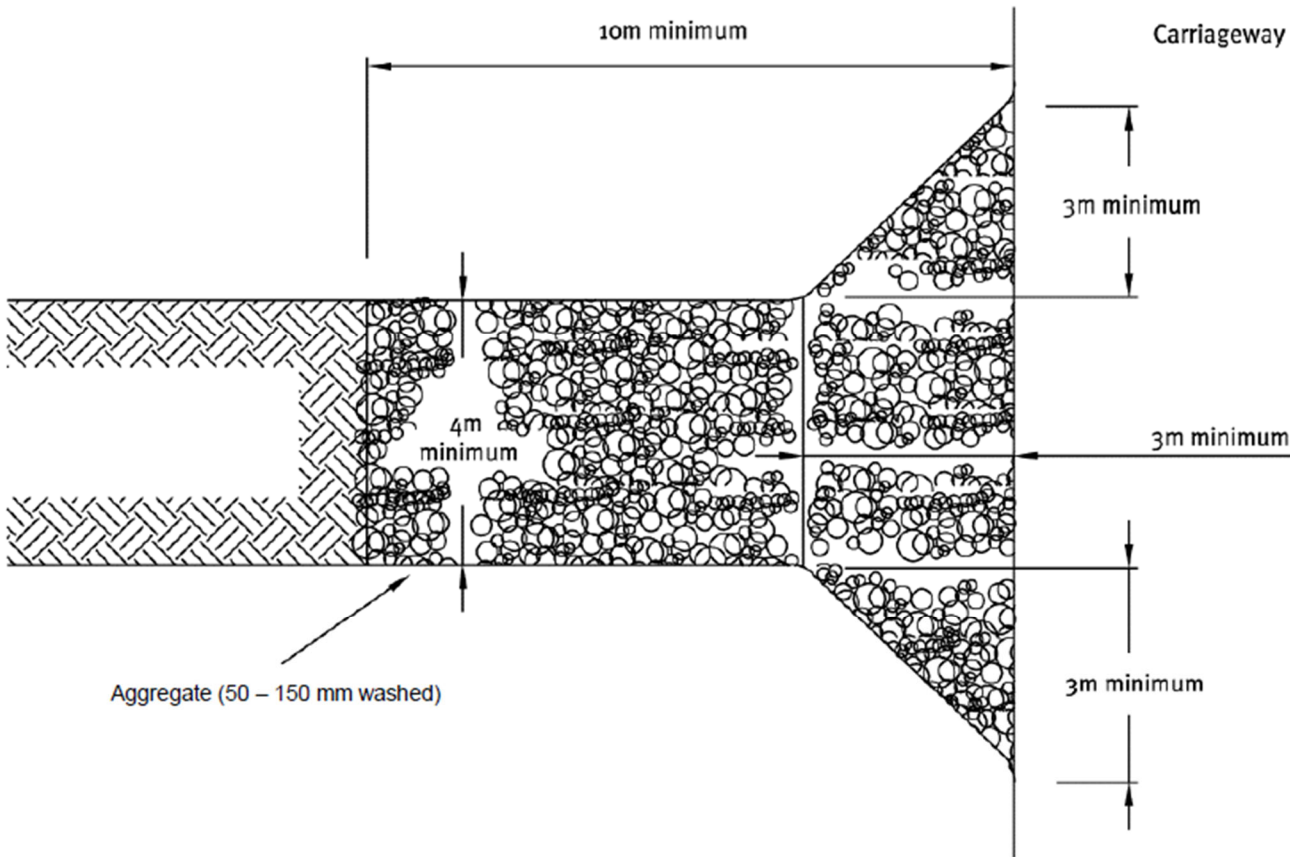
	Project: The Dene, Driveway Access				
	Description: Erosion and Sediment Control Plan - Schematics				
	Drawn	Approved	Date	Drawing Number	Revision
	TG	TG	23.03.2023	ECSP - 002	A

STABILISED ACCESS

(Page 60 from GD05)



Side Elevation



Plan View

Design Parameter	Specification
Aggregate size	50-150 mm washed aggregate
Minimum thickness	150 mm
Minimum length	10 m
Minimum width	4 m

- Additional aggregate may need to be added to the stabilised entranceway throughout the project to maintain the thickness.
- Any sediment that has been tracked onto the surrounding roads must be swept away at regular intervals.

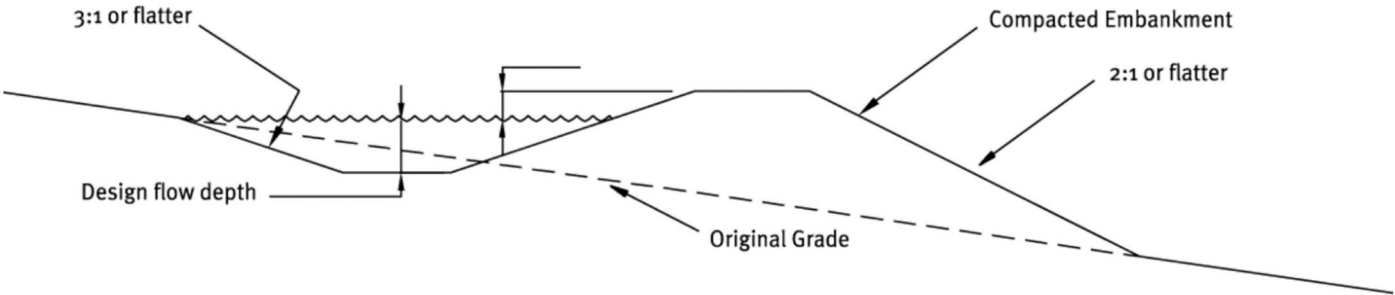


Project: The Dene, Driveway Access
Description: Erosion and Sediment Control Plan - Schematics

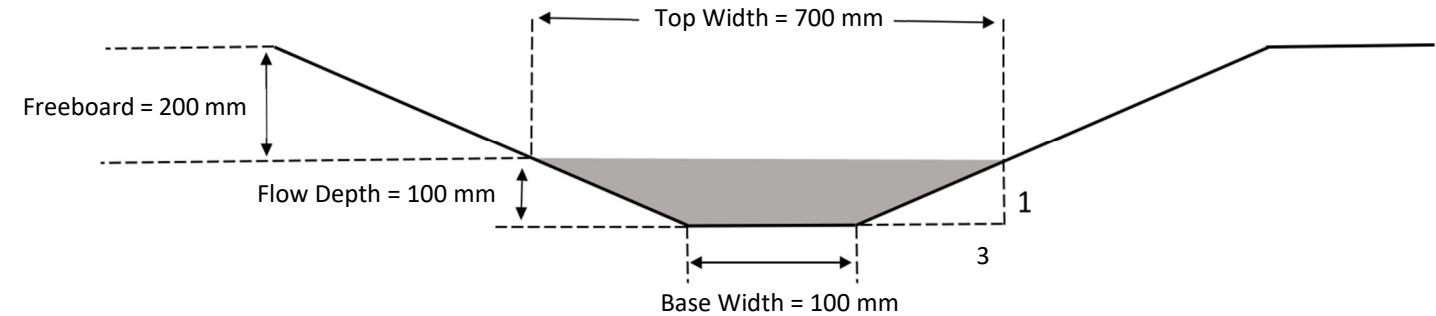
Drawn	Approved	Date	Drawing Number	Revision
TG	TG	23.03.2023	ECSP - 003	A

DIRTY WATER DIVERSION CHANNEL

(Pages 43-46 from GD05)



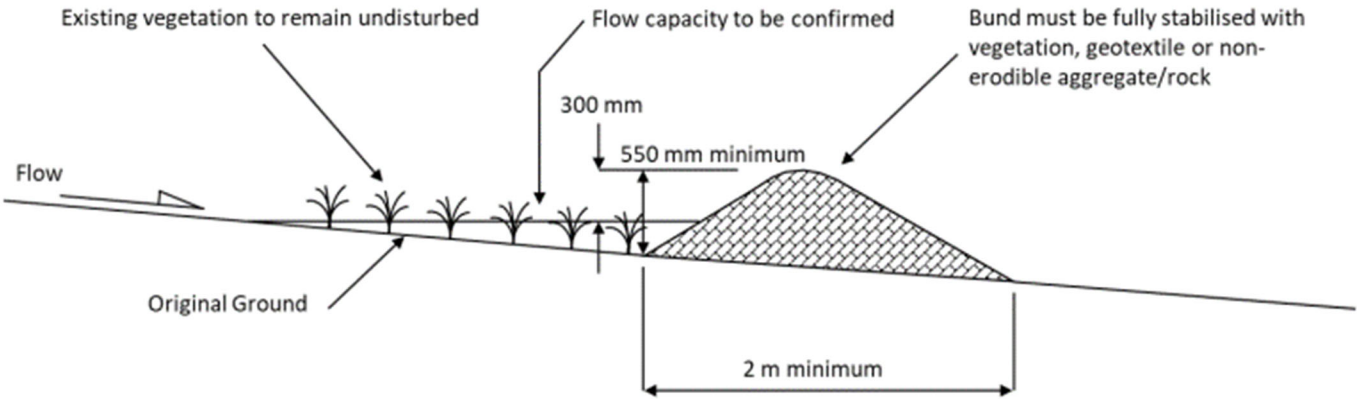
Cross Section



- This has been designed to convey up to a 5% AEP design event.
- Trapezoidal shape
- Full calculations are included in [Appendix 2](#).

CLEAN WATER' DIVERSION BUND

(Page 38-43 from GD05)



- Ensure bund is well compacted and stabilised.
- Ensure there are no areas of ponding or blockages along the length of the bund.



Project: The Dene, Driveway Access
Description: Erosion and Sediment Control Plan - Schematics

Drawn	Approved	Date	Drawing Number	Revision
TG	TG	23.03.2023	ECSP - 004	A

DROP-OUT PIT

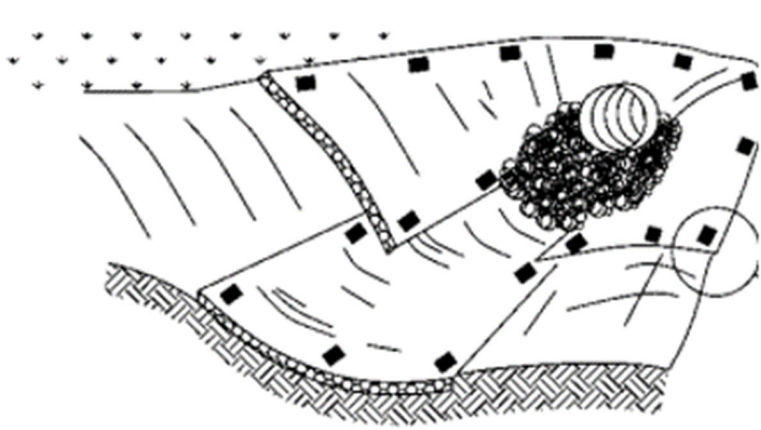
Page 45 from GD05



- Drop out pits should be one metre deep by one-metre-wide cube.
- As a contingency measure, drop out pits can be increased in size and lined to prevent any scour of the pit.

TEMPORARY CULVERT

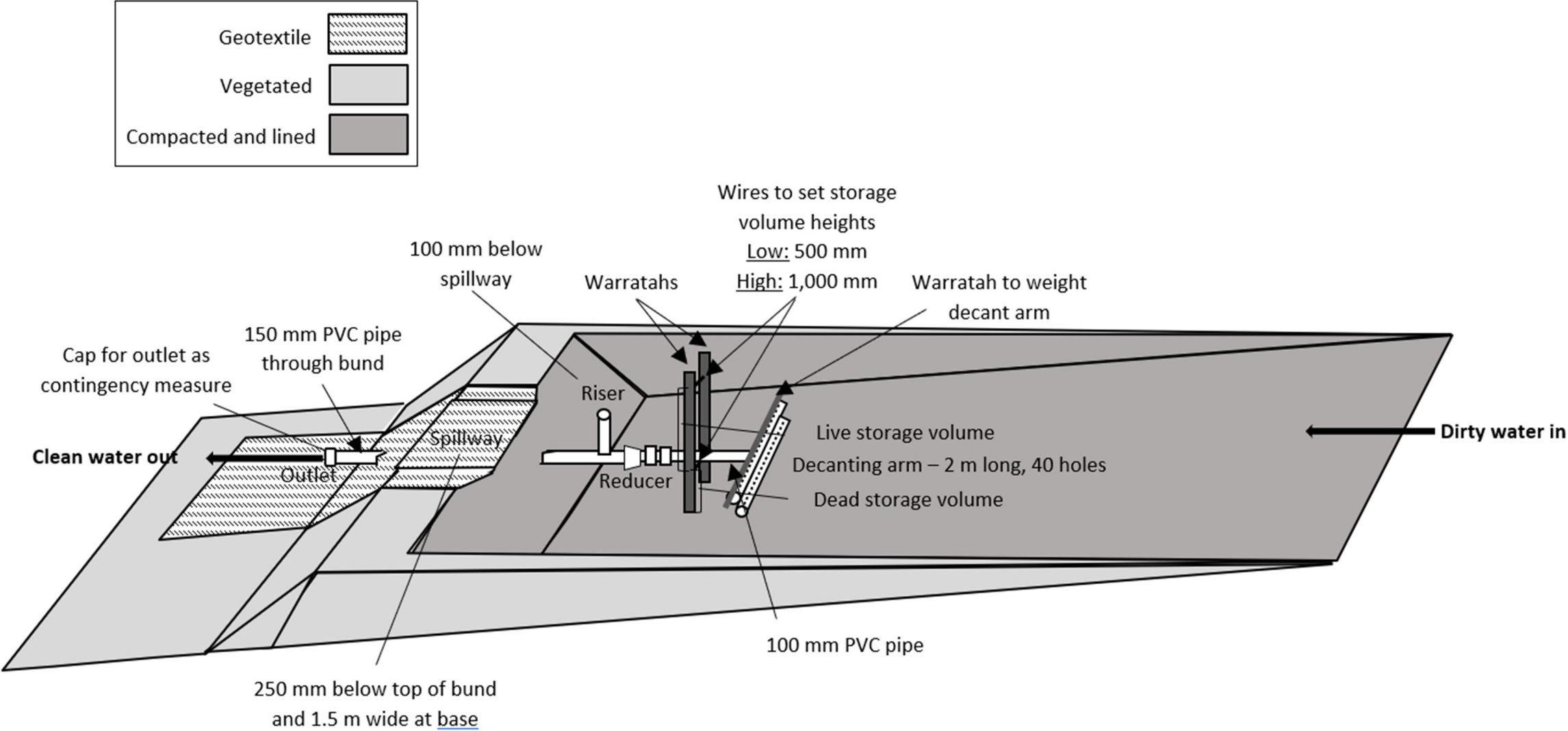
(Diagram from TP90 – now GD05)



- To be non-perforated concrete, PVC or plastic drainage coil.
OR
- The culvert should consist of a PVC or farm-grade culvert to allow for heavy haul vehicles to traffic over.
- Geofabric and rock should be placed at the outlet to prevent scour from the higher velocity water exiting the culvert.

	Project: The Dene, Driveway Access				
	Description: Erosion and Sediment Control Plan - Schematics				
	Drawn	Approved	Date	Drawing Number	Revision
	TG	TG	23.03.2023	ECSP - 005	A

DECANTING EARTH BUND
Page 106-112 from GD05

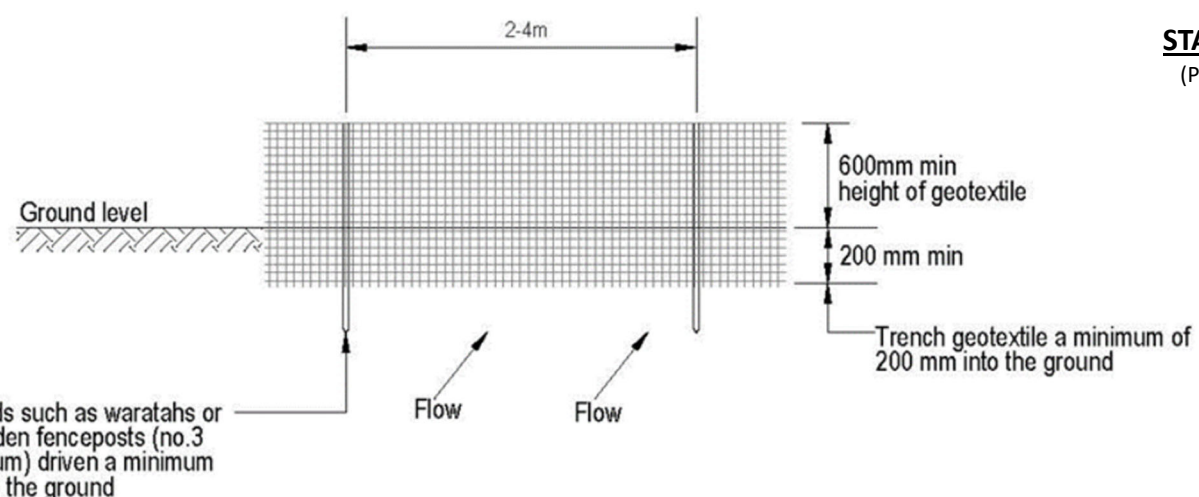


- See [Appendix 2](#) for full calculations.



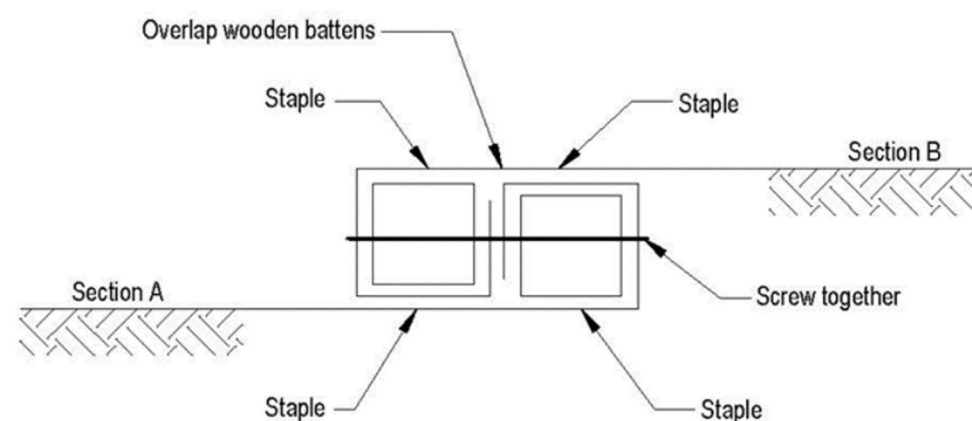
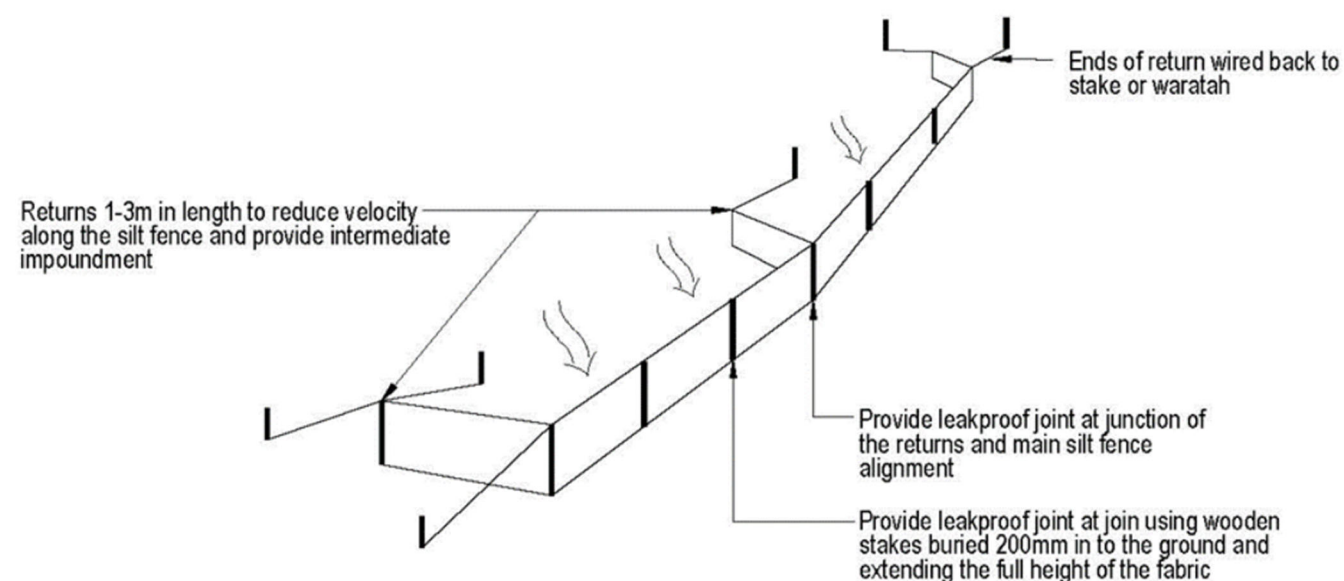
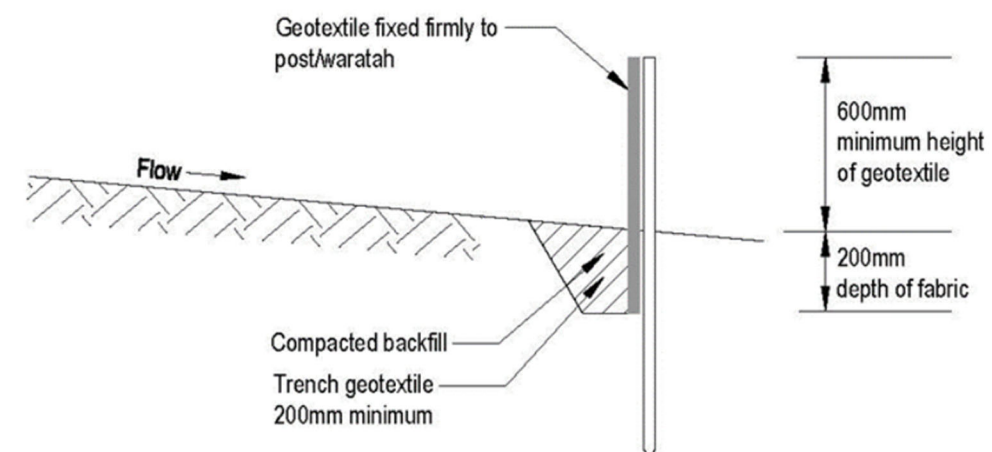
Project: The Dene, Driveway Access
Description: Erosion and Sediment Control Plan - Schematics

Drawn	Approved	Date	Drawing Number	Revision
TG	TG	02.03.2023	ECSP - 006	A



STANDARD SILT FENCE

(Page 112-119 from GD05)



Slope steepness (%)	Slope length (m) (maximum)	Spacing of returns (m)	Silt fence length (m) (maximum)
Less than 2%	Unlimited	N/A	Unlimited
2- 10%	40	60	300
10- 20%	30	50	230
20- 33%	20	40	150
33- 50%	15	30	75
Greater than 50%	6	20	40

- Ensure the silt fence is 'keyed' into the ground to form a good seal at ground level to capture water and avoid undermining.
- Silt fences should be 600 mm above ground level and 200 mm below ground level.
- Supporting waratahs should be placed at 2-4 m intervals.
- Returns should be formed at either end facing upslope to contain flows.
- It is also important that silt fences are installed along the contour of the slope to prevent ponding of water in a concentrated area of the fence.
- To be mucked out once 20% capacity reached.

enviroscope

Project: The Dene, Driveway Access

Description: Erosion and Sediment Control Plan - Schematics

Drawn

Approved

Date

Drawing Number

Revision

TG

TG

23.03.2023

ECSP - 007

A

REFUELING BAY



- Locate the hardstand as far as practicably possible from waterways and concentrated flows.
- Ensure spill kit is located nearby.

SPILL KITS



WASTE



- Where possible, waste shall be segregated into labelled bins.
- Wastes on site will be suitably contained and prevented from escaping off site. This may include covering skip bins during high winds.
- Waste storage is not permitted in or near drainage paths.
- Wastes will be removed from site when bin is full.

	Project: The Dene, Driveway Access				
	Description: Erosion and Sediment Control Plan - Schematics				
	Drawn	Approved	Date	Drawing Number	Revision
	TG	TG	23.03.2023	ECSP - 008	A

APPENDIX 2

Calculations for Erosion and Sediment Controls

DIRTY WATER DIVERSION CHANNEL CALCULATIONS - The Dene - REVISION A - 23/03/2023



Specifications	Value 1	Value 2	Value 3	Value 4	Value 5	Units	Reference/Notes
Site Details							
Contributing catchment					0.3	ha	CFMA Survey Plan
Design rainfall event					0.05	AEP	5% AEP as required by GD05
Time of Concentration							
Overland sheet flow path length (L)					15	m	Google Earth
Hortons roughness value (n)					0.012		
Slope of surface (S)					3.0	%	
Time of Concentration (Tc)					2.1	minutes	
Rounded Tc to align with HIRDS					10	minutes	10 minute minimum required if Tc <10
Rational Method: $Q = (C \cdot I \cdot A) / 360$							
Area ground cover	Grass	Concrete	Forest	Shrubs	Bare soil		
Proportion of catchment	0	0	0	0	1		
Runoff coefficient (C)	0.4	1	0.25	0.5	0.9		Mannings Rounghness Coefficient (n)
Rainfall intensity (I)	39.4	39.4	39.4	39.4	39.4	mm	NIWA HIRDS, 10 min (Tc), 5% AEP
Catchment Area (A)	0.00	0.00	0.00	0.00	0.30	ha	
Qp (Peak runoff flow)	0.0000	0.0000	0.0000	0.0000	0.0296	m3/s	Rational Method: $Q = CIA$
Total Qp (Peak runoff flow)					0.0296		
Channel Design							
Mannings Formula Uniform Trapezoidal Channel Flow							
Bottom Width					100	mm	
Batter ratio= 1 to					3	ratio	
Manning's roughness coefficient of channel (n)					0.025		Gravelly earth channel
Channel slope					6	%	Slope=rise/run
Flow depth					100	mm	
Channel depth					300	mm	200 mm freeboard selected rather than 300 mm as per GD05 to reflect the significantly less intensive rain in Central Otago (approx 50% as intense as Auckland)
Flow (Q)					0.0564	m3/s	
Buffer					91	%	
Top width					700	mm	
Additional Controls							
Drop out pit					No		
Check dams					No		
Geofabric lining					No		

DECANTING EARTH BUND CALCULATIONS - The Dene - REVISION A - 23/03/2023



Specification	Value	Value 2	Value 3	Units	Source / Notes / Reference
Site Details					
Contributing catchment				0.30 ha	CFMA Survey Plan
Percentage volume factor				2.00 %	
GD05 theoretical DEB volume				60.00 m3	
DEB Specifications	Total Storage	Dead Storage (30%)	Live Storage (70%)		
Top length (A)	19.00	15.00		19.00 m	
Top width (B)	6.00	4.00		6.00 m	
Base length (a)	11.00	11.00		15.00 m	
Base width (b)	2.00	2.00		4.00 m	
Depth (h)	1.00	0.50		0.50 m	Measured from primary spillway down
Internal batter ratio= 1 to	2	2		2 ratio	Inlet batter is 1:3
Actual volume (v)	62.67	19.83		42.83 m3	
Width to length ratio	3.2:1	3.8:1		3.2:1 ratio	
Buffer	4.44%			%	
Percentage of total DEB	100.00%	31.65%		68.35%	%
External batter ratio= 1 to	2	2		2 ratio	
Decant Details					
		Reduced Level (RL)			
RL at base of bund		354.90		m	
Bottom of decanting arm range		355.40		0.50 m	
Top of decanting arm range		355.90		1.00 m	
T-bar diameter				0.15 m	
Decant arm length				2.00 m	
Decant rate				0.30 L/sec/1000m2	
Number of holes on T-bar				40 Holes	10 mm diameter holes
Primary Spillway Details					
		Reduced Level (RL)			
RL at primary spillway		355.90		m	0.1 m lower than emergency spillway invert
Outlet pipe diameter				150.00 mm	
Emergency Spillway					
		Reduced Level (RL)			
RL at emergency spillway invert		356.00		m	
RL at emergency spillway crest		356.25		m	0.25 m higher than emergency spillway invert
Spillway width at invert				1.50 m	

APPENDIX 3

Environmental Site Induction Handout

ENVIRONMENTAL SITE INDUCTION HANDOUT

Key Roles and Responsibilities

Role	Responsibilities
Project Manager	The Project Manager is responsible for the effective implementation of the EMP and overall responsibility for the environmental performance of the project. • Ensuring adequate resources are in place to implement the EMP. • Ensuring that project objectives and targets are achieved in accordance with the relevant EMP. • Ensuring Project Managers, Employees and Sub-Contractors operate within the guidelines of the EMP. • Ensuring that an EMP is prepared and that environmental standards, processes and procedures meet relevant resource consent conditions. • Overseeing the successful implementation, monitoring and review of the EMP. • Providing reporting of environmental incidents to the QLDC and other periodic environmental reports to QLDC as required by the EMP Guidelines. • Ensuring that inspections and audits are carried out in accordance with the relevant EMP. • Restrict or stop any activity on the Project that has the potential to or has caused environmental effects. • Delegate authority of the above responsibilities.
Environmental Representative	The Environmental Representative is accountable to the Project Manager and supports the Project Manager in the day-to-day implementation of the EMP. • Ensure installation of environmental controls as per the EMP. • Undertake environmental site inspections of the project including weekly inspections of controls. • Oversee the maintenance and improvement of defective environmental controls. • Keep project leadership informed of the environmental performance of the project. • Inform staff of procedures and constraints applicable to managing specific environmental issues. • Responsible for providing environmental inductions to all staff and sub-contractors. • Assist the project leadership in attending to Environmental Incidents and Complaints. • The Environmental Representative shall be familiar with: - Environmental aspects of the project. - Environmental Management Plan. - Best practice erosion and sediment control from: ○ <i>Guidance Document 2016/005: Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05)</i>

Role	Responsibilities
All staff and sub-contractors	All Project staff have responsibility for their environmental performance and the impact they have on Project environmental performance. All subcontractor personnel are considered equivalent to staff personnel. All staff are required to: • Undertake all activities in accordance with the requirements of the EMP. • Ensure they are aware of the contact person related to environmental matters. • Report to the Environmental Representative, any activity that has the potential to or has resulted in an Environmental Incident.

Key Environmental Locations

Environmentally sensitive receptors: Lake Hawea and flow paths.

Key Resource Consent Conditions

TBC

Limits of Clearing and Importance of Staging

The staging and sequencing of works is a key component to ensure that environmental effects of construction are appropriately managed. It is imperative that the sequencing outlined in Section 2.1 of the EMP is followed so that the site is stabilised in the most efficient manner.

All staff should be familiar with this sequence. Any potential changes to that sequence need to be approved by the Site Supervisor which will be discussed first with the Environmental Consultant.

Key Environmental Management Measures in EMP

Erosion and Sediment Control (Section 4 of EMP)

- Direction provided in Erosion and Sediment Control Plan (ESCP) in Appendix 1 of EMP.
- Separation of clean and dirty water is the most important principle to ensure that the contributing catchment of dirty water that needs to be treated is as small as possible.
- Progressive stabilisation (revegetation) of disturbed areas will ensure that the extent and duration of exposed soil is minimised. Keep it covered!
- All controls to be checked immediately before storm events to ensure they are in good-working order.
- Erosion and sediment control devices to remain in place until site is stabilised (defined as 80% vegetative cover).

Any works that disturb the controls outlined on the ESCP must be reinstated before moving to the next task.

Water Quality Management (Section 5 of EMP)

- Any water caught in the sediment devices to be re-used in dust suppression where possible and if required.

- Any observations of dirty water running offsite to be reported directly to the Project Manager.

Dust Management (Section 6 of EMP)

- Dust suppression should occur on any exposed soil on unsealed roads, this can be done using the water caught in the retention basin.
- Avoid all unnecessary vegetation clearing that exposes soil and work should be conducted in stages as this can increase the impact from dust in the event of strong winds.
- During high wind events and dust suppression is becoming difficult works must cease until more favourable weather conditions.
- Constant vigilance should be maintained onsite to ensure that dust is appropriately managed and weekly monitoring should be completed to ensure that management measures are effective.

Noise and Vibration Management (Section 7 of EMP)

- Noise producing works only be undertaken during the hours of 0730-1800 from Monday-Saturday and no works to be completed on Sundays or public holidays.
- Particularly noisy work should be completed during the middle of the day during business hours.
- Noise dampening should occur when possible.
- Weekly site inspections should be undertaken by the Environmental Representative to ensure the strategies in place are effective.

Historic Heritage Management (Section 8 of EMP)

- If any artefacts are found works must stop within 20 meters of the discovery and the project manager notified immediately.
- The site manager must then secure the area and notify the Heritage New Zealand Regional Archaeologist, who will advise when works can begin again.

Vegetation Management (Section 9 of EMP)

- Avoid the spread of pest or noxious plant and or weed species.

Chemicals and Fuel Management (Section 10 of EMP)

- Chemicals and fuels are stored and used so not to cause contamination of works areas and surrounding environment.

Waste Management (Section 11 of EMP)

- Waste management on site will ensure wastes are stored safely and in an organised manner until recycling, reuse or disposal.

Environmental Incidents

The procedure for managing environmental incidents is outlined in Section 3.6 of the EMP, however these can be summarised as follows:

- Environmental incidents must be reported as soon as they occur, and the Project team must respond immediately to mitigate further environmental impacts.
- Investigation into the cause of the incident should be completed and a solution should be constructed to remediate the Environmental damage.
- The Project Manager must then notify the QLDC and/or the ORC of the details of the incident within 12 hours of being made aware of the incident.

Rapid Response for Storm Events

The procedure for rapid response to storm events is outlined in Section 4.6 of the EMP, however these can be summarised as follows:

- The Site Supervisor will observe and understand the **weather forecast** throughout the project to ensure appropriate preparation onsite.
- If a **significant storm** event is forecast all works should stop within an appropriate amount of time to inspect ESC devices and undertake any maintenance or site stabilisation required.
- The sediment controls should be in operating condition and fully functional.
- Dirty water contour drains should be proactively installed prior to rainfall event.
- During the storm event the site should be monitored to sure the functioning of the ESC devices and maintained if required.

When storms are forecast it is crucial that tools are downed in time for the rapid response procedure to be implemented. This will help avoid environmental incidents, potential enforcement action and site shutdown.

APPENDIX 4 **Environmental Site Induction Register**

ENVIRONMENTAL SITE INDUCTION REGISTER

Name	Organisation	Date Inducted	Induction Delivered by	Signature

APPENDIX 5

Weekly Environmental Site Inspection Form

Environmental Representative:

Date:

D: 9014741
 ion Date: 14/09/2025

Item	Yes	No	Comment
Do sediment controls have over 80% capacity?	☐	☐	
Cultural Heritage			
Have any finds of cultural significance been found throughout the week?	☐	☐	
Noise and Vibration			
Have any complaints been received during the week?	☐	☐	*If yes, complete Complaints Register
Are nearby sensitive receptors being notified before significant noise and/or vibration causing activities?	☐	☐	
Are works only occurring within the hours of operation?	☐	☐	
Dust			
Have any complaints been received during the week?	☐	☐	*If yes, complete Complaints Register
Are works being staged to minimise soil exposure?	☐	☐	
Have completed areas been revegetated or stabilised?	☐	☐	
Is dust suppression of disturbed work areas and stockpiles occurring?	☐	☐	
Are works ceasing during high winds?	☐	☐	
Are only designated access points and haul routes being used?	☐	☐	
Is the site access and surrounding roads swept clean of sediment?	☐	☐	
Vegetation			
Is vegetation being maintained where possible?	☐	☐	
Chemicals and Fuels			
Are all hazardous substances on site stored, transported and used according to the safety data sheet requirements?	☐	☐	
Is refuelling of vehicles and plant on site will occur in the designated refuelling bay?	☐	☐	
Is concrete washing being undertaken in the designated concrete wash-out pit?	☐	☐	

Item	Yes	No	Comment
Is there an adequate supply of spill kits onsite? Have any used materials been replaced?	☐	☐	
Waste			
Is the site in a safe, clean and tidy state?	☐	☐	
Are wastes segregated into labelled bins with lids?	☐	☐	
Are skip bins not overfilled?	☐	☐	
Is waste removed from open drains and drainage paths?	☐	☐	

Actions resulting from this inspection must be forwarded to the Project Manager any actions should be recorded in the Non-Conformance Register – Appendix 8.

Additional Comments:

Names and Signatures of inspection attendees:

APPENDIX 6 **Environmental Incident Report Form**

ENVIRONMENTAL INCIDENT REPORT FORM

Project Address:	Consent Number:
Brief Project Description:	

Instructions- Complete this form for all environmental incident that cause contaminants (including sediment) or environmental nuisance to leave the site. Be succinct, stick to known facts and do not make assumptions. Once completed submit to the Regulatory team at Queenstown Lakes District Council at RCMonitoring@qldc.govt.nz. Call the Regulatory team immediately on 03 441 0499 for any serious or ongoing incidents that cannot be brought under immediate control.

Date and Time	Date: <u>XX/XX/XXX</u> Time: <u>XX:XX</u> hours
Description? Provide a brief and factual description of what happened during the incident, include relevant details such as: - The activity being undertaken when the incident occurred - The estimated distance to nearest waterway (include stormwater and dry courses) - The estimated distance to the nearest sensitive receiver Sketches/diagrams/photos may be referenced and appended to this report to aid in the description of the incident.	
Exact Location of the incident? Include address, landmarks, features, nearest tree, etc. Maps and plans can be attached.	
Quantity or volume of material escaped or causing incident? (provide and estimate quantity)	
Who identified the incident?	Contractor ☐ Council ☐ Community ☐ Other ☐

What immediate actions/control measures were taken to rectify or contain the incident?
What initial corrective action will be taken to prevent similar incidents recurring in the near future?
Has the Otago Regional Council been notified? Yes ☐ No ☐ Will be notified ☐

Environmental Representative/person making report:	
Name.....	Signature.....
Organisation.....	Date.....
Mobile phone number.....	
Project Manager:	
Name.....	Signature.....
Organisation.....	Date.....
Mobile phone number.....	

APPENDIX 7 **Environmental Complaints Register**

ENVIRONMENTAL COMPLAINTS REGISTER

Complaint #	Date and Time Received	Complainant details (name, address, phone number)	Details of Complaint	Investigation and Findings	Outcome	Close out Date

APPENDIX 8 **Environmental Non-Conformance Register**

ENVIRONMENTAL NON-CONFORMANCE REGISTER

Ref Number	Date Observed	Found via (e.g., inspection, monitoring, complaint?)	Details of Non-conformance	Corrective Actions	Updated by	Close out Date

APPENDIX 9 **Water Quality Monitoring Results Form**

WATER QUALITY MONITORING RESULTS FORM

Date	Monitoring Trigger	Location Description	
	Yes	No	Measurement
Is the clarity of the water more than 100 mm?	☐	☐	____ mm
Is turbidity less than 100 NTU?*	☐	☐	____ NTU
Is the pH of the water between 5.5-8.5?*(only if chemical treatment)	☐	☐	pH ____
Are total suspended solids less than 50 mg/L?*	☐	☐	____ mg/L
Are hydrocarbons visible?	☐	☐	
Are tannins visible in the water?	☐	☐	
Is there any waste in the water?	☐	☐	
Description of any non-conformance and actions required:			
•			
Include images of sampling location:			

*Enviroscope can provide Water Quality Monitoring services to measure turbidity and pH. If 100 NTU is exceeded, collect a water sample to send to laboratory for TSS measurement.

APPENDIX 10 **Archaeological Discovery Protocol**



HERITAGE NEW ZEALAND
POUHERE TAONGA

Heritage New Zealand Pouhere Taonga Archaeological Discovery Protocol

Under the Heritage New Zealand Pouhere Taonga Act (2014) an archaeological site is defined as any place in New Zealand that was associated with human activity that occurred before 1900 and provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand. For pre-contact Maori sites this evidence may be in the form of bones, shells, charcoal, stones etc. In later sites of European/Chinese origin, artefacts such as bottle glass, crockery etc. may be found, or evidence of old foundations, wells, drains or similar structures. Burials/koiwi tangata may be found from any historic period.

In the event that an unidentified archaeological site is located during works, the following applies;

1. Work shall cease immediately at that place and within 20m around the site.
2. The contractor must shut down all machinery, secure the area, and advise the Site Manager.
3. The Site Manager shall secure the site and notify the Heritage New Zealand Regional Archaeologist. Further assessment by an archaeologist may be required.
4. If the site is of Maori origin, the Site Manager shall notify the Heritage New Zealand Regional Archaeologist and the appropriate iwi groups or kaitiaki representative of the discovery and ensure site access to enable appropriate cultural procedures and tikanga to be undertaken, as long as all statutory requirements under legislation are met (*Heritage New Zealand Pouhere Taonga Act, Protected Objects Act*).
5. If human remains (koiwi tangata) are uncovered the Site Manager shall advise the Heritage New Zealand Regional Archaeologist, NZ Police and the appropriate iwi groups or kaitiaki representative and the above process under 4 shall apply. Remains are not to be moved until such time as iwi and Heritage New Zealand have responded.
6. Works affecting the archaeological site and any human remains (koiwi tangata) shall not resume until Heritage New Zealand gives written approval for work to continue. Further assessment by an archaeologist may be required.
7. Where iwi so request, any information recorded as the result of the find such as a description of location and content, is to be provided for their records.
8. Heritage New Zealand will determine if an archaeological authority under the *Heritage New Zealand Pouhere Taonga Act 2014* is required for works to continue.

It is an offence under S87 of the *Heritage New Zealand Pouhere Taonga Act 2014* to modify or destroy an archaeological site without an authority from Heritage New Zealand irrespective of

whether the works are permitted or a consent has been issued under the Resource Management Act.

Heritage New Zealand Regional archaeologist contact details:

Dr Matthew Schmidt
Regional Archaeologist Otago/Southland
Heritage New Zealand
PO Box 5467
Dunedin
Ph. +64 3 470 2364, mobile 027 240 8715
Fax. +64 3 4773893
mschmidt@heritage.org.nz

Project Number: 6-XZ582.00

1576 Makarora-Lake Hawea Road

HAIL Assessment

20 March 2020



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Environment



Document History and Status

Revision	Date	Author	Reviewed by	Approved by	Status
A	17/02/2020	M. Baddiley	L. Bond	R. Bond	Draft
B	20/03/2020	M. Baddiley	L. Bond	R. Bond	Final

Revision Details

Revision	Details
A	Draft – issue to client
B	Incorporation of client comments. Issued as Final.



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Appendix A – Supporting Information

Disclaimers and Limitations

This report (**'Report'**) has been prepared by WSP exclusively for Lesley and Jerry Burdon (**'Client'**) in relation to the completion of a HAIL assessment for 1576 Makarora – Lake Hawea Road, Wanaka (**'Purpose'**) as defined in Offer of Service 6-XZ582.00 dated 19 November 2019. The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

In preparing the Report, WSP has relied upon data, surveys, analyses, designs, plans and other information (**'Client Data'**) provided by or on behalf of the Client. Except as otherwise stated in the Report, WSP has not verified the accuracy or completeness of the Client Data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this Report are based in whole or part on the Client Data, those conclusions are contingent upon the accuracy and completeness of the Client Data. WSP will not be liable in relation to incorrect conclusions or findings in the Report should any Client Data be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

Environmental Limitations

This investigation concentrates on the potential contamination levels in the soil throughout the proposed subdivision site. However, any earthworks should be undertaken with due care and should ground conditions other than those anticipated be encountered work should cease and a Suitably Qualified and Experienced Practitioner (SQEP) consulted to further assess the risks to human health.

The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry best practise. Due to the inherent variation in spatial and temporal patterns of contaminants, the interpretation of site conditions at the specific locations investigated is not a complete description of all material at the site. Should further data be obtained that differs from that presented in this report, then conclusions and recommendations may no longer be valid.

The report is valid at date of issue. 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 recommendation invalid.

1 Introduction and Site Description

WSP were engaged by Lesley and Jerry Burdon to undertake a Hazardous Activities and Industries (HAIL) Assessment on 1576 Makarora – Lake Hawea Road, Lake Hawea, also referred to as The Dene (the Site). It is understood that the property is proposed to be subdivided into four sections requiring a change in land use and possible soil disturbance associated with future residential development.

The site is located at 1576 Makarora – Lake Hawea Road, Lake Hawea, approximately 20km north east of Wanaka Town Centre, refer to Figure 1.1. the site details are provided in Table 1.1.

Table 1-1 Summary of the Site

Site address	1576 Makarora – Lake Hawea Road
Territorial Authority	Queenstown Lakes District Council (QLDC)
Legal Description	Lot 1 DP 396356
Owner	Burdon Family
Title	384225
Approximate total site area	382,459
Geology	GNS Geology Web Map ¹ indicates that the site is underlain by late quaternary till deposits of pebbly to boulder gravel, sand, silt and mud of the Pakihi Supergroup.
Topography	The site is gently undulating with small hills at the northern and southern ends. The site gently slopes downward towards Lake Hawea to the east.
Recognised HAIL status	Otago Regional Council (ORC) was contacted regarding the HAIL status of the site. ORC confirmed that: <i>“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 [sic]. 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.”</i>
Nearest Surface Water Body	Land Information New Zealand (LINZ) NZTopo50 map CA13 indicates that the site sits between two hills to the north and south with total elevations of 414m and 412m respectively. Located on the lake side the site gently undulates between an elevation of 360 to 400m before steeply rising beyond State Highway 6 to the west.
No. of known boreholes and wells within 500m	No known boreholes and wells within 500m of site.
Proposed Site Use	Subdivision into four rural residential/residential lots
Details of Resource Consents	No known resource consents.

¹ <https://data.gns.cri.nz/geology/>



Figure 1.1 Site location (Base map sourced from QLDC Web maps, 2020).

2 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 search of council records. Historical information is presented in Appendix A.

A summary of the site history is presented in Table 2.1.

Table 2-1 Summary of the site history (approximate site location indicated in red)

Photograph Year and Source	Observations
1939 Maps Past	The site is boarded to the west by a paper road and to the east by Lake Hawea. Shown as part of Run 581, a 31,000 acre station (Mt Burke Station), the site is situated in the south eastern corner of the wider station. A stream is depicted transecting the site to the shores of Lake Hawea.
1949 Maps Past	Mt Burke Station has been split into two properties with the site forming the eastern portion of the southern property.
1955 Retrolens	A dirt track is present along the lake front and dissects the site. The site is open country with minimal bush cover. At least two streams cross the property and discharge into Lake Hawea.
1964 Retrolens	Little change to the site, however the beginnings of State Highway 6 are visible as a large dirt cutting to the west of the site.
1974 Retrolens	The original track north along the Lake front is no longer visible. The profile of the Lake also appears to have altered slightly, most likely due to erosional events. The site appears to be largely unchanged since 1964.
1983	No discernible change since 1974.

Photograph Year and Source	Observations
Retrolens	
2003 Retrolens	First colour photo available. Site remains largely unchanged since 1983. Small amount of soil disturbance visible to the west.
2011 Google Earth	No discernible change since 2003.
2016 Google Earth	Small amount of soil disturbance adjacent to State Highway. The remainder of the site remains unchanged.
2019 Google Earth	No discernible change since 2016.

A review of the historical aerial photographs indicates the site has been used primarily for grazing since at least 1939. A dirt road was present on site along the lake front prior to the construction of State Highway 6 circa 1964.

Discussions with Lesley Burdon (site owner/operator) indicated that the site has been used as grazing land as early as the 1930s when the Burdon family purchased the property. No fuel storage or livestock processing (sheep dips) are indicated to have been undertaken on the site. The only known soil disturbance was related to the installation of stormwater drainage infrastructure and the construction of State Highway 6 adjacent to the site.

3 Walkover Survey

A site walkover was undertaken by a WSP Engineer on 8 January 2020, a summary of the walkover is presented in Table 3.1.

Table 3-3-1 Walkover summary

Site Access	Site access was from State Highway 6
Current Site Use	Occasional pasture/grazing
Existing Structure	Stormwater discharge infrastructure No other existing structures within the proposed subdivision site.
Existing Vegetation	Grasses, scrub and bracken. Few trees.
Odours	No odours noted
Adjoining Sites Uses	The site is bordered by Lake Hawea to the east, and the Mount Burke Range to the west.
Surface Water Bodies	Several surface water bodies are present onsite as a result of poor drainage and pooling.
Site Observations	Small rubbish pile noted on the site (empty drums and feed bags). Filling noted by SH6.

4 Implications of Identified HAIL Activities

4.1 Contaminants of Concern

No potential contaminants of concern have been identified on the site as no HAIL activities are considered to have occurred.

4.2 NES Implications

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

- Removing or replacing a fuel storage system;
- Sampling soil;
- Soil disturbance;
- Subdividing land; and
- Changing land use

4.3 Conceptual Site Model

The 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;
- 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).

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 but has not been identified through risk assessment.

Using the desk-based information on the site, no potential contaminants of concern are identified, therefore no risk to potential receptors are present on site. As such a conceptual site model is not considered necessary for this site.

5 Conclusion

The conceptual site model and initial qualitative human health risk assessment presented herein is based upon information gained from a site inspection, anecdotal evidence, information gained from ORC, CODC and other sources.

The site identified in this investigation has been triggered under the NES as a result of a proposed subdivision, change in land use and rural residential development. The site history, anecdotal evidence, historical aerial photography and site inspections have confirmed that the site has only been used as farmland/pasture apart from the construction of stormwater drainage infrastructure.

No HAIL activities were noted to have taken place within the area of proposed subdivision of the site. The Regulations within the NESCS are therefore **NOT** considered applicable to the proposed subdivisions where a land use change is proposed.

5.1 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 and where necessary selected site sampling, 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.

Appendix A

1955

219640



1007

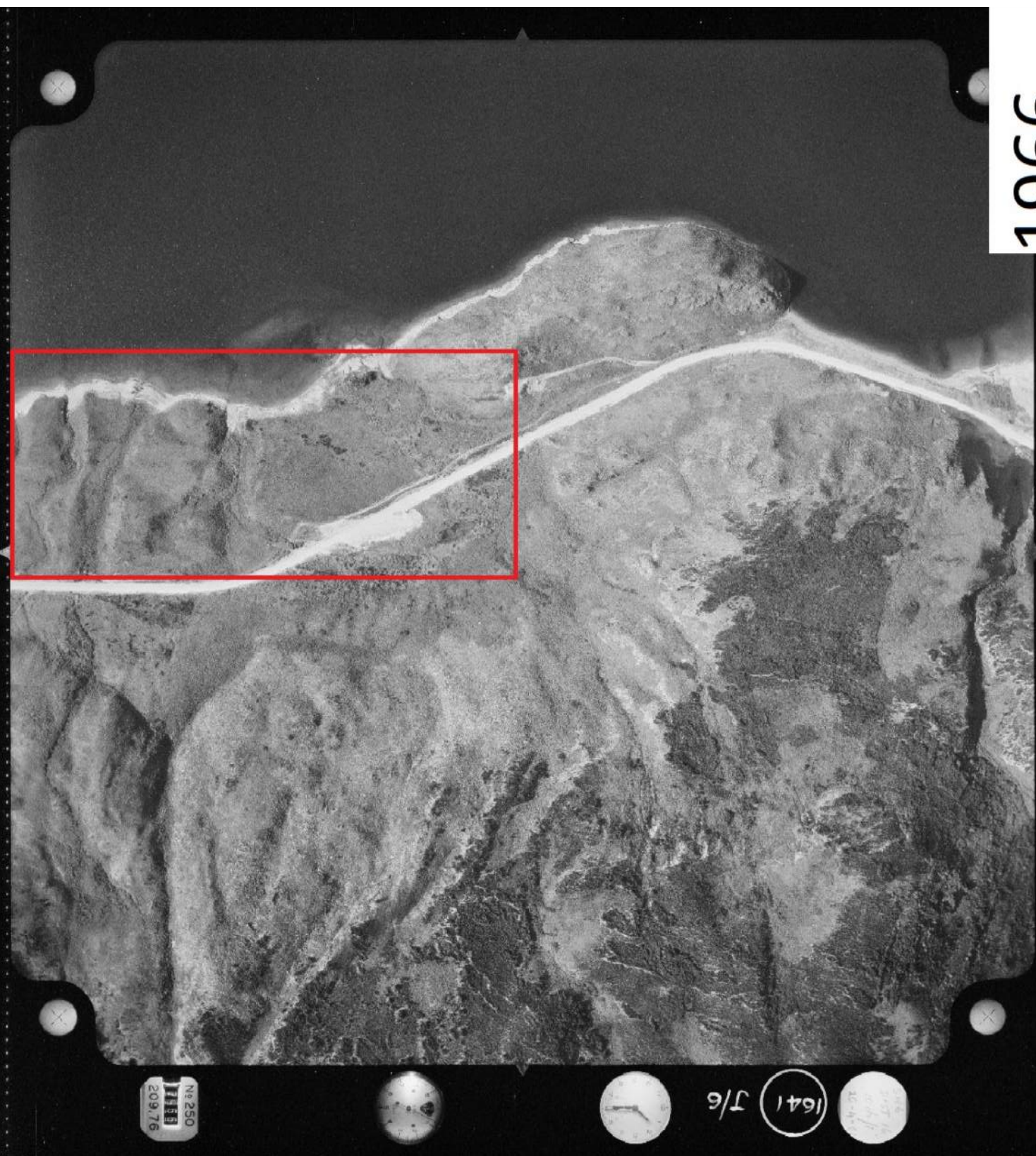


B/1



1964





1966

©Sourced from <http://retrolens.nz> and licensed by LINZ



1974

AI 119
11233
209 72



SN 3718 B/1







2003

©Sourced from <http://retrolens.nz> and licensed by LIN.

wsp		PHOTOGRAPHIC LOG	
Client Name Burdon Family	Site Location 1576 Makarora-Lake Hawea Road		Project No. 6-XQ582.00

Photo No.	Date	
1	8 January 2020	
Description Overview of site. Photo taken facing north east.		

Photo No.	Date	
2	8 January 2020	
Description Overview of site. Photo taken facing north east.		

		PHOTOGRAPHIC LOG	
Client Name Burdon Family	Site Location 1576 Makarora-Lake Hawea Road		Project No. 6-XQ582.00

Photo No.	Date	
3	8 January 2020	
Description Surface water present on site.		

Photo No.	Date	
4	8 January 2020	
Description Surface water present on site.		

wsp		PHOTOGRAPHIC LOG	
Client Name Burdon Family	Site Location 1576 Makarora-Lake Hawea Road		Project No. 6-XQ582.00

Photo No.	Date	
5	8 January 2020	
Description Small waste pile present onsite. Photo taken facing south east.		

Photo No.	Date	
6	8 January 2020	
Description Storm water outlet. Photo taken facing south.		

8 January 2020

Dear Megan Baddiley,

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

Address	Valuation Number / Legal Description
-	Lot 1 DP 396356

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,



Jessie Callaghan
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 inaccuracy in, or omission from, this information. Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

HAIL Status	
Verified HAIL	Information has been provided confirming, more likely than not, that an activity or industry described in the HAIL is being or has been undertaken on the site.
Unverified HAIL	Information has been provided that suggests an activity or industry described in the HAIL is or has been undertaken on the site; however, this information has not been verified.
Verified non-HAIL – more likely than not	It has been established, more likely than not, that an activity or industry described in the HAIL has not been undertaken on the site at the time of listing.

Contamination Status	
Contaminated for <Context>	The site has been investigated and results demonstrate that there are hazardous substances in or on the land at the site that have, or are reasonably likely to have significant adverse effects on the environment. <Context> refers to the current or proposed site use and/or on/off-site ecological receptors.
Managed for <Context>	The site has been investigated and results demonstrate that there are hazardous substances present at the site that have the potential to pose risks to human health or the environment. However, those risks are considered managed for <context> because - The nature of the use of the site prevents human and/or ecological exposure to the hazard; and/or - The land has been altered in some way and/or restrictions have been placed on the way it used to prevent human and/or ecological exposure to the hazard.
Acceptable for <Context>	The site has been investigated and results demonstrate that there are hazardous substances present at the site, but assessment indicates that any adverse effects or risks to human health are considered to be so low as to be acceptable for <context>.
At or Below Background Concentrations	The site has been investigated or remediated. The investigation or post-remediation validation results confirm that there are no hazardous substances above local background concentrations. Local background concentrations are those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterize the site.
Partially investigated	The site has been partially investigated. Investigations have been conducted that – - Demonstrate there are hazardous substances present; however, there is insufficient information to quantify any adverse effects or risks to human health or the environment; or, - Do not adequately verify the presence or absence of contamination associated with all HAIL activities that have been undertaken on the site.
Not Investigated	The soils at the site have not been subject to investigation. Contamination may have occurred but should not be assumed to have occurred.
New Information	New information has been received. This information is currently being assessed prior to assigning a site status.