



Certificate of Analysis

Client:	Briar Ridge Management Co	Lab No:	1932296	DWAPv1
Contact:	Neville Low C/- Briar Ridge Management Co PO Box 854 Invercargill 9840	Date Received:	27-Feb-2018	
		Date Reported:	05-Mar-2018	
		Quote No:		
		Order No:		
		Client Reference:	Briar Ridge Management Co LTD	
		Submitted By:	Neville Low	

Sample Type: Aqueous

Sample Name:		Briar Ridge Management 26-Feb-2018 3:05 pm		Guideline Value	Maximum Acceptable Values (MAV)
Lab Number:		1932296.1			
Routine Water + E.coli profile Kit					
Escherichia coli	MPN / 100mL	< 1		-	< 1
Routine Water Profile					
pH	pH Units	8.0		7.0 - 8.5	-
Total Alkalinity	g/m ³ as CaCO ₃	188		-	-
Free Carbon Dioxide	g/m ³ at 25°C	3.5		-	-
Total Hardness	g/m ³ as CaCO ₃	194		< 200	-
Electrical Conductivity (EC)	mS/m	39.9		-	-
Electrical Conductivity (EC)	µS/cm	399		-	-
Approx Total Dissolved Salts	g/m ³	270		< 1000	-
Total Boron	g/m ³	0.0130		-	1.4
Total Calcium	g/m ³	59		-	-
Total Copper	g/m ³	< 0.00053		< 1	2
Total Iron	g/m ³	0.25		< 0.2	-
Total Magnesium	g/m ³	11.2		-	-
Total Manganese	g/m ³	< 0.00053		< 0.04 (Staining) < 0.10 (Taste)	0.4
Total Potassium	g/m ³	2.3		-	-
Total Sodium	g/m ³	11.2		< 200	-
Total Zinc	g/m ³	0.161		< 1.5	-
Chloride	g/m ³	5.6		< 250	-
Nitrate-N	g/m ³	2.2		-	11.3
Sulphate	g/m ³	13.2		< 250	-

Note: The Guideline Values and Maximum Acceptable Values (MAV) are taken from the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)', Ministry of Health. Copies of this publication are available from <http://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2008>

The Maximum Acceptable Values (MAVs) have been defined by the Ministry of Health for parameters of health significance and should not be exceeded. The Guideline Values are the limits for aesthetic determinands that, if exceeded, may render the water unattractive to consumers.

Note that the units g/m³ are the same as mg/L and ppm.



pH/Alkalinity and Corrosiveness Assessment

The pH of a water sample is a measure of its acidity or basicity. Waters with a low pH can be corrosive and those with a high pH can promote scale formation in pipes and hot water cylinders.

The guideline level for pH in drinking water is 7.0-8.5. Below this range the water will be corrosive and may cause problems with disinfection if such treatment is used.

The alkalinity of a water is a measure of its acid neutralising capacity and is usually related to the concentration of carbonate, bicarbonate and hydroxide. Low alkalinities (25 g/m³) promote corrosion and high alkalinities can cause problems with scale formation in metal pipes and tanks.

The pH of this water is within the NZ Drinking Water Guidelines, the ideal range being 7.0 to 8.0.

With the pH and alkalinity levels found, it is unlikely this water will be corrosive towards metal piping and fixtures.

The high alkalinity of this water may cause an increase in the pH in the root zones of plants which are irrigated using this water.

Hardness/Total Dissolved Salts Assessment

The water contains a moderate amount of dissolved solids and would be regarded as being hard.

There will be difficulty in forming a lather with soap, and a 'scum' will form in baths, showers, etc.

Nitrate Assessment

Nitrate-nitrogen at elevated levels is considered undesirable in natural waters as this element can cause a health disorder called methaemaglobinaemia. Very young infants (less than six months old) are especially vulnerable. The Drinking-water Standards for New Zealand 2005 (Revised 2008) suggests a maximum permissible level of 11.3 g/m³ as Nitrate-nitrogen (50 g/m³ as Nitrate).

Nitrate-nitrogen was detected in this water but at such a low level to not be of concern.

Boron Assessment

Boron may be present in natural waters and if present at high concentrations can be toxic to plants.

Boron was found at a low level in this water but would not give any cause for concern.

Metals Assessment

Iron and manganese are two problem elements that commonly occur in natural waters. These elements may cause unsightly stains and produce a brown/black precipitate. Iron is not toxic but manganese, at concentrations above 0.5 g/m³, may adversely affect health. At concentrations below this it may cause stains on clothing and sanitary ware.

Iron was found in this water at a low level.

Manganese was not detected in the water.

Bacteriological Tests

The NZ Drinking Water Standards state that there should be no Escherichia coli (E coli) in water used for human consumption. The presence of these organisms would indicate that other pathogens of faecal origin may be present. Results obtained for Total Coliforms are only significant if the sample has not also been tested for E coli.

Escherichia coli was not detected in this sample.

Final Assessment

The parameter Total Iron did NOT meet the guidelines laid down in the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2008)' published by the Ministry of Health for water which is suitable for drinking purposes.

Summary of Methods

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

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Routine Water Profile		-	1
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch.	-	1
Total Digestion	Nitric acid digestion. APHA 3030 E 22 nd ed. 2012 (modified).	-	1
pH	pH meter. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 4500-H ⁺ B 22 nd ed. 2012. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1
Total Alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2320 B (Modified for alk <20) 22 nd ed. 2012.	1.0 g/m ³ as CaCO ₃	1
Free Carbon Dioxide	Calculation: from alkalinity and pH, valid where TDS is not >500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO ₂ D 22 nd ed. 2012.	1.0 g/m ³ at 25°C	1
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B 22 nd ed. 2012.	1.0 g/m ³ as CaCO ₃	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2510 B 22 nd ed. 2012.	0.1 mS/m	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. APHA 2510 B 22 nd ed. 2012.	1 µS/cm	1
Approx Total Dissolved Salts	Calculation: from Electrical Conductivity.	2 g/m ³	1
Total Boron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012.	0.0053 g/m ³	1
Total Calcium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012.	0.053 g/m ³	1
Total Copper	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012 / US EPA 200.8.	0.00053 g/m ³	1
Total Iron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012.	0.021 g/m ³	1
Total Magnesium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012.	0.021 g/m ³	1
Total Manganese	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012 / US EPA 200.8.	0.00053 g/m ³	1
Total Potassium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012.	0.053 g/m ³	1
Total Sodium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012.	0.021 g/m ³	1
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 nd ed. 2012 / US EPA 200.8.	0.0011 g/m ³	1
Chloride	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 22 nd ed. 2012.	0.5 g/m ³	1
Nitrate-N	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 22 nd ed. 2012.	0.05 g/m ³	1
Sulphate	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 22 nd ed. 2012.	0.5 g/m ³	1
Escherichia coli	MPN count using Colilert (Incubated at 35°C for 24 hours), or Colilert 18 (Incubated at 35°C for 18 hours), Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9223 B (2004), 22 nd ed. 2012.	1 MPN / 100mL	1

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

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

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

A handwritten signature in blue ink, consisting of several overlapping, stylized lines that form a unique, illegible mark.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

LANDSCAPE AND VISUAL EFFECTS ASSESSMENT - PEER REVIEW MEMO

CENTRAL OTAGO DISTRICT COUNCIL

BURN COTTAGE ROAD JV LTD - RESOURCE CONSENT APPLICATION FOR SUBDIVISION TO CREATE FOUR RURAL LIVING ALLOTMENTS AND FIVE BUILDING PLATFORMS AT 172 BURN COTTAGE ROAD

Jess McKenzie (Landscape Planner)

vivian+espie

27 April 2023

INTRODUCTION

- 1 Burn Cottage Road JV Ltd have applied to the Central Otago District Council (**CODC**) for resource consent to subdivide to create four rural living allotments and five building platforms at 172 Burn Cottage Road. Vivian+espie have been engaged by the CODC to carry out a peer review of the landscape assessment prepared by Mike Moore dated 23 November 2022 (**the Moore Report**). The peer review also considers an additional memorandum (**the Moore Memo**), provided in response to a further information request, dated 16 February 2023. We visited the site on 24 April 2023.
- 2 The scope of the review includes¹:
 - The appropriateness of the location and topographical elevation of building platforms on Lots 1 (including the worker's platform), 2 and 3 in terms of visibility, the maintenance and enhancement of rural character and landscape, and the amenity values of prominent hillsides and terraces.
 - The extent that the conditions proposed by the landscape architect will adequately mitigate the effects of future development on the building platforms, such that the open natural

¹ As per the brief given to vivian+espie from the CODC, 30/03/2023.

character of hills and ranges, skylines, prominent places and natural features will not be compromised.

- The projected timeframe in which this mitigation would likely become effective.
- Identification of any gaps or inaccuracies in the assessment.
- Identification of any additional conditions which should be included.

3 Details of the subdivision and building platforms are set out in the application and its attached appendices. The details that are most relevant to this peer review include:

- The proposal is to create four rural living allotments of the following sizes:
 - Lot 1: 15.5562 hectares with two proposed building platforms. The first building platform is to be 450m² and located in the north-eastern corner of the site. The second is to be 1000m² and also located on the eastern side of the site, to the south of the smaller platform.
 - Lot 2: 8.0661 hectares with one proposed building platform of 450m² that will sit centrally within the proposed lot.
 - Lot 3: 4.8776 hectares with one proposed building platform of 750m² that will sit in the north-eastern corner of the proposed lot.
 - Lot 4: 3.4856 hectares with one proposed building platform of 750m² that will sit relatively centrally within the proposed lot.
- Landscape mitigation includes:
 - Controls on building height, materials, colour, fencing, earthworks, planting and lighting.
 - Mounding to the southeast of the proposed Lot 2 platform.
 - Tree planting to the southeast of the proposed Lot 4 platform as per Figure A - Proposed Mitigation Planting Concept – Lot 4 building platform.

METHODOLOGY

- 4 The Moore Report states in the Landscape Effects Assessment section of the report that it has been guided by the Te Tangi A Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines². We consider this approach appropriate. The scale from Te Tangi a te Manu is used to describe the degree of identified effects in the Landscape Effects Discussion and Conclusion section of the Moore Report. We will use the same scale of effects.
- 5 We note that the adjectives used to describe the degree of effects within the viewpoints assessment of the Moore Report do not correlate with the Te Tangi a te Manu scale, rather the Moore report describes effects as “not significant” or “minimal”. It is not clear how these adjectives correlate relevant scale.

THE EXISTING LANDSCAPE

- 6 We generally agree with the description of the in the Moore report.

RELEVANT STATUTORY CONTEXT

- 7 We agree with the relevant statutory context described in the Moore Report and the Assessment of Environmental Effects. The site is located within the Rural Resource Area (**RU**). Parts of the site are also within the Significant Amenity Landscape (**SAL**).
- 8 We understand the proposed subdivision is a discretionary activity pursuant to Rule 4.7.4(i) of the Central Otago District Plan (**CODP**), and the proposed residential activity is a discretionary (restricted) activity pursuant to Rule 4.7.3(vii) of the CODP. The matters of discretion are described and commented on in the Moore Report.
- 9 Rule 4.7.4 identifies the effects of subdivision and future development on open space, natural character and amenity values as matters to be given particular consideration. Relevant objectives and policies are discussed further below.

² Te Tangi A Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines, April 2021, New Zealand Institute of Landscape Architecture

REVIEW OF EFFECTS ON VIEWS AND VISUAL AMENITY

10 Visual effects are:

“effects on landscape values as experienced in views. ... A proposal that is in keeping with the landscape values, for example, may have no adverse visual effects even if the proposal is a notable change to the view. Conversely, a proposal that is completely out of place with landscape values may have adverse effects even if only occupying a portion of the view”³.

11 The Moore Report identifies locations from which the proposed development may be visible and assesses the visual effects from these locations. These locations include Burn Cottage Road, McFelin Road, Cromwell Town Centre, Cromwell Lake front and State Highway 8. We comment on the assessment from each viewing location below. In addition to these locations, we consider that an assessment of effects on views and visual amenity from surrounding rural residential development that looks towards the site is appropriate and relevant.

Views from Burn Cottage Road.

12 We generally agree with the Moore Report’s assessment of the relevance of the viewpoint and the visibility of building platforms and proposed earthworks required for formation of access of Lots 1-3. We note very small glimpses of Lot 2 are available along Burn Cottage Road. The establishment of a building for rural residential purposes is not limited to buildings; development is likely to also include other elements of domestication that are visible from outside the site; i.e. domestic curtilage. We note that no controls have been proposed in to limit the spread of this sort of domestication. We suggest that this should appropriately be included if consent is granted in order to mitigate potential effects on views and visual amenity of this open, rural landscape.

13 We agree with the Moore Assessment of the proposed Lot 4 platform. Tree planting is proposed to the southeast of the proposed Lot 4 platform. Proposed tree species include *Betulus* sp (birch), *Alnus* sp (alder), *Quercus* sp (oak), *Salix* sp (willow) as shown in Figure A - Proposed Mitigation Planting Concept – Lot 4. No details regarding the size of planting and planting practices to be

³ Te Tangi A Te Manu, Aotearoa New Zealand Landscape Assessment Guidelines, April 2021, New Zealand Institute of Landscape Architecture, paragraphs 6.25 and 6.27.

used. As such, timeframes for establishment are uncertain. Again, this could be dealt with by appropriate conditions of consent.

- 14 Overall, we consider that the adverse effects on views and visual amenity from Burn Cottage Road are of a low degree at most.

McFelin Road

- 15 Figure 8 of the Moore report illustrates views towards the site from McFelin Road and Photograph 5 appended to this Review Memo illustrates views towards McFelin Road from the proposed platform on Lot 2. We consider that from part of McFelin Road, built form on the skyline of this open terraced landscape will be clearly visible. Again, the introduction of rural built form to a site also leads to the spread of domestication, which is likely to exacerbate adverse effects on visual amenity. We note views towards the site from McFelin Road are likely to be for a limited time because the stretch of road is relatively short and road users are likely to be moving. As such, we consider that the adverse effects on views and visual amenity from McFelin Road are of a low-moderate degree.

Views from Cromwell

- 16 As is illustrated by Photographs 4 & 6 of this Review Memo, the proposed Lot 2 platform is visible from much of the Cromwell Township. We disagree with the Moore Report that concludes that *“any visibility of built form is minimal”* and *“any night time effects associated with lights will be minimal.”*
- 17 The relevant viewing distances are long. However, we consider that built form within the proposed building platform on Lot 2 will be readily noticeable atop the prominent, terraced landform, that currently takes the form of open rural landscape. We also consider that given the openness of the site, the widespread availability of views, the lack of existing visible development or visual interruptions and the existing sparse vegetation on the site (which forms part of the character of the broad terraced landforms), the proposed development and any modification of this prominent terraced landform is likely to have adverse effects on views and visual amenity. Overall, we consider the degree of adverse effects on views and visual amenity from Cromwell that result from the proposal is best described as moderate.

Views from Lake Dunstan and its margins

- 18 As is illustrated in Photographs 1, 4 & 7 of this Review Memo, the proposed Lot 2 platform and Lot 1 smaller platform are visible from a considerable area of the surface of Lake Dunstan and its margins. The Lot 2 platform is visible from the Lakefront near the Cromwell Township and the Lot 3 platform is visible from the surface and margins of Lake Dunstan further north.
- 19 Again, viewing distances are long. However, we again consider that built form within the proposed building platform on Lot 2 will be readily noticeable atop a prominent and open landform, and that proposed development and modification of this recognisable and legible terraced landform will have an adverse effect on views and visual amenity. Again, the openness of the site, the widespread availability of views, the sparseness of existing vegetation and the legible, simple landform of this landscape are key factors.
- 20 Overall, we consider the degree of adverse effects on views and visual amenity from as experienced from the lake and its margins is best described as low - moderate.

Views from SH8

- 21 We agree with the description of the visibility of platforms 1 & 2 in the Moore Report. However, we do not agree that visual prominence will be significantly mitigated. We consider that given the existing openness and naturalness of the top terrace, the introduction of built form and domestication will have an adverse effect on views and visual amenity of a low-moderate degree.

Views from surrounding private land.

- 22 The Moore Report does not assess effects on the neighbouring properties and surrounding rural living developments but does conclude in the assessment against Policy 4.4.2 and Policy 4.4.10 that *'any adverse effects on the amenity value of neighbours will be less than minor'*. We understand affected party approval has been provided by the owners of adjacent properties.

- 23 Several rural living allotments are located within the vicinity, including elevated rural living properties accessed from McFelin Road that overlook the site. We have not viewed the site from these private properties, however, attached Photograph 2 illustrates views from the site look towards surrounding rural living development and gives an indication of the indicative viewshed. In views from several of these properties, one or more of the proposed platforms will be visible. Without visiting the properties, our initial view is that the introduction of rural living development to the upper terrace appears likely to have an adverse effect on some views and visual amenity of a moderate degree.

REVIEW OF LANDSCAPE EFFECTS

- 24 *“A landscape effect is a consequence of changes in a landscape’s physical attributes on that landscape’s values. Change is not an effect: landscapes change constantly. It is the implications of change on landscape values that is relevant. To assess effects, it is therefore necessary to first identify the landscape’s ‘values’ – and the attributes on which such values depend”*⁴.
- 25 As discussed above, we have been asked to assess whether the proposal will lead to the maintenance and enhancement of the landscape character, particularly relating to the openness of hills and ranges.
- 26 The Moore report concludes that *“the adverse the landscape effects of the proposed development will be adverse in nature but low-moderate in degree”*. We disagree and consider that the proposal will result in adverse effects on landscape character that range up to being of a high degree.
- 27 The significance and sensitivity of the terraced landform and the open character of the terrace is highlighted in the Central Otago District Rural Review Landscape Assessment⁵. As can be seen in the attached Photographs, the valley floor is more occupied and developed with buildings and amenity planting visible along Burn Cottage Road. The steep, well-defined escarpments and upper terrace take the form of an open and very legible landscape of pasture with very limited shrub and tree vegetation or built form.

⁴ Ibid, paragraphs 6.1 and 6.2.

⁵ Central Otago District Rural Review Landscape Assessment Report and Recommendations, LA4 Landscape Architects, July 2008.

- 28 We agree that Lot 4 is the most readily integrated into an already relatively domesticated valley floor area. However, the terraced landform is recognised as an SAL with value attached to the unique, dramatic landform and openness. The proposal will result in an open rural lot being subdivided into 4 rural living lots. Proposed Lots 2 and 3, 4, contain one proposed building platform and Lot 1 contains two proposed building platforms. As discussed above, establishment of rural residential development is not limited to built form. Each residence is likely to include elements of domestication such as a lawn, landscaping, clothes lines, sheds outdoor living spaces etc. The introduction of four rural living opportunities will likely lead to a spread of domestication and the fragmentation of the open, pasture-covered upper terrace. The spread of domestication onto the flat upper terrace will lead to a change in the character of this unique area of landform that has been identified as an SAL and as a having low visual absorption capacity⁶. The introduction of domestication as proposed potentially encourages future further subdivision and fragmentation.
- 29 We consider that the addition development into this landscape will have an adverse effect on landscape values that derive from the open, empty and natural character of the escarpment-and-terrace landform. Given the significance of the landform and its broad legibility, any potential visual mitigation through earthworks or structural landscaping is likely to exacerbate adverse effects rather than reduce them. It is noted a potential development can have an adverse effect on the values and open natural character of a landscape without being highly visible.
- 30 Another key landscape issue concerning the subdivision of rural land is that of adverse cumulative effects on the landscape character of the area and the wider landscape context. Incremental changes from ongoing subdivision have altered the character of the area with development starting to creep from the lower valley floor to more elevated land. Currently, the land the upper terrace remains very largely undeveloped. We consider the introduction of four instances of rural living within this open landscape would lead to a considerable shift in landscape character; a moderate-high adverse cumulative effect in terms of landscape character and values.

CONSIDERATION OF STATUTORY DOCUMENTS

- 31 The Moore report lists and comments on the the relevant matters of discretion.

⁶ Ibid.

- 32 With regard to the matter of discretion concerning effects of subdivision and development on open space, landscape, natural character and amenity values, the Moore report concludes that adverse effects on landscape values are less than minor because both the valley area and the terrace top are already characterised by rural housing and form part of a settled lowland landscape. We consider that while this is accurate in terms of the valley floor, this is not the case for the upper terraces that are very largely open, rural and empty, with one residential development be located on the upper terrace on the adjacent property. The unique, largely undeveloped terraced topography is valued for its openness for its contribution to wider views which are representative of Central Otago landscape. These wider views are composed of the open, rural terraces in the foreground of the more rugged upper mountain slopes and skylines. It is our assessment that the introduction of additional rural living opportunities as proposed would have an adverse effect on open space, landscape, natural character and amenity values that would range up to a high degree.
- 33 Regarding the matter of discretion concerning visual absorption of future built development with particular regard to SALs, the Moore report concludes that with the mitigation measures proposed, the proposed development can be acceptably absorbed visually in this landscape. One of the proposed platforms on Lot 1 and the proposed platform on Lot 2 are visible from a considerable part of the Cromwell and Lake Dunstan area. The terrace landscape is distinct due to its physical form, legibility, simplicity and visual exposure. As such, any visible development within these platforms will not be easily absorbed.
- 34 Regarding the matter of discretion concerning earthworks, the Moore report again concludes that the proposed development can be acceptably absorbed visually. We consider that given the distinct topography and the open character of the upper terraces, any earthworks are likely to have an adverse effect on views and visual amenity.
- 35 Regarding the matter of discretion concerning building platforms being encouraged in locations that will maintain the open natural character of hills and ranges without compromising the landscape and amenity values of prominent hillsides and terraces, the Moore Report concludes that the site is terraced but the proposed mitigation measures ensure acceptable integration and protection of landscape values. We consider that the introduction of four rural living platforms on

this open terraced landscape will lead to a moderate-high adverse effect on open, natural character.

- 36 Regarding the matter of discretion concerning clustering we agree with the Moore Report that clustering built form within the valley would minimise adverse effects, but this is not practical.

CONCLUSIONS

- 37 Overall, we disagree with a number of the findings of the Moore Report. Key areas of disagreement are adverse effects on views and visual amenity and on the open, natural character of the terrace. Disagreement regarding views and visual amenity relates primarily to platforms on proposed Lots 1 and 2 that are visible on the ridgeline of a prominent terrace. We consider the adverse effects to be of a moderate degree at most. Regarding landscape character, we consider that proposal will lead to an adverse effect on the open, natural character of the terrace that will range up to being of a high degree.

vivian+espie

27 April 2023

Quality Assurance

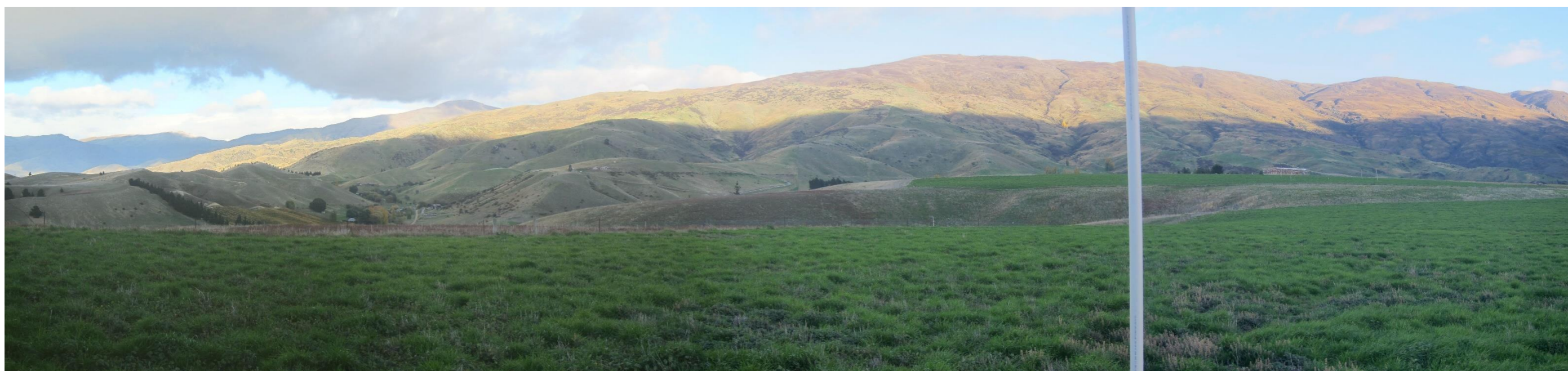
Report prepared by Vivian and Espie for Central Otago District Council			
Reviewed and Approved By	Jess McKenzie	Landscape Architect	27 April 2023



Context and Viewpoint Plan – viewpoints for photographs shown as red numbers.



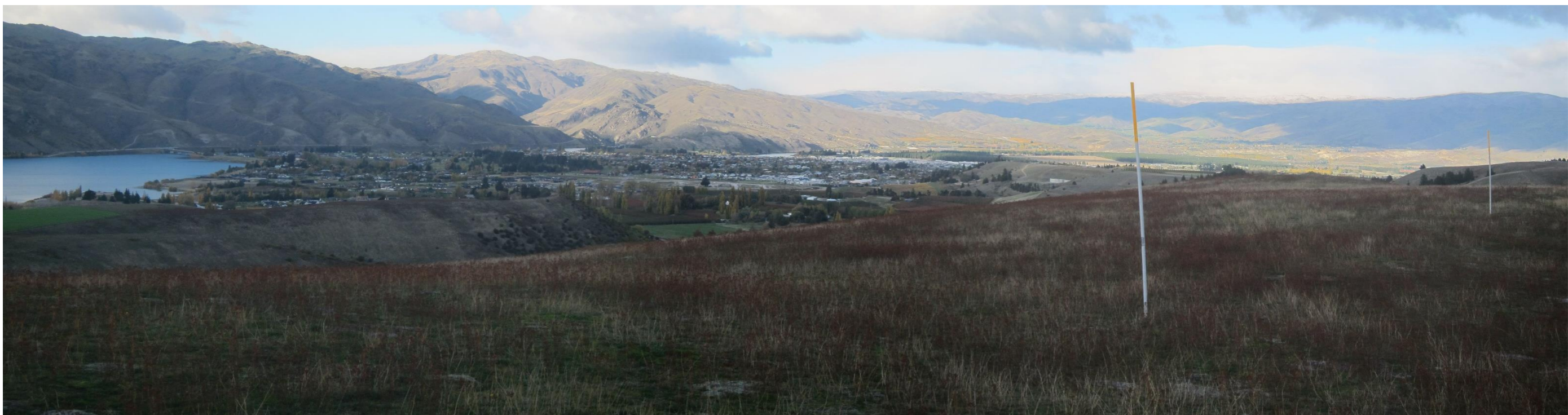
Viewpoint 1: Looking north east towards Lake Dunstan from the second proposed building platform on Lot 1. This photograph illustrates the viewshed from which the proposed platform will be visible.



Viewpoint 2: Looking south west towards established rural living from the primary proposed building platform on Lot 1. This photograph illustrates the viewshed from which the proposed platform will be visible.



Viewpoint 3: Looking north from proposed Lot 2 towards the proposed building platforms on Lots 1 and 3. This photograph illustrates the existing and proposed level of development on the upper terrace.



Viewpoint 4: Looking south east towards Cromwell from the proposed building platform on Lot 2. This photograph illustrates the viewshed from which the proposed platform will be visible



Viewpoint 5: Looking south west towards the rural living on Burn Cottage Road from the proposed building platform on Lot 2. This photograph illustrates the viewshed from which the proposed platform will be visible.



Viewpoint 6: Looking towards the proposed platform on Lot 2 from Cromwell. This photograph illustrates the degree of visibility from Cromwell. Inset photograph shows a zoom-in of the Lot 2 poles.



Viewpoint 7: Looking towards the proposed platform on Lot 1 from Northburn. The entire second building platform on Lot 1 is visible.



MEYERCRUDEN

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GEOTECHNICAL ASSESSMENT REPORT





172 BURN COTTAGE ROAD,
CROMWELL



DATE: 19 DECEMBER 2022
REF: R2022153

REPORT VERSION CONTROL

CROMWELL OFFICE
2D McNulty Road, Cromwell

WANAKA OFFICE
Level 1, 71 Ardmore Street, Wanaka

-  PO Box 161, Cromwell
-  (03) 445 0670
-  accounts@mcengineering.co.nz
-  www.mcengineering.co.nz

REPORT REFERENCE		R2022153	PROJECT NUMBER		2022153
CLIENT		Sam Hazeldine			
REV	DATE	REVISION CONTROL			
-	13/9/22	final			
1	5/10/22	Appendix D2 correction			
2	19/12/22	Amended report to reflect updated subdivision plan			
3	9/3/22	Amended to clarify Lot 4 mitigation work			
PREPARED BY		Oliver De Silva	REVIEWED BY		Mark Cruden
AUTHOR SIGNATURE			REVIEWER SIGNATURE		
QUALIFICATIONS		BAppSc, PMEG	QUALIFICATIONS		BEng(Hons), CPEng

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1 EXECUTIVE SUMMARY

- The following Geotechnical Assessment Report has been commissioned in relation to the proposed subdivision development at 172 Burn Cottage Road, Cromwell. The report covers:
 - a) Geotechnical considerations for residential development;
 - b) Suitability of site for disposal of stormwater and wastewater to ground;
 - c) Hazards risk assessment including identification of any measures required to mitigate identified risks.
- A site investigation has been completed, involving a site walkover, test pits and Scala penetrometer results. Lots 1-3 are situated on the upper terrace and are underlain with topsoil and outwash deposits. Lot 4 is situated on the lower site and has some limited alluvium material with underlying outwash deposits.
- The proposed building platform locations for Lots 1 and 3 are deemed suitable. The ground conditions within the proposed building platforms of Lots 1-3 are deemed as 'good ground' below the overlying topsoil and standard NZS3604 foundations are deemed suitable.
- In Lot 4, the overlying alluvium silt material that was found to be up to 1.0m deep, is not suitable for foundations to bear upon. This material should be undercut prior to the placement of fill material.
- Once building footprints have been finalised, specific Geotech investigations will be required within each building platform. These investigations will aim to confirm the ground conditions are in accordance with those stated within this report.
- We have analysed the channel adjacent to Lot 4, against the predicted 1% AEP (1 in 100) and 0.4% AEP (1 in 250) rainfall events.
- It is required that an easement be created over the channel adjacent to Lot 4, to ensure the channel is kept undisturbed. In order to accommodate the estimated flow width within the channel, the easement should be at least 15m wide. It should also extend 20m north and 20m south of the Lot 4 building platform extents.
- Progressively decreasing minimum floor levels have been specified for the Lot 4 building platform and finished floor levels. This is to ensure 0.5m of freeboard above the 1% AEP flow depth in the channel where it passes Lot 4.
- Stormwater disposal to ground is feasible, provided that the underlying outwash deposits are targeted.
- Wastewater disposal to ground is feasible, provided that the underlying outwash deposits are targeted. It is likely that the location of the wastewater disposal system within Lot 4 will be within 50m of an existing or ephemeral watercourse. As such an Otago Regional Council Discharge Permit will be required. The final design for Lot 4 should also consider the relatively shallow depth to groundwater.

2 INTRODUCTION

Meyer Cruden Engineering Limited (MCE) have been engaged by Sam Hazledine to complete a Geotechnical Assessment Report for a proposed subdivision of Lot 2 DP 306317 – 172 Burn Cottage Road, Cromwell. The site location is shown in Figure 1 below. The objectives of the investigation and subsequent report were to provide:

- Geotechnical considerations for subdivision and residential development;
- Suitability of site for disposal of stormwater and wastewater to ground;
- Hazards assessment including identification of any measures required for mitigation.



Figure 1: Location Plan

2.1 PROJECT OVERVIEW

In preparing this report we have undertaken the following activities:

- A desktop study of:
 - Published Geology [1];
 - Central Otago District Council (CODC) [2] and Otago Regional Council (ORC) [3] mapping systems;
 - Historical and current satellite and aerial photography, utilizing Retrolens and Google Earth Pro.
- A site investigation which consisted of:
 - Site walkover and field mapping of the subject site, wider area, and contributing upstream catchment areas;
 - 22 test pits;
 - 18 Scala penetrometer tests.

2.2 PROPOSED DEVELOPMENT & BACKGROUND INFORMATION

The proposed 4-Lot subdivision is detailed in the scheme plan, which has been provided by the client and is attached in Appendix A.

3 SITE DESCRIPTION & DESKTOP STUDY

The 32 Ha site is situated on the northern side of Burn Cottage Road, approximately 1.5km west of Lake Dunstan.

The area is defined by an eroded gully with a large, flat-lying terrace above it. The gully feeds into the lower lying area of the site, which has been subject to alluvial fan activity and is undulating in topography.

The gully is orientated roughly north to south until it meets Burn Cottage Road, where it feeds into a channel and veers east.

3.1 GEOLOGICAL MAPPING

We have reviewed the GNS 1:250,000 NZ Geology Map Series [1]. The site is located on the boundary of two differing units:

- *OIS1 (Holocene) fan deposits, which are described as loose, commonly angular, boulders, gravel, sand, and silt forming alluvial fans; grades into scree (upslope) & valley alluvium.*
- *OIS16 (Early Pleistocene) outwash deposits, which are described as moderately weathered schist and greywacke gravel in terrace remnants.*

3.2 NATURAL HAZARDS

The Otago Natural Hazard Portal mapping system [3] indicates the following natural hazards imposed on the subject site.

3.2.1 ALLUVIAL FAN HAZARD

The ORC hazard mapping [3] identifies the lower portion of the site as being located on an 'active' and 'debris-dominated' alluvial fan. This mapping is sourced from the *Otago Alluvial Fans Project* completed by Opus in 2009 [5]. This mapping has been completed on a broad scale, with no site-specific investigations undertaken at the site in question. Alluvial fans can present both debris flow and flooding hazards. In the location of the site in question this alluvial fan activity is described as 'active' and 'debris dominated'.

Additionally, the lower area of the site, adjacent to Burn Cottage Road, has been mapped as 'Fan recently active' which is described as '*area of relatively recent (e.g. <300 yrs) stream activity. Immature forest (if present) and raw or very immature soils. Alternatively, a stream flowing on the fan surface, in a channel <1m deep. Includes tce-riser slopes up to adjacent surfaces.*'

The alluvial fan hazard has been assessed in detail, with relevant discussion in Section 4.4 of this report.

3.2.2 SEISMIC HAZARD

The Pisa Fault Zone is located approximately 2km west of the site and the Dunstan Fault Zone is located approximately 22km east of the site. The Alpine Fault lies approximately 95km northwest of the subject site and has an estimated recurrence interval of 300 years. The Alpine Fault is most likely to produce shaking at the site during the lifetime of any structure. There is a high probability of a magnitude 8 or greater earthquake occurring within the next 50 years on this fault. Such an event will likely cause strong ground shaking in the Central Otago area.

3.3 HISTORIC AERIALS & MODERN SATELITE IMAGERY

Retrolens (Historic Image Resource) and Google Earth Pro have been utilised in reviewing historical aerials of the subject site and surrounding areas, dating back to 1950. Modern satellite imagery, sourced from Google Earth and the CODC GIS mapping have also been reviewed. Based on review of the available aerials and imagery, the following observations have been made:

1950

- There appears to be some possible localised gully erosion within the incised channel.
- Water races are present to the east and west of the channel apex.

1958

- Scouring present within upper reaches of channel.
- Water race constructed within the separate gully to the west, which feeds into the subject site.

1976 & 1984

- Minor localised scour throughout channel.
- Water race in western channel more pronounced (remnants of which are still there today).
- Possible surface disturbance on lower area. Not clear enough to decipher, but possible signs of minor alluvial fan activity.

4 SITE WALKOVER & SUBSURFACE INVESTIGATIONS

Site investigations were completed in July and August 2022. The following investigations were undertaken:

- A site walkover;
- 22 test pits, excavated by machine to depths of up to 2.5m below ground level (bgl);
- 18 Scala penetrometer test completed to 1.9m bgl ore refusal, whichever was encountered first.

A test location plan and results are attached in Appendix B.

When MCE was first engaged to complete the work, the scheme plan was for a 6-lot subdivision. However, after we completed our fieldwork, the proposed subdivision was adjusted to 4 lots with building platform locations changed. We then completed a second round of fieldwork to assess these new areas.

In December 2022, the subdivision scheme plan was altered again. No further investigations were deemed necessary at this stage.

All completed test locations and results have been attached.

4.1 STRATIGRAPHY

The test pits revealed the following stratigraphy:

Stratigraphy	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10	TP11	TP20	TP21	TP22
Topsoil	0.0 -0.2	0.0 - 0.3	0.0 - 0.3	0.0 - 0.2	0.0 -0.3	0.0 -0.3	0.0 -0.3	0.0 -0.2	0.0 -0.3	0.0 - 0.2	0.0- 0.2	0.0- 0.2	0.0- 0.2	0.0- 0.2
Cobbly GRAVEL/ gravelly SAND/SAND/silty GRAVEL/GRAVEL (Outwash Deposits)	0.2 -2.4	0.3 - 2.0	0.2 - 1.6	0.2 - 2.0	0.3- 2.0	0.3- 2.0	0.3- 2.0	0.2- 2.2	0.3- 1.5	0.2 - 2.2	0.2- 1.7	0.2- 1.7	0.2- 1.6	0.2- 1.5

Table 1 - Site Stratigraphy of Upper Terrace

Stratigraphy	TP12	TP13	TP14	TP15	TP16	TP17	TP18	TP19
Topsoil	0.0 -0.05	0.0 -0.1	0.0 -0.3	0.0 -0.2	0.0 -0.3	0.0 -0.2	0.0 -0.2	0.0 -0.2
Recent Alluvium or Buried Topsoil					0.2 -0.4			
Buried Topsoil					0.4 -0.6			
SILT (Alluvium)		0.1 -0.2	0.3 -1.0	0.2 -0.5	0.6 -1.2	0.2 -0.7	0.2-0.9	0.2-1.0
Silty COBBLES/silty GRAVEL(Alluvium)			1.0 -1.4		1.2 -1.7	0.7-0.9	0.3-1.2	
Cobbly GRAVEL/ gravelly SAND/SAND/silty GRAVEL/GRAVEL (Outwash Deposits)	0.05-1.5	0.2 -1.9	1.4 -2.3	0.5 -2.3	1.7 -2.3	0.9-2.5		1.0-2.3

Table 2 - Site Stratigraphy of Lower Area

Full soil descriptions are provided in the geologic logs attached in Appendix B.

4.2 COMMENTS ON STRATIGRAPHY

4.2.1 UPPER TERRACE – LOTS 1-3

- Outwash deposits were found to be underlying in all test pits. These deposits can be broadly characterized as either medium (gravelly SAND/SAND) or coarse (GRAVEL/cobbly GRAVEL). These deposits were loosely packed or medium dense and were all logged as moist or dry. The coarse deposits were underlying the medium deposits, which is an indication for age of deposition. These deposits are a terrace remnant from the Lowburn Formation [1].
- Topsoil was found to be overlying in all completed test pits. There were no areas where fresh gravel was exposed at the surface, suggesting a period of quiescence. As detailed in Table 1 above, topsoil thickness was 0.2-0.3m.

4.2.2 LOWER AREA – LOT 4

- Outwash deposits were found to be underlying in all test pits and were of similar description to those found in the upper terrace test pits described above.
- Overlying the outwash deposits were deposits of alluvium. The alluvium deposits could be separated into underlying coarser deposits (silty COBBLES/silty GRAVEL) and overlying finer deposits (SILT). Although primarily sourced from the slopes to the northwest, it is likely that the finer grained content of these deposits is loess derived. Loess, a wind-blown deposit, would have blanketed select areas of the region in the post-glacial environment, and then been eroded and combined with the fan alluvium material through alluvial activity.
- A limited buried topsoil layer was observed in TP16 from 0.4-0.6m bgl. This layer was overlain with 200mm of GRAVEL and 200mm of Topsoil. It is likely that an episode of

alluvial fan activity carried this gravel material from the gully to the northwest and deposited it over the existing topsoil. This test pit is located 50m southwest of the Lot 4 building platform location. No similar layer was found in the test pits in the vicinity of the Lot 4 building platform.

- Topsoil was found to be overlying in all completed test pits. There were no areas where fresh gravel was exposed at the surface, suggesting a period of quiescence since the last alluvial fan deposit on the terrace. As detailed in Table 1 above, topsoil thickness was 0.2-0.3m in TP14-19. However, in TP12-13 topsoil thickness was a maximum of 0.1m, potentially suggesting a shorter a period of inactivity since the last alluvial flow, within the area directly adjacent to the gully channel.

4.3 GROUNDWATER

4.3.1 UPPER TERRACE – LOTS 1-3

On the upper terrace, no groundwater or saturated soils were encountered in any of the test pits. Test pits were excavated to a depth of 2.4m bgl and were logged as dry to the base suggesting that the excavation was not nearing a groundwater source. Based on the elevation of the terrace, groundwater is not expected to affect the development of Lots 1-3.

4.3.2 LOWER AREA – LOT 4

No groundwater or saturated soils were encountered in the test pits completed in the vicinity of Lot 4 building platform. Further southwest of the lot 4 building platform, groundwater was observed in two of the completed test pits. TP17 revealed perched groundwater within the silty GRAVEL alluvium layer that is overlying the underlying outwash SAND deposits. TP19 revealed groundwater at 1.9m.

A search of the Otago Regional Council's online bore data has been undertaken to further assess the likely depth to groundwater. F41/0375 is located 150m west of the subject site and has a recorded depth to water reading of 2.6m below an approximate elevation of 279.31mRL.

The proposed location of building platform of Lot 4 has a minimum elevation of approximately 287.5mRL.

Based on the above information and the topography of the site, we conservatively estimate that the building platform of Lot 4 is likely to have a minimum depth to water table of 7m, with consideration of seasonal fluctuation.

4.4 SCALA PENETROMETER TESTING

18 Scala penetrometer tests were completed across the site in order to estimate the bearing capacity of the underlying soils. These results are discussed in Section 6.2.

4.5 ALLUVIAL FAN HAZARD OBSERVATIONS

To assess the mapped alluvial fan hazard, we completed a walkover of the wider site and a portion of the contributing upstream catchment area. The following observations, relevant to the alluvial fan hazard, were made:

- The site is defined by an incised gully that trends downslope from north to south. The slopes on the sides of this gully have an approximate slope gradient of 2H:1V.
- The channel that is located within this gully continues through proposed Lot 4 to the

south. This channel was observed as dry. However, this channel will run with surface water during high rainfall events.

- Within the gully, there are stacks of cobbly rocks present which could potentially be from minor gold sluicing activity.
- The channel has an average gradient of 1V:7H within the gully.
- The gradient of the channel decreases to 1V:10H adjacent to the proposed building platform within Lot 4.
- Adjacent to the Lot 4 building platform the channel is 10m wide and up to 1.0m deep.
- TP12, which was completed within the channel adjacent to the Lot 4 building platform, revealed only 50mm of topsoil. This indicates a shorter period of inactivity than elsewhere in the site.
- To the south of Lot 4, at the boundary with the neighboring property to the east, the channel begins to flow with water. This water is likely to be groundwater originated.
- No signs of recent debris-dominated alluvial fan activity were evident.
- The gully to the northwest also fans out to the south of the building platform and is obvious from the saturated surface and grasses. Due to the topography of the site, this gully will not adversely affect the Lot 4 building platform. Any flow from this gully will travel south.
- There are the remnants of an abandoned water race which comes out of this northwest gully and follows the contour round to the west.
- Buried topsoil was present within TP16. This suggests that, in recent times, alluvial fan action may have occurred.
- It appears some earthworks have occurred on the eastern side of channel, on the opposite side of the Lot 4 building platform.
- The eastern extent of the proposed Lot 4 building platform has been shifted and is now situated a minimum of 22m from the channel centerline, which comes down the gully from the north. An analysis of this channel and the contributing catchment has been undertaken, as detailed in the following report sections.

5 UPSTREAM CATCHMENT ANALYSIS

To supplement our site observations and test pits, we have completed an assessment of the contributing catchment that feeds into the unnamed gully above Lot 4 to estimate potential peak flows. The assessment was undertaken using the Rational Method in HydroCAD. The catchment details are summarised in Table 3 below. A catchment plan, as well as the modelling calculations are attached in Appendix C.

Details	Qty
Catchment Area	45 Hectares
Run-off coefficient	0.2
Length of Catchment	1.5 km
Mannings "n" (roughness coefficient) for channel	0.030
Estimate Time of Concentration	50 minutes, comprising shallow concentrated flow over short pasture grass (48 mins) and channel flow (2 mins) over earth, grassed and winding
Peak Rainfall Intensity (RCP 8.5)	38.8mm/hr (100 ARI) 47.9mm/hr (250 ARI)
Peak Flow	1.2m ³ /sec (100 ARI) 1.49m ³ /sec (250 ARI)

Table 3 - Catchment Details

5.1 CATCHMENT INPUTS

5.1.1 RUNOFF COEFFICIENT

The runoff coefficient has been determined with reference to Table 1 of NZBC E1/VM1 [5]. A coefficient of 0.2 has been selected based on the high soakage of the underlying gravels and the grass cover of the land.

5.1.2 RAINFALL DATA

The rainfall data was sourced from NIWA's High Intensity Rainfall Design System (HIRDS) [6]. In response to ongoing climate change, we have adopted rainfall data based on a Representative Concentration Pathway scenario RCP8.5 for the period 2081-2100.

A Representative Concentration Pathway (RCP) is a greenhouse gas concentration trajectory adopted by the IPCC for its fifth Assessment Report (AR5) in 2014. It supersedes Special Report on Emissions Scenarios (SRES) projections published in 2000. Under the RCP approach four pathways have been selected for climate modelling and research, which describe different climate futures, all of which are considered possible depending on how much greenhouse gases are emitted in the years to come. The RCP8.5 scenario assumes 'business as usual' with an increase in mean temperature of 3.7 degrees C by the end of the century.

5.1.3 TIME OF CONCENTRATION

Estimated time of concentration has been estimated using the Rational Method in HydroCAD. The result was 50 minutes which comprised of a combination of shallow concentrated flow atop the terrace riser (48 mins) and channel flow within the gully (2 mins).

5.2 PEAK FLOW

HydroCAD was used to calculate the peak flow for a 1 in 100 and 1 in 250 ARI, 50-minute duration event.

For a 1 in 100-year event, a peak runoff flow from the contributing catchment has been calculated at 1.2m³/sec.

For a 1 in 250-year event, a peak runoff flow from the contributing catchment has been calculated at 1.49m³/sec.

In running the analysis, we have conservatively used a blockage factor of 90% within the channel, to allow for debris flow type events.

The maximum flow depth in the channel, adjacent to the building platform is estimated to be 0.54m and 0.59m for the respective storm events.

The HydroCAD modelling results are attached in Appendix C.

5.3 PROPOSED GROUND AND FLOOR LEVELS OF DEVELOPMENT ON LOT 4

With guidance from NZS4404 and the NZBC E1/VM1 [5], we recommend the following:

- An progressively decreasing minimum floor level requirement from the northeast to the southwest from 290.6 to 286.6m. This is represented graphically in figure 2 below and ensures that the FFL will be 0.5m above the 1 in 100 year flood level:-
- Minimum building platform levels are to be no greater than 0.25m below the specified minimum floor levels.

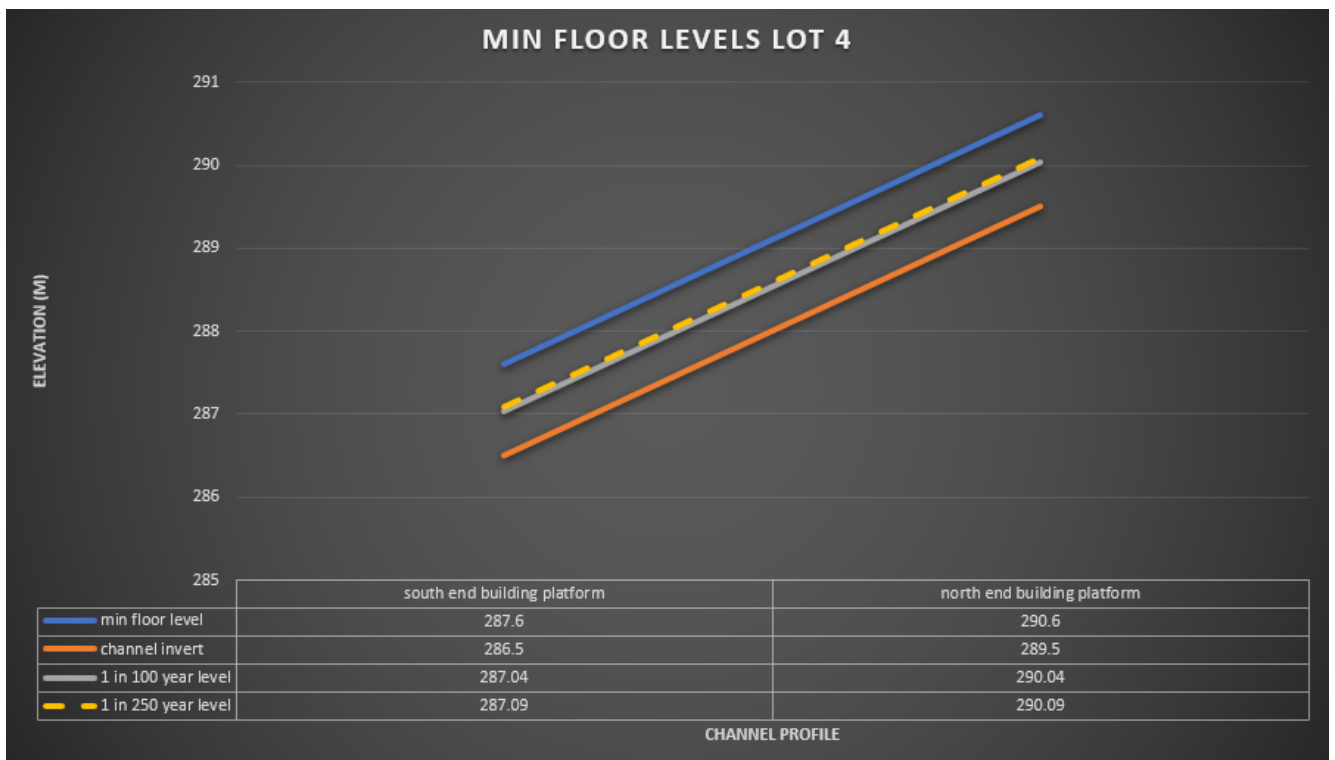


Figure 2: Minimum Floor Levels Lot 4

5.4 CHANNEL CROSS-SECTION

When we completed our initial report, the subdivision scheme plan had the Lot 4 building platform located directly adjacent to the channel. However, the decision has since been made by the developer to move the building platform to the west.

At its new location, the platform is clear of any possible inundation, as modeled in the HydroCAD analysis. Therefore, no channel widening, or deepening of the existing channel is deemed necessary to avoid inundation onto the platform. However the minimum floor levels should still be adhered to as lowering the ground surface and floor levels from those specified could result in a redirection of the flow out of the natural channel and onto the building platform. These levels have been specified to ensure 0.5m freeboard above the 1% AEP flow depth.

It is required that an easement be created over the channel adjacent to Lot 4, to ensure the channel is kept undisturbed. In order to accommodate the estimated flow width within the channel, the easement should be at least 15m wide. It should also extend 20m north and 20m south of the Lot 4 building platform extents.

Where it passes the building platform, the maximum velocity of the channel flow, for a 1 in 250-year event, is 0.64m/s. Based on Table 5 of E1 Building Code, some minor erosion within the existing channel may occur but is not expected to be significant.

6 GEOTECHNICAL ENGINEERING CONSIDERATIONS

6.1 SOIL PARAMETERS

Table 2 below provides a summary of the geotechnical properties of the soils encountered during the site investigations.

Soil Description	Bulk Density (kn/m ³)	Cohesion, C' (kPa)	Friction Angle (degrees)	Minimum likely Bearing Capacities*, (kPa)
Topsoil, uncontrolled fill & Buried Topsoil	16	n/a – remove from all subgrades prior to filling or foundation construction		
SILT (Alluvium)	18	-	32	35 – allowable 50 – factored ULS 100 – ULS
Silty GRAVEL/silty COBBLES (Alluvium)	18	-	32	100 – allowable 150 – factored ULS 300 – ULS
Cobbly GRAVEL/gravelly SAND/SAND/silty GRAVEL/GRAVEL (Outwash Deposits)	18	-	32	100 – allowable 150 – factored ULS 300 – ULS

Table 5 – Soil Parameters

**BASED ON 400M WIDE 400MM DEEP STRIP FOOTINGS*

6.2 BEARING CAPACITY

Section 3 of NZS3604:2011 [7] specifies minimum Scala Penetrometer results required for the site to be assumed to have an ultimate bearing capacity of not less than 300kPa and defined as “good ground”. These are five blows/100mm to a depth equal to twice the width of the widest footing beneath the footing and then three blows/100mm at greater depths. These results can be averaged over 300mm.

6.2.1 UPPER TERRACE – LOTS 1-3

The cobbly nature of the underlying material resulted in shallow refusals in all Scala penetrometer tests. Therefore, these tests were not able to assess the entire zone of influence expected from the foundations. Meyer Cruden has extensive experience with the soils in this area and the acquired engineering judgment to be satisfied that the underlying outwash deposits constitute “good ground” as per NZS3604 requirements.

6.2.2 LOWER AREA – LOT 4

The overlying SILT (alluvium) is relatively soft, achieving minimum Scala results of 1 blow/100mm, which equates to <100kPa ultimate bearing capacity. The material was also somewhat dilatant and in general unsuitable to bear foundations of any structure.

The underlying coarser grained alluvium deposits and underlying outwash deposits provided Scala results exceeding those required to be considering as “good ground”.

6.3 EARTHWORKS AND RETAINING

Future development may include terraced fills due to the sloping nature of some of the building platform locations.

If fill is required to form building platforms, then these earthworks should be undertaken in accordance with NZS4431:2022. It will be required that any fill over 0.3m thick under foundation elements will need to be certified in accordance with NZS4431:2022.

All topsoil, uncontrolled fill, buried topsoil and alluvium silt shall be removed to stockpile during subgrade stripping. Based on Scala and test pit results, strip depths are likely to be up to 0.3m for Lots 1-3 and 1.0m for Lot 4. The in-situ SILTS are not suitable for reuse as engineered fill and imported material will be required. We recommend a crushed AP65 or well graded max AP100 pitrun.

At the time of earthworks Meyer Cruden can advise on the appropriate methodology and supervise the works.

6.3.1 CUT & FILL BATTERS

Table 6 indicates appropriate temporary and permanent cut batter slopes for the material likely to be encountered during earthworks.

Material Type	Temporary cut batter slope	Permanent cut batter slope
Topsoil and Fill	1.5H:1V	3H:1V
SILT (Alluvium)	1H:1V	2.5H:1V
Silty GRAVEL/silty COBBLES (Alluvium)	1H:1V	2.5H:1V
Cobbly GRAVEL/ gravelly SAND/SAND/silty GRAVEL/GRAVEL (Outwash Deposits)	1H:1V	2.5H:1V

Table 6 – Cut batters

Any permanent fill batter slopes under 3m shall be constructed at a maximum permanent batter slope angle of 2.5H:1V. Fill slopes beyond 3m in height shall be subject to specific engineering design.

6.3.2 RETAINING WALL DESIGN PARAMETERS

Retaining walls should be designed following the guidance provided in the MBIE's Module 6: Earthquake Resistant Retaining Wall Design.

Engineered retaining wall design is required if any of the following circumstances are present:

- Where retained height is greater than 1.5m;
- Where retaining walls support any surcharged loads such as sloping ground and structure/traffic loads;
- Where retaining wall failure will affect the stability and integrity of adjacent structures and neighboring properties.

The following geotechnical parameters should be used for engineering retaining wall design:

- Cohesion (c') = 0 kPa
- Friction angle = 32 degrees
- Unit Weight = 18kN/m³

Appropriate drainage systems should be designed in conjunction with any retaining walls. This should include a minimum of 300mm width of free draining material behind the wall with a subsoil at the base of the foundation. A geotextile barrier should be installed between the drainage material and natural soil or compacted fill behind.

6.4 SEISMIC SOIL CLASS

For the purposes of detailed design, the underlying deposits are classified as subsoil Class D (Deep soil site) in terms of clause 3.1.3 of NZS1170.5:2004 [5].

7 RECOMMENDATIONS TO FACILITATE DEVELOPMENT

7.1 LOT 1

7.1.1 PROPOSED DWELLING LOCATION

- The underlying outwash deposits are likely to facilitate standard NZS3604 foundations.
- The proposed building platform is suitably located and.

7.1.2 PROPOSED FARMERS RESIDENCE LOCATION

- The underlying outwash deposits are likely to facilitate standard NZS3604 foundations.
- The proposed building platform is suitably located and is not affected by any known hazards.

7.2 LOT 2

- The original proposed building platform was located half down the slope, which has a gradient of 1V:2H. Based on this degree of slope, in combination with the soil characteristics of the underlying outwash material, we considered this location impractical and subject to slope stability issues. We recommended a building setback line. The developer has since taken agreement with this recommendation and has repositioned the platform upslope of our recommended building setback line.
- The underlying outwash deposits are likely to facilitate standard NZS3604 foundations.

7.3 LOT 3

- Since our initial report, the developer has moved the proposed platform location 40m to the north.
- We do not have any test pits or Scala penetrometer test completed in the newly proposed platform location. However, due to the consistent underlying geology we have uncovered in this general area of the site, we expect underlying outwash deposits that are likely to facilitate standard NZS3604 foundations.
- The proposed building platform is suitably located and is not affected by any known hazards.

7.4 LOT 4

- When we completed our initial report, the eastern edge of the proposed building platform was located adjacent to the western side of the existing channel alignment. However, the proposed platform has since been shifted to the west. Based on our catchment calculations, no alteration to the channel is required. However, it is also essential that no filling/reducing of the channel capacity is permitted.
- The farm fence which is located to the north of the platform has the potential to cause debris build up that may lead to water flow jumping out of the channel. Therefore, the fence is to be removed.
- Based on the catchment calculations we have nominated minimum floor levels 290.6mRL at the northern end of the platform and 287.5mRL at the southern end of the building platform. This will provide 0.5m of freeboard above the 1% flow depth in the channel.
- The underlying stratigraphy varies across the building platform. TP13 and TP15 revealed up to 0.5m of overlying unsuitable material, with underlying outwash deposits which constitute to 'good ground'. However, TP14 revealed 1.0m of overlying silt material

which is unsuitable for foundations to bear upon due to its extremely low bearing capacity. Undercut and backfill

Based on the recommendations bullet pointed above, we recommend the site be built up to achieve the minimum required ground levels. This would first involve stripping the overlying topsoil and undercutting the overlying alluvium silt material. Granular fill would then be utilised to build the site up to design subgrade level following NZS4431:2022. Due to sloping nature of building platform, benching in of fill will be required.

8 WASTEWATER FEASIBILITY ASSESSMENT

The lots of the proposed subdivision would be required to manage their own wastewater disposal on site.

The test pits were used to complete an assessment of the suitability for wastewater disposal to the underlying soils. Based on the test pits completed and the stratigraphy described in section 4.1, we recommend that the underlying outwash deposits be targeted for wastewater disposal. This deposit can broadly be classified as Category 1 sands and gravels as per NZS1547:2012, and on-site wastewater management is feasible.

For primary treated effluent we recommend a design load rate of 20mm/day. For secondary treated effluent we recommend a design load rate of 50mm/day. These figures have been taken from table L1 of NZS1547:2012 and assume disposal via a traditional trench or bed method. If an alternative disposal method is selected, then design load rates should be derived from NZS1547:2012.

In the case of Lot 4 careful consideration should be given to the final location of any wastewater disposal system. It is likely that the location of the wastewater disposal system within Lot 4 will be within 50m of an existing or ephemeral watercourse. As such an Otago Regional Council Discharge Permit will be required. The final design for Lot 4 should also consider the relatively shallow depth to groundwater.

Further site investigation should be undertaken in the specific locations of any proposed onsite wastewater disposal systems as part of the detailed design process.

9 STORMWATER FEASIBILITY ASSESSMENT

Stormwater disposal to ground is considered viable in all test pit locations. The underlying outwash deposits should be targeted for stormwater disposal to ground as these deposits will provide the most generous soakage. Any on-site soakage system will need to be designed in accordance with NZBC Clause E1 and CODC standards. Soakage testing will be required at specific soakpit locations.

10 CONCLUSIONS

A site investigation has been completed, involving a site walkover, test pits and Scala penetrometer results. Lots 1-3 are situated on the upper terrace and are underlain with topsoil and outwash deposits. Lot 4 is situated on the lower site and is underlain with limited alluvium material, some of which is undesirable, with underlying outwash deposits.

The proposed building platform locations for Lots 1 and 3 are deemed suitable. The ground conditions within the proposed building platforms of Lots 1-3 are deemed as 'good ground' below the overlying topsoil and standard NZS3604 foundations are likely to be suitable. In Lot 4, the overlying alluvium silt material that was found to be up to 1.0m deep, is not suitable for foundations to bear upon. This material should be undercut prior to the placement of fill material.

Once building footprints have been finalised, specific Geotech investigations will be required within each building platform. These investigations will aim to confirm the ground conditions are in accordance with those stated within this report.

We have analysed the channel adjacent to Lot 4, against the predicted 1 in 100 and 1 in 250 year events. The proposed Lot 4 building platform is not expected to be inundated by stormwater traveling down this channel subject to the recommendations of section 7.4 of this report being adhered to.

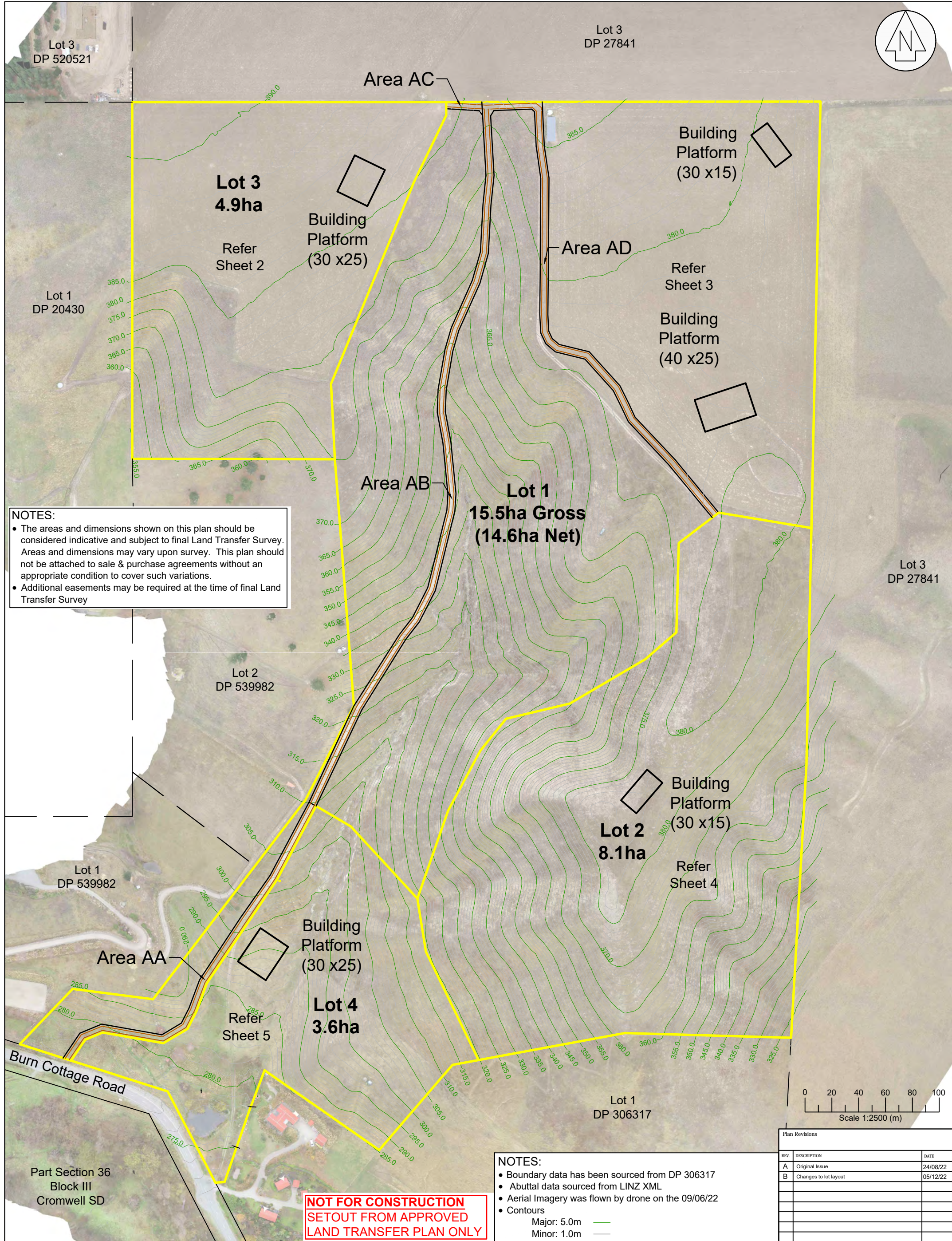
It is required that an easement be created over the channel adjacent to Lot 4, to ensure the channel is kept undisturbed. In order to accommodate the estimated flow width within the channel, the easement should be at least 15m wide. It should also extend 20m north and 20m south of the Lot 4 building platform extents. Minimum floor levels are also specified for Lot 4 relative to the flow depth in this channel to ensure 0.5m of freeboard above the 1% AEP flow depth.

Stormwater disposal to ground is feasible, provided that the underlying outwash deposits are targeted.

Wastewater disposal to ground is feasible, provided that the underlying outwash deposits are targeted. It is likely that the location of the wastewater disposal system within Lot 4 will be within 50m of an existing or ephemeral watercourse. As such an Otago Regional Council Discharge Permit will be required. The final design for Lot 4 should also consider the relatively shallow depth to groundwater.

11 REFERENCES

- [1] GNS, "GNS Science Geological Maps, 1:250,000," [Online]. Available: <https://data.gns.cri.nz/geology/>.
- [2] CODC, "GIS Mapping System".
- [3] ORC, "GIS Hazard Mapping System".
- [4] R. Thomson, "Proposed Garage at 7 Northburn Station Road: Assessment of the Hazard Zone Depicted on District Plan Maps," 09 December 2009.
- [5] Opus, "Otago Alluvial Fans Project," 2009.
- [6] H. Jakob, Debris-flow Hazards and Related Phenomena, 2005.



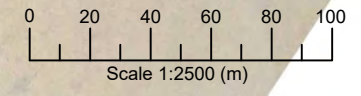
NOTES:

- The areas and dimensions shown on this plan should be considered indicative and subject to final Land Transfer Survey. Areas and dimensions may vary upon survey. This plan should not be attached to sale & purchase agreements without an appropriate condition to cover such variations.
- Additional easements may be required at the time of final Land Transfer Survey

NOTES:

- Boundary data has been sourced from DP 306317
- Abuttal data sourced from LINZ XML
- Aerial Imagery was flown by drone on the 09/06/22
- Contours
 - Major: 5.0m
 - Minor: 1.0m

**NOT FOR CONSTRUCTION
SETOUT FROM APPROVED
LAND TRANSFER PLAN ONLY**



REV	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22

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Meyer Cruden Engineering Limited

Notes

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Prepared for
Resource Consent

Drawing Title
Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

2022153

APPLICANT
Sam Hazledine

COMPRISED IN
RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

DATE
05/12/22

SCALE
1:2,500 @ A3

REVISION	DRAWING REFERENCE	SHEET
B	Y4205_S2	1 of 6

SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	05/12/22

DRAWN	DATE	APPROVED	DATE
JR	14/11/22	0695	05/12/22



Lot 3
DP 520521

Lot 3
DP 27841

Area AC

Area AD

390.0
234.0

25.2

39.7m

55.7

23.4m

Building
Platform
(30 x25)

Lot 1
DP 20430

Lot 3
4.9ha

385.0
380.0
375.0
370.0
365.0
360.0

Lot 1
15.5ha Gross
(14.6ha Net)

68.0

6m

365.0

Lot 1
DP 20430

Lot 2
DP 539982

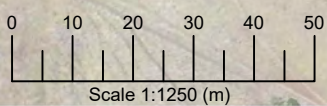
365.0 150.9 360.0 370.0

Area AB

370.0
365.0
360.0
355.0
350.0

56.2

184.4



NOTES:

- Boundary data has been sourced from DP 306317
- Abuttal data sourced from LINZ XML
- Aerial Imagery was flown by drone on the 09/06/22
- Contours

Major: 5.0m
Minor: 1.0m

Plan Revisions

REV	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22

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Drawing Title
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172 Burn Cottage Road, Cromwell

APPLICANT
Sam Hazledine

COMPRISED IN
RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

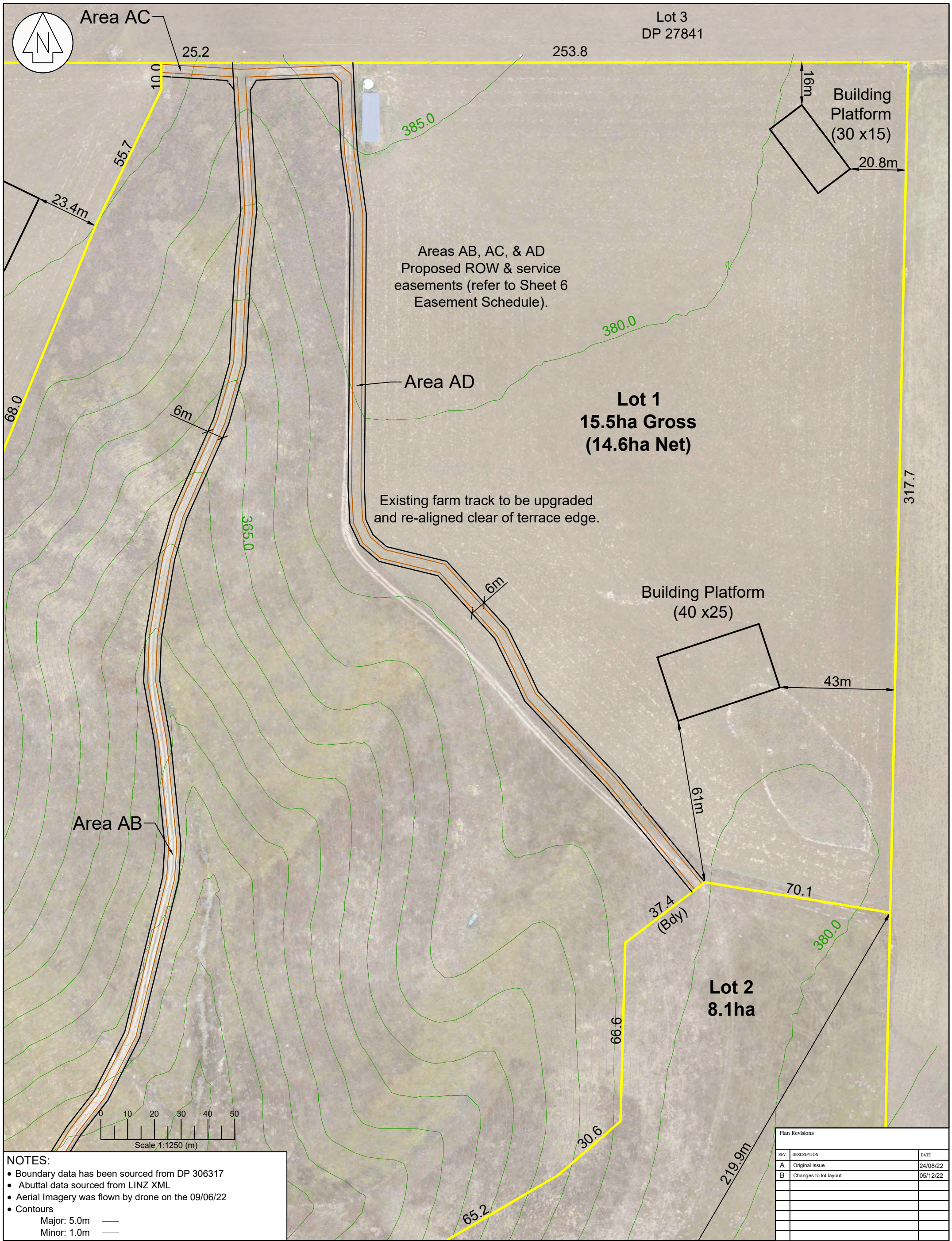
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05/12/22

SCALE
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**Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m**

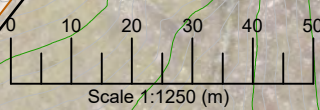
REVISION	DRAWING REFERENCE	SHEET
B	Y4205_S2	2 of 6

SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	05/12/22
DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	05/12/22



NOTES:

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Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

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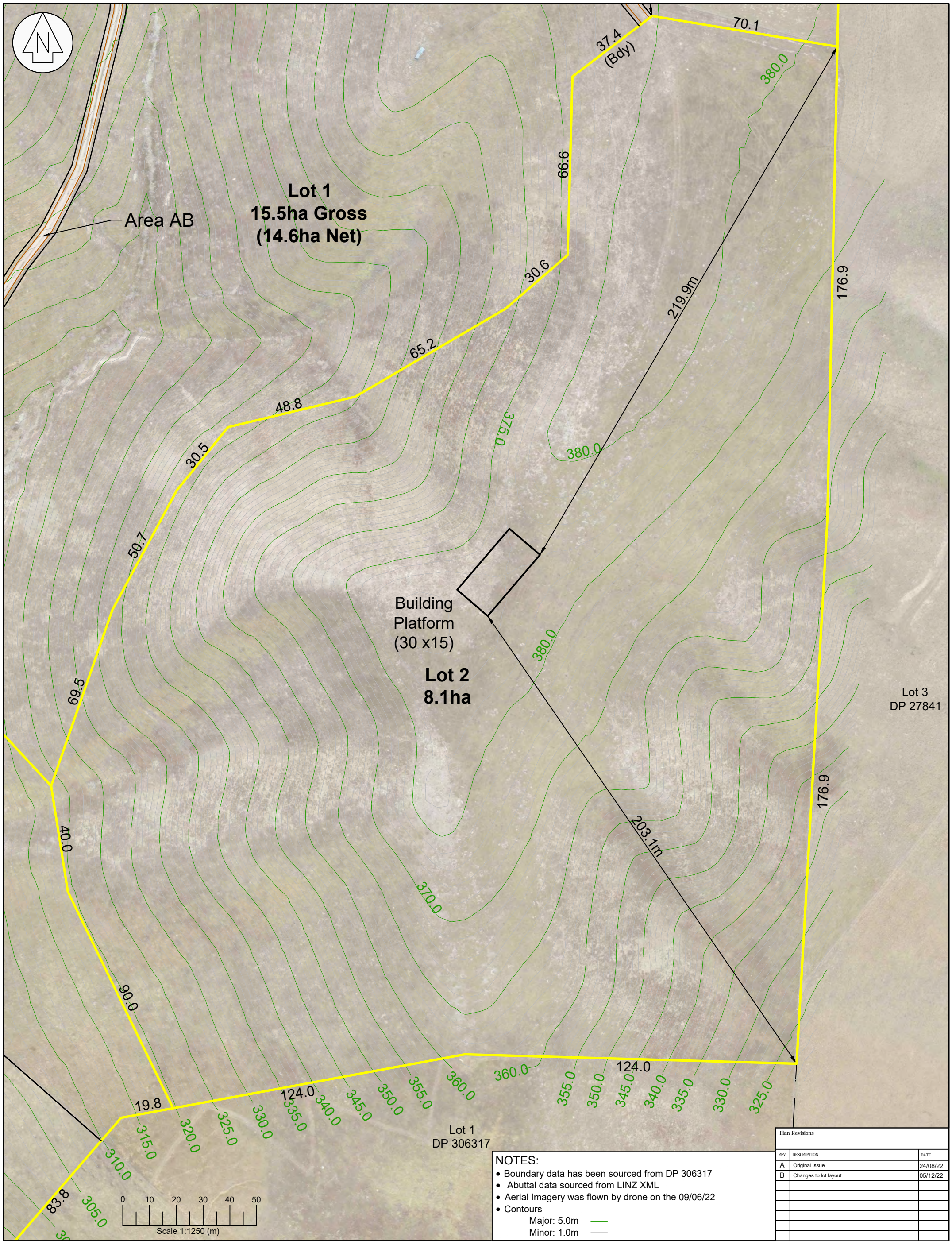
LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

DATE
05/12/22

REV	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22

SCALE			
1:1,250 @ A3			
DATUM & LEVEL			
Lindis Peak 2000 Levels in Terms of New Zealand Vertical Datum 2016 Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m			
REVISION	DRAWING REFERENCE	Sheet	
B	Y4205_S2	3 of 6	
SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	05/12/22
DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	05/12/22



Building Platform
(30 x 15)

Lot 1
15.5ha Gross
(14.6ha Net)

Lot 2
8.1ha

Lot 3
DP 27841

Lot 1
DP 306317

- NOTES:**
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 - Contours
 - Major: 5.0m
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REV	DESCRIPTION	DATE
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Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

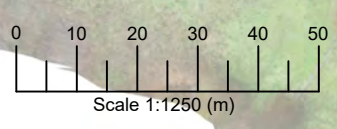
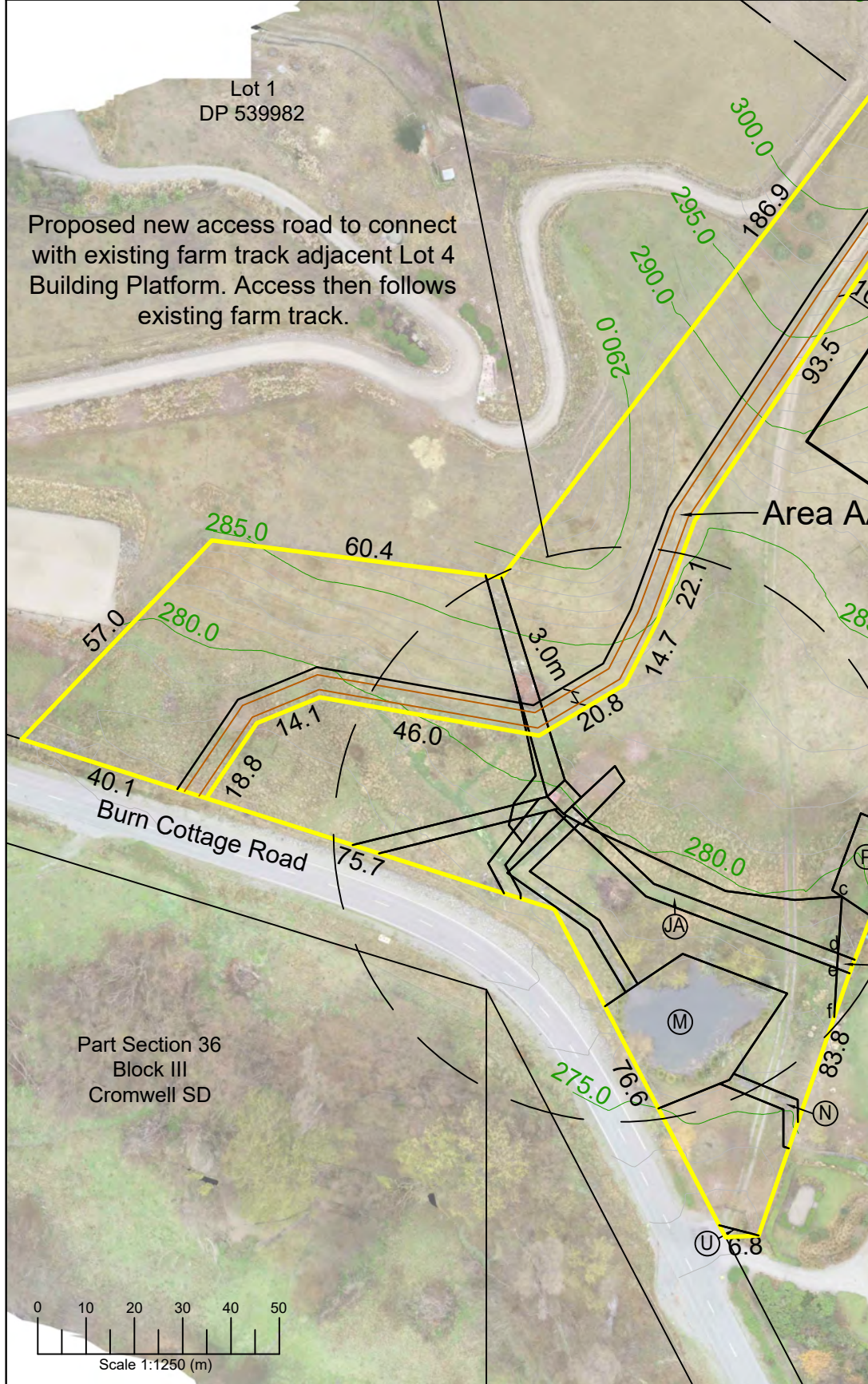
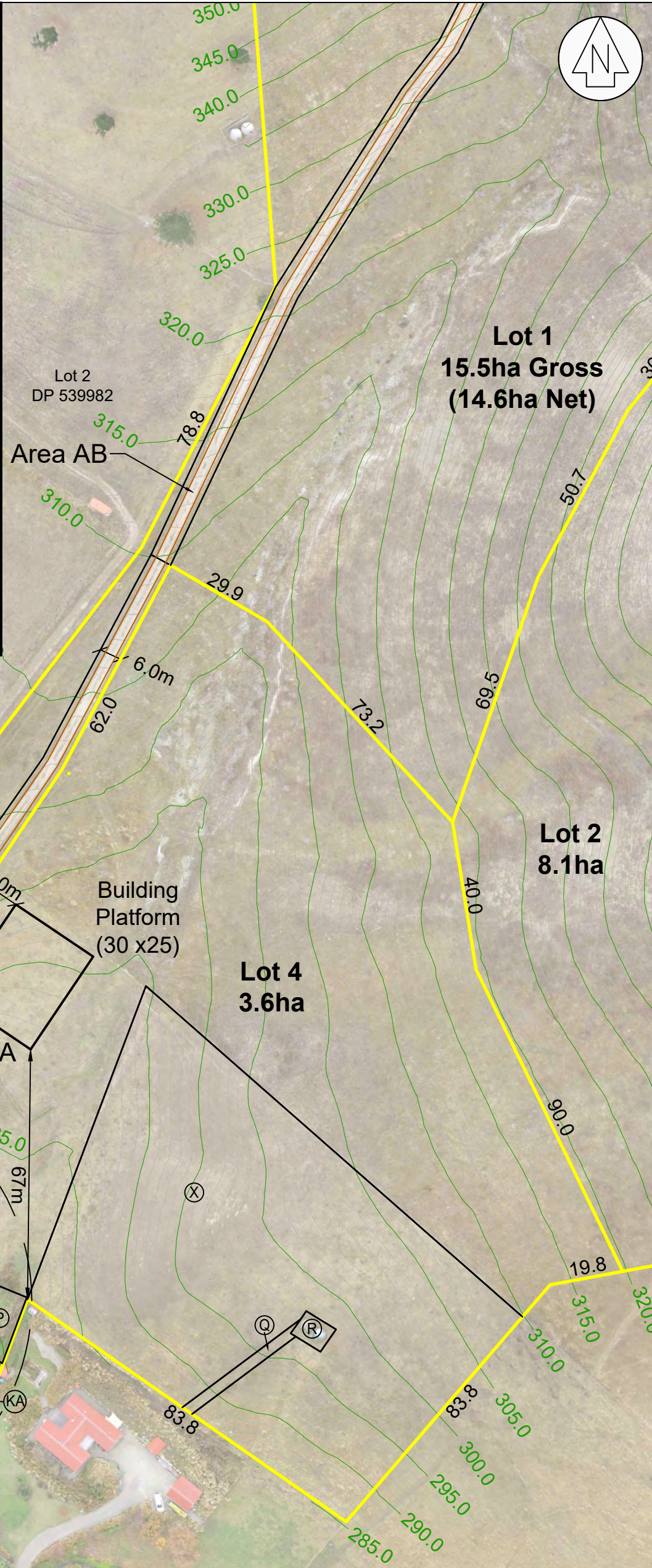
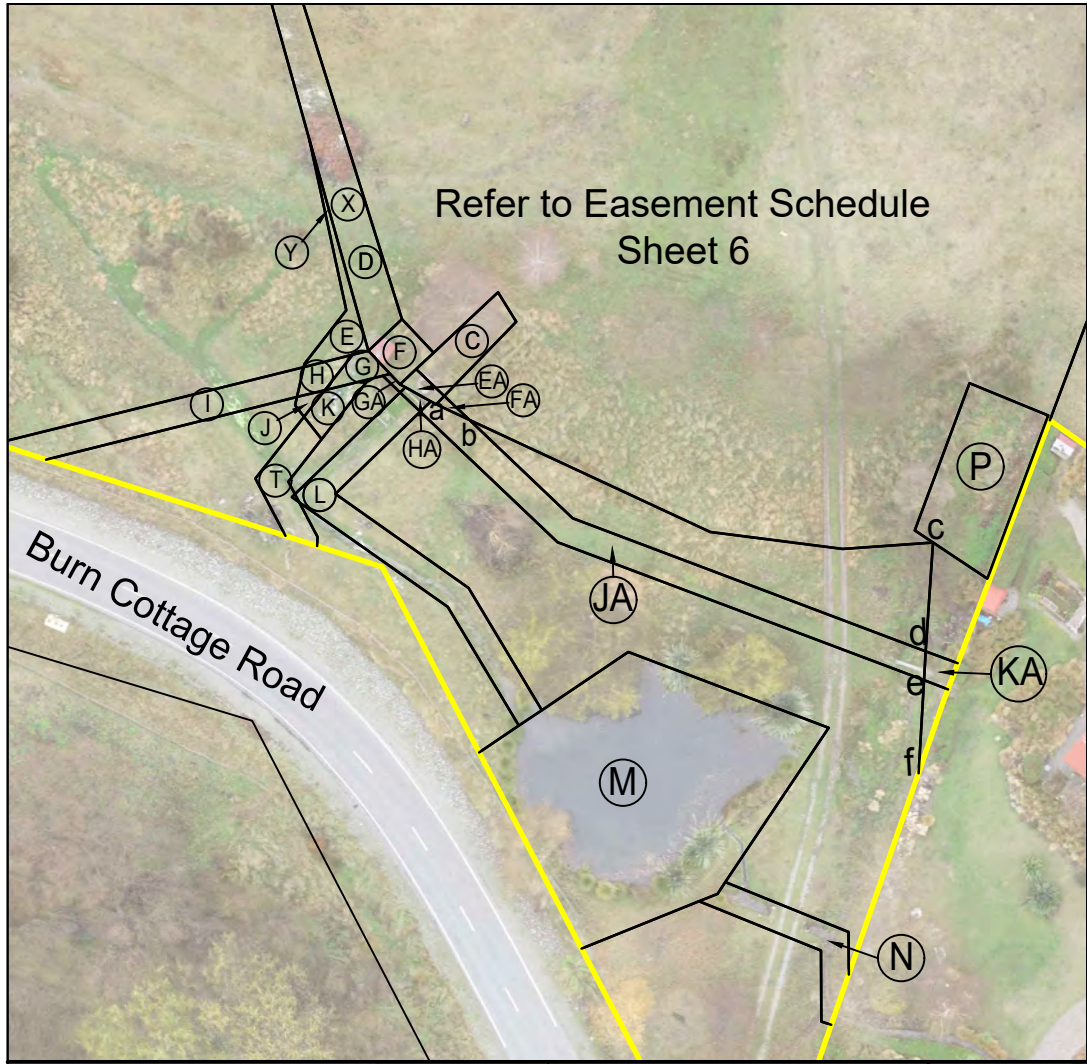
172 Burn Cottage Road, Cromwell

APPLICANT Sam Hazledine
COMPRISED IN RT 24795
TERRITORIAL AUTHORITY Central Otago District Council
LAND DISTRICT Otago
TOTAL AREA 32.0ha
DATE 05/12/22

SCALE 1:1,250 @ A3			
DATUM & LEVEL Lindis Peak 2000 Levels in Terms of New Zealand Vertical Datum 2016 Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m			
REVISION B	DRAWING REFERENCE Y4205_S2	Sheet 4 of 6	
SURVEYED JVB	DATE 09/06/22	CHECKED B.W.	DATE 05/12/22
DRAWN JR	DATE 24/08/22	APPROVED B.W.	DATE 05/12/22



Refer to Easement Schedule Sheet 6



NOTES:
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• Aerial Imagery was flown by drone on the 09/06/22
• Contours
Major: 5.0m
Minor: 1.0m

REV	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22

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Drawing Title
Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

APPLICANT
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RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

DATE
05/12/22

SCALE
1:1,250 @ A3

DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION	DRAWING REFERENCE	SHEET
B	Y4205_S2	5 of 6

SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	05/12/22

DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	05/12/22



EASEMENT SCHEDULE

Schedule of Proposed Easements			
Purpose	Shown	Servient Tenement (Burdened Land)	Dominant Tenement (Benefited Land)
Right of Way, Right to convey water & electricity	AA	Lot 1 Hereon	Lot 2, 3 Hereon
	AB	Lot 1 Hereon	Lot 2, 3 Hereon
	AC	Lot 1 Hereon	Lot 3 Hereon
	AD	Lot 1 Hereon	Lot 2, 3 Hereon

Schedule of Existing Easements			
Purpose	Shown	Servient Tenement (Burdened Land)	Creating Document
Right to convey water	E, G, H, J, K	Lot 4 Hereon	EI 11579049.7
	EA, FA, GA, HA, JA, KA, L, N, Q, F	Lot 4 Hereon	EC 5280259.3
	HA, L, N, a-b-c-d-e-f	Lot 4 Hereon	T 5010357.2
	D	Lot 4 Hereon	EC 5116837.2
Right to take water	C, EA, P	Lot 4 Hereon	T 5010357.2
	C, EA	Lot 4 Hereon	EC 5116837.2
	C, EA	Lot 4 Hereon	EC 5280259.3
Right to store water	M	Lot 4 Hereon	T 5010357.2
	M, R	Lot 4 Hereon	EC 5280259.3
Right to pump water	F	Lot 4 Hereon	EC 5280259.3
Right to pump water and a transformer site	F	Lot 4 Hereon	EC 5116837.2
Right to convey electricity	F	Lot 4 Hereon	EI 11579049.7
	EA, FA, GA, HA, JA, KA, F	Lot 4 Hereon	EC 5280259.3
	D, G, H, I	Lot 4 Hereon	EC 5116837.2
Right of Way	U	Lot 4 Hereon	EC 5280259.3

Schedule of Existing Easements in Gross				
Purpose	Shown	Servient Tenement (Burdened Land)	Grantee	Creating Document
Right to convey water	D, F, G, K, T	Lot 4 Hereon	Briar Ridge Management	EI 11579049.8
Right to convey electricity	D, E, G, H, I	Lot 4 Hereon	Aurora Energy Limited	EI 11579049.9
	F, G, H, I	Lot 4 Hereon	Dunedin Electricity Limited	T 5116837.3
Right to establish & maintain an electricity transformer	F	Lot 4 Hereon	Dunedin Electricity Limited	T 5116837.3

Table of Existing Covenants			
Purpose	Shown	Servient Tenement (Burdened Land)	Creating Document
No structure will be built or placed	Q, R, X	Lot 4 Hereon	T 5280259.5
No structure will be built or placed	Q, R, X	Lot 4 Hereon	T 5116837.4

REV	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22

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Prepared for
Resource Consent

Drawing Title
Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

APPLICANT
Sam Hazledine

COMPRISED IN
RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

DATE
05/12/22

SCALE
Not To Scale

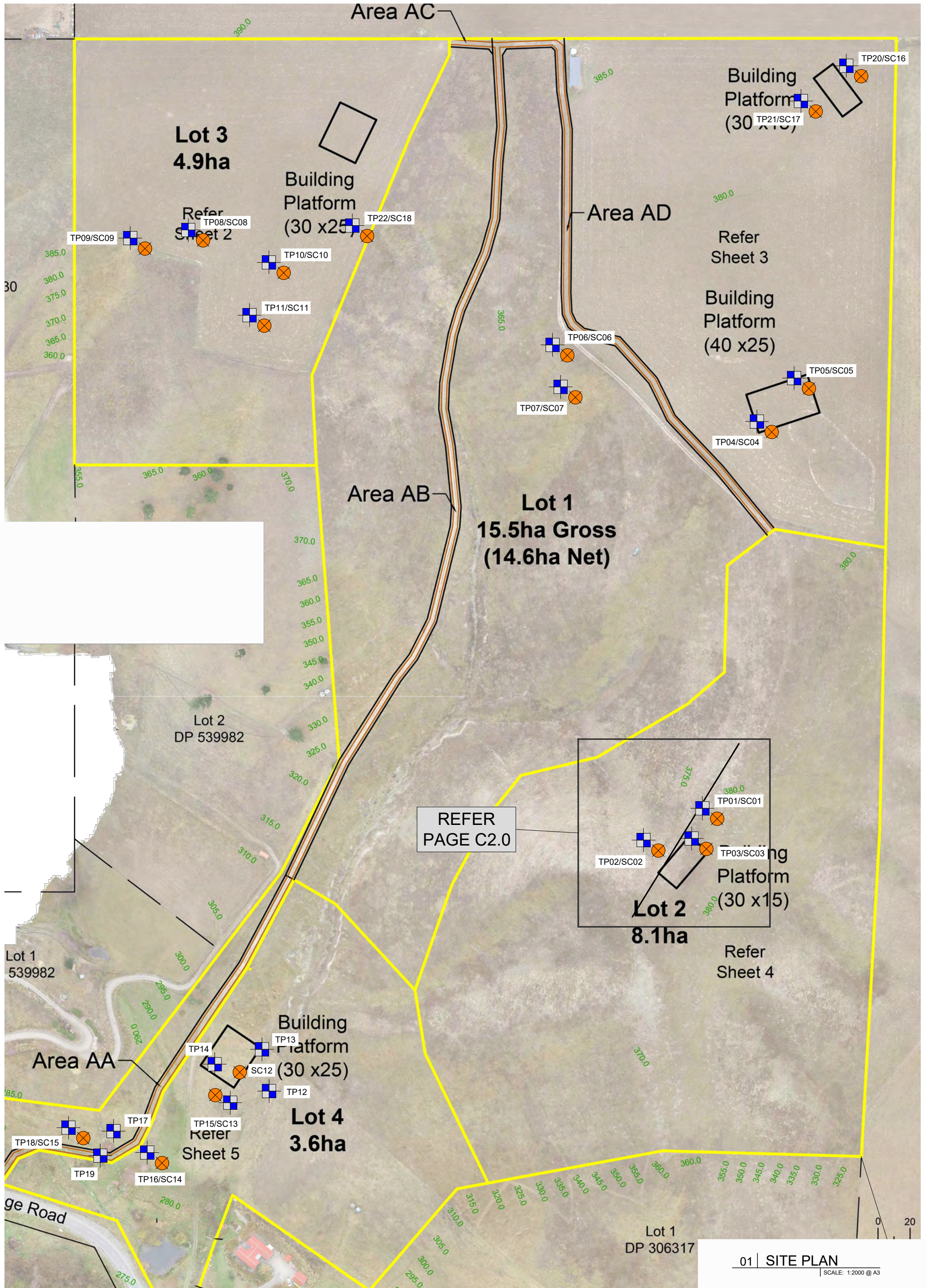
DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION	DRAWING REFERENCE	SHEET
A	Y4205_S2	6 of 6

SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	05/12/22

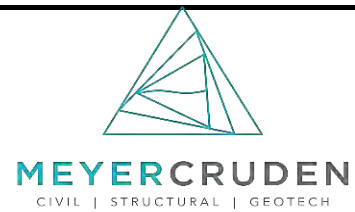
DRAWN	DATE	APPROVED	DATE
JR	15/06/22	B.W.	05/12/22

APPENDIX B – SITE INVESTIGATION PLAN AND TEST RESULTS



01 | SITE PLAN
SCALE: 1:2000 @ A3

Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP1
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil	☀ ☀ ☀ ☀	ORGANIC SOIL
0.1		☀ ☀ ☀	
0.2	Outwash Gravels		Cobbly fine-coarse GRAVEL with some sand; Brown; bedded. Loosely packed; moist; sub-rounded, slightly weathered.
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP2
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2			
0.3	Outwash Sands		Gravelly fine-coarse SAND; Brown; bedded. Medium dense; moist; sub-rounded, slightly weathered. Gravel is fine-medium.
0.4			
0.5			
0.6	Outwash Gravels		Cobbly fine-coarse GRAVEL with some sand; Brown; bedded. Loosely packed; moist; sub-rounded, slightly weathered.
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP3
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2			
0.3	Outwash Gravels		fine-coarse GRAVEL with some silt, sand and cobbles; Brown; bedded. Tightly packed; moist; sub-angular to sub-rounded.
0.4			
0.5			
0.6	Outwash Sands		fine-coarse SAND with minor gravel; Brown; bedded. Medium dense; moist; sub-rounded.
0.7			
0.8			
0.9			
1	Outwash Gravels		Cobbly fine-coarse GRAVEL with some sand; Brown; bedded. Loosely packed; moist; sub-rounded, slightly weathered. Calcification present.
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

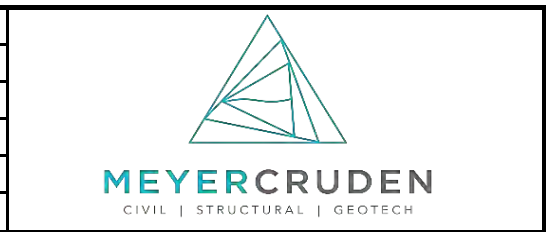
Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP4
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2	Outwash Gravels		Cobbly fine-coarse GRAVEL with some sand; Brown; bedded. Loosely packed; dry; sub-rounded, slightly weathered. Trace boulders
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
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2.6			
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2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

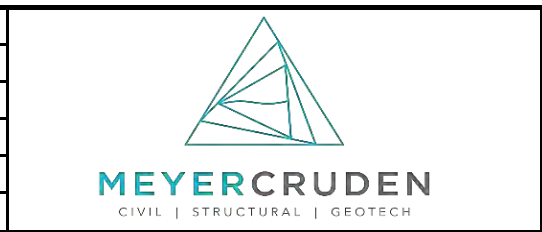
Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP5
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2			
0.3	Outwash Gravels		Silty GRAVEL with some sand and cobbles; Brown; bedded. Tightly packed; moist; sub-angular to sub-rounded.
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

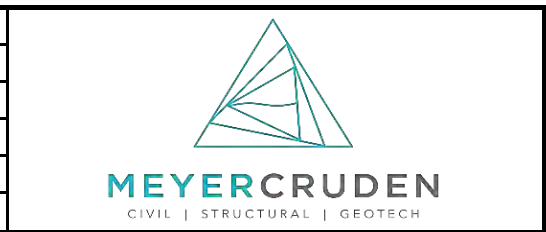
Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP6
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2			
0.3	Outwash Sands		Gravelly medium-coarse SAND with minor cobbles; Brown; bedded. Medium dense; moist; sub-rounded. Gravel is fine-coarse.
0.4			
0.5			
0.6	Outwash Gravels		Cobbly fine-coarse GRAVEL with minor sand and boulders; Brown; bedded. Loosely packed; dry; sub-rounded, slightly weathered.
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

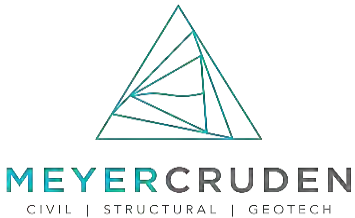
Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

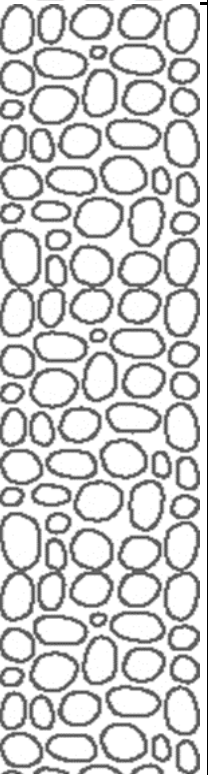
Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP7
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2			
0.3	Outwash Gravels		Sandy fine-coarse GRAVEL with minor cobbles; Brown; bedded. Loosely packed; moist; sub-rounded, slightly weathered. Sand is medium-coarse.
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

Date:	9/08/2022	
Project Number:	2022153	
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment	
Address:	172 Burn Cottage Road, Cromwell	
Test Number:	TP8	
Completed by:	ODS	

Depth	Geology	Graphic	Material Description
0	Topsoil	☀ ☀ ☀ ☀	ORGANIC SOIL
0.1		☀ ☀ ☀	
0.2	Outwash Gravels		Cobbly GRAVEL with minor sand and boulders; Brown; bedded. Loosely packed; moist; sub-angular to sub-rounded, slightly weathered.
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

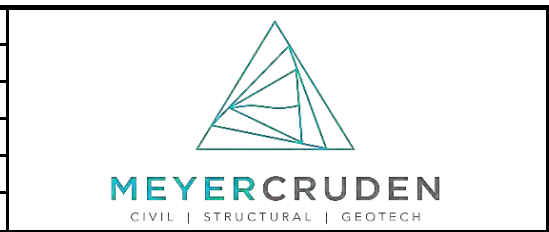
Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP9
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2			
0.3	Outwash Gravels		fine-coarse GRAVEL with minor sand and cobbles; Brown; bedded. Loosely packed; moist; sub-rounded, slightly weathered.
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

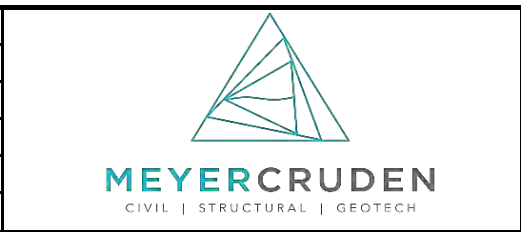
Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP10
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2	Outwash Sands		fine-coarse SAND with some gravel; Brown; bedded. Dense; moist; sub-rounded, slightly weathered.
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2	Outwash Gravels		Cobbly GRAVEL with minor sand and boulders; Brown; bedded. Loosely packed; moist; sub-rounded.
2.1	Gravels		
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

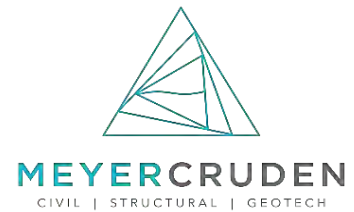
Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP11
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2	Outwash Gravels		Sandy fine-coarse GRAVEL with minor cobbles; Brown; bedded. Loosely packed; moist; sub-rounded, slightly weathered. Sand is medium-coarse.
0.3			
0.4			
0.5			
0.6			
0.7			Cobbly GRAVEL with minor sand and boulders; Brown; bedded. Loosely packed; moist; sub-angular to sub-rounded, slightly weathered.
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

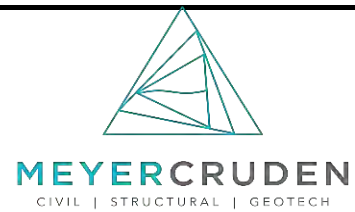
Date:	9/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road Geotech & Civil Assessment
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP12
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL - 50mm thick
0.1	Outwash Gravels		Cobbly GRAVEL with some sand; Brown; bedded. Tightly packed; moist; sub-rounded, slightly weathered.
0.2			
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3	Outwash		BOULDERS. UTP
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

Date:	10/08/2022
Project Number:	2022153
Project Name:	Geotech Assessment - 172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP13
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil	☀ ☀ ☀ ☀	ORGANIC SOIL
0.1	Alluvium	✕ ✕ ✕ ✕	SILT with minor sand and gravel; Brown; Stiff; moist.
0.2	Outwash Gravels		Cobbly GRAVEL with some sand and boulders; Brown; bedded. Tightly packed; moist; sub-rounded, slightly weathered.
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

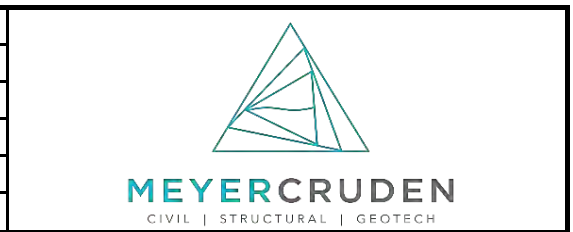
Date:	10/08/2022
Project Number:	2022153
Project Name:	Geotech Assessment - 172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP14
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2			
0.3	Alluvium		SILT with some sand and gravel; Brown; Firm; moist; low plasticity. Trace clay
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1	Alluvium		Silty COBBLES with some sand and gravel; Brown; bedded. Tightly packed; moist; sub-rounded, slightly weathered.
1.1			
1.2			
1.3			
1.4	Outwash Sands		fine SAND with trace of gravel; Brown; bedded. Medium dense; dry.
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

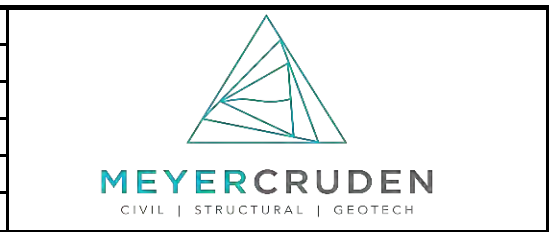
Date:	10/08/2022
Project Number:	2022153
Project Name:	Geotech Assessment - 172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP15
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2	Fill or Alluvium		SILT; Brown mottled; Stiff; moist.
0.3			
0.4			
0.5	Outwash Gravels		Cobbly GRAVEL with some sand and boulders; Brown; bedded. Tightly packed; moist; sub-rounded, slightly weathered.
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

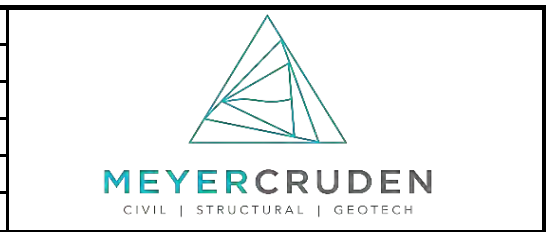
Date:	10/08/2022
Project Number:	2022153
Project Name:	Geotech Assessment - 172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP16
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2	Recent Alluvium		GRAVEL with some sand; Brown; Tightly packed; dry; sub-rounded, slightly weathered.
0.3			
0.4	Buried Topsoil		ORGANIC SOIL; Dark brown.
0.5			
0.6	Alluvium		SILT with trace of clay and sand; Brown; Very stiff; moist.
0.7			
0.8			
0.9			
1			
1.1			
1.2	Alluvium		Silty fine-coarse GRAVEL with trace of sand and cobbles; Brown; bedded. Loosely packed; moist; sub-rounded.
1.3			
1.4			
1.5			
1.6			
1.7	Outwash Sands		Silty fine SAND with trace of gravel; Brown; bedded. Medium dense; moist.
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
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3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

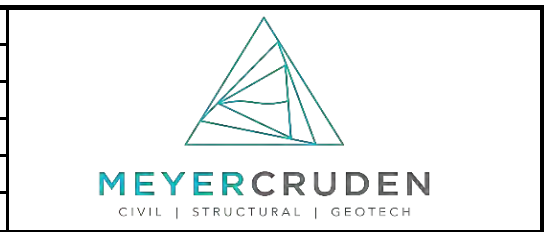
Date:	10/08/2022
Project Number:	2022153
Project Name:	Geotech Assessment - 172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP17
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2	Alluvium		SILT with some sand; Brown; Firm; wet; Dilatant
0.3			
0.4			
0.5			
0.6			
0.7	Alluvium		Silty GRAVEL; Brown; Loose; saturated; sub-angular to sub-rounded, slightly weathered. Perched water present within layer
0.8			
0.9	Outwash Sands		fine SAND with some silt and trace of gravel; Brown; bedded. Medium dense; moist.
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
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3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

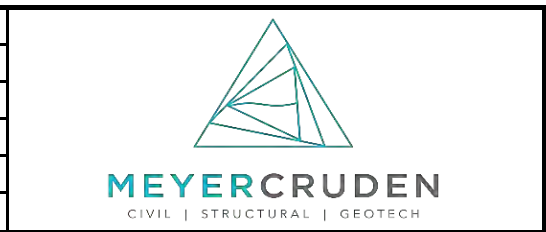
Date:	10/08/2022
Project Number:	2022153
Project Name:	Geotech Assessment - 172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP18
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil	☀ ☀ ☀ ☀	ORGANIC SOIL
0.1		☀ ☀ ☀	
0.2	Alluvium	× × × ×	SILT with some sand; Brown; Firm; wet; Dilatant
0.3		× × ×	
0.4		× × × ×	
0.5		× × ×	
0.6		× × × ×	
0.7		× × ×	
0.8		× × × ×	
0.9	Alluvium	× × ×	Silty GRAVEL with minor sand and cobbles; Grey Brown; bedded; wet; sub-angular to sub-rounded.
1		× × × ×	
1.1		× × ×	
1.2		× × × ×	
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
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3			
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3.3			
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3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

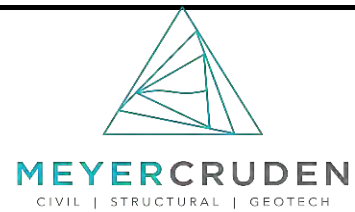
Date:	10/08/2022
Project Number:	2022153
Project Name:	Geotech Assessment - 172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP19
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil	☀ ☀ ☀ ☀	ORGANIC SOIL
0.1		☀ ☀ ☀	
0.2	Alluvium	× × × ×	SILT with some sand; Brown; Firm; wet; Dilatant
0.3		× × ×	
0.4		× × × ×	
0.5		× × ×	
0.6		× × × ×	
0.7		× × ×	
0.8		× × × ×	
0.9		× × ×	
1	Outwash Gravels		Cobbly GRAVEL with minor silt and sand; Brown; bedded. Loosely packed; moist; sub-rounded, slightly weathered. Groundwater @ 1.9m
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

Date:	29/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP20
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil	☐ ☐ ☐ ☐	ORGANIC SOIL
0.1		☐ ☐ ☐	
0.2	Outwash Gravels		Silty GRAVEL with some sand and cobbles; brown; bedded. Tightly packed; moist; sub-angular to sub-rounded.
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

Date:	29/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP21
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SILT
0.1			
0.2	Outwash Gravels		Silty GRAVEL with some sand and cobbles; brown; bedded. Tightly packed; moist; sub-angular to sub-rounded.
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			Cobbly fine-coarse GRAVEL with some sand; brown; bedded. Loosely packed; dry; sub-rounded, slightly weathered. Trace boulders.
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

Date:	29/08/2022
Project Number:	2022153
Project Name:	172 Burn Cottage Road
Address:	172 Burn Cottage Road, Cromwell
Test Number:	TP22
Completed by:	ODS



Depth	Geology	Graphic	Material Description
0	Topsoil		ORGANIC SOIL
0.1			
0.2	Outwash Gravels		GRAVEL with some sand and cobbles; brown; bedded; dry-moist; sub-rounded; slightly weathered.
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

Note: Described in accordance with 'Field Description of Soil and Rock' prepared by NZGS inc., Dec 2005

Project Name: 172 Burn Cottage Road Geotech & Civil Assessment

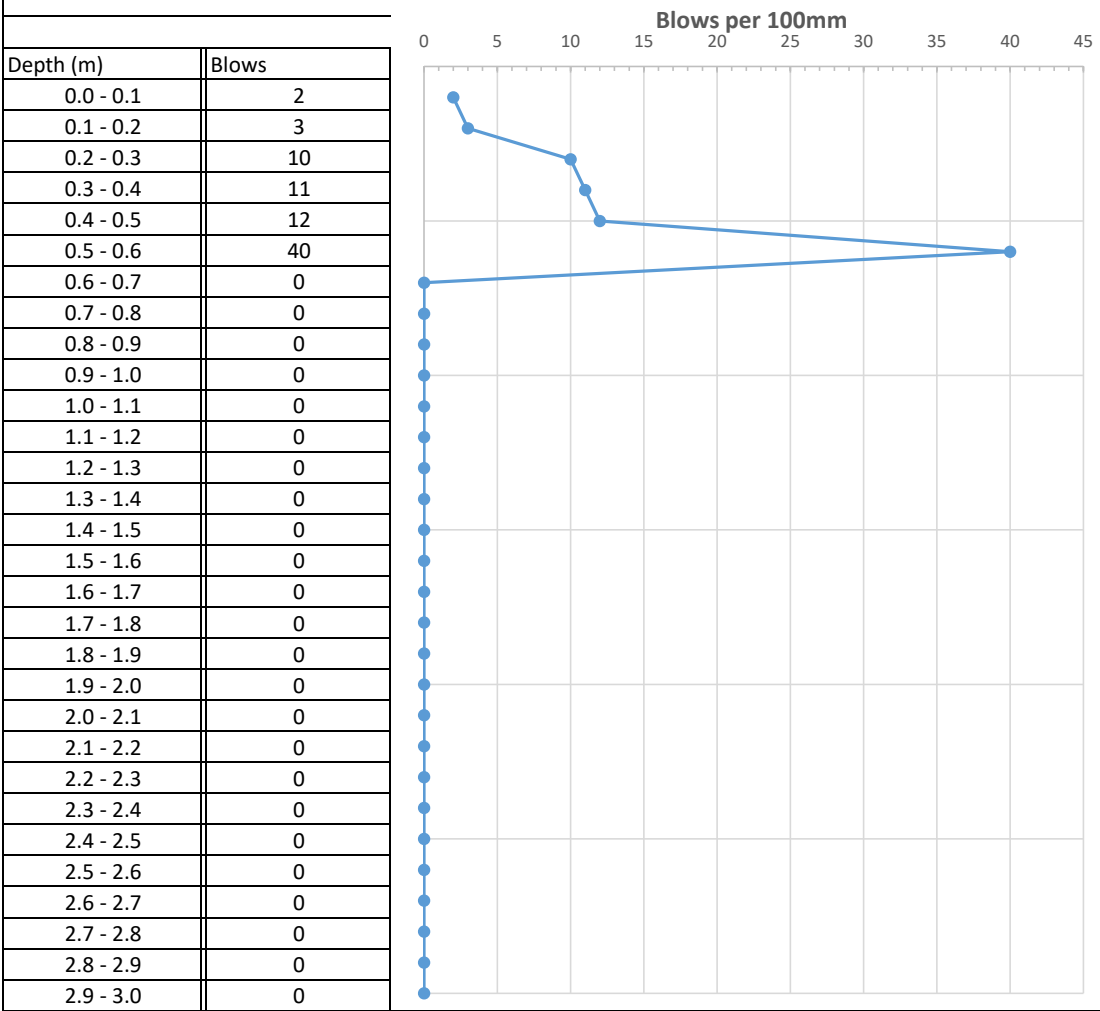
Project Number: 2022153

Date: 9/08/2022



Scala Reference: 1

GPS Location: -45.0122963,169.1893403



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment

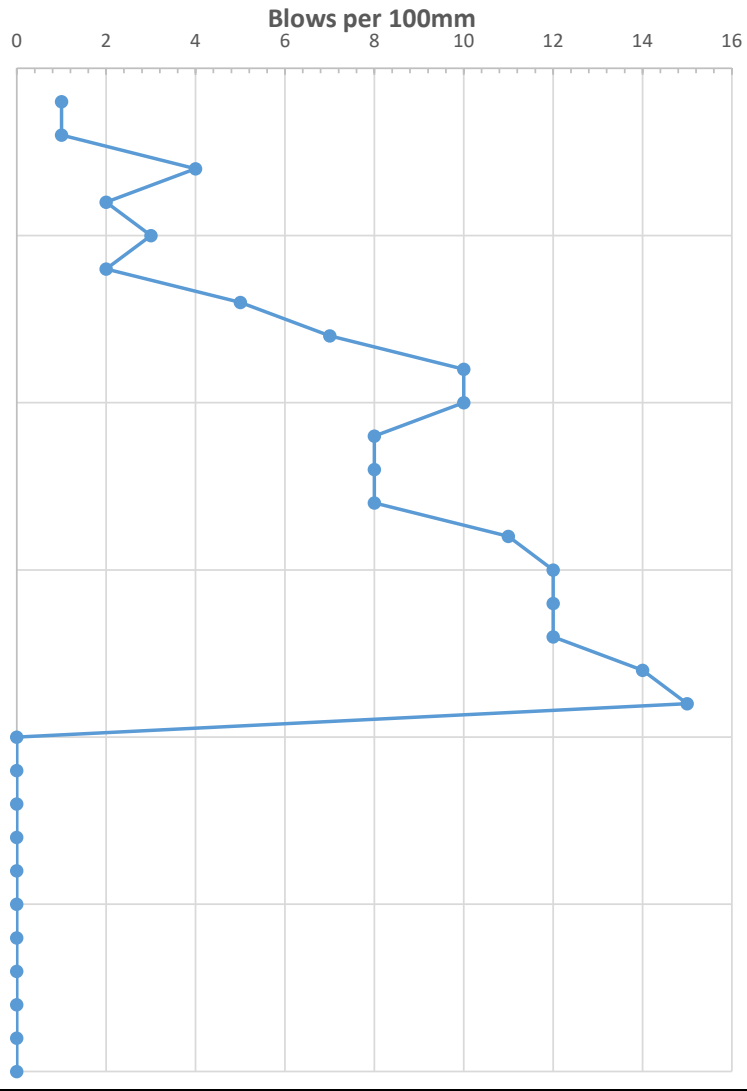
Project Number: 2022153

Date: 9/08/2022



Scala Reference: 2 GPS Location: -45.0122901,169.1893432

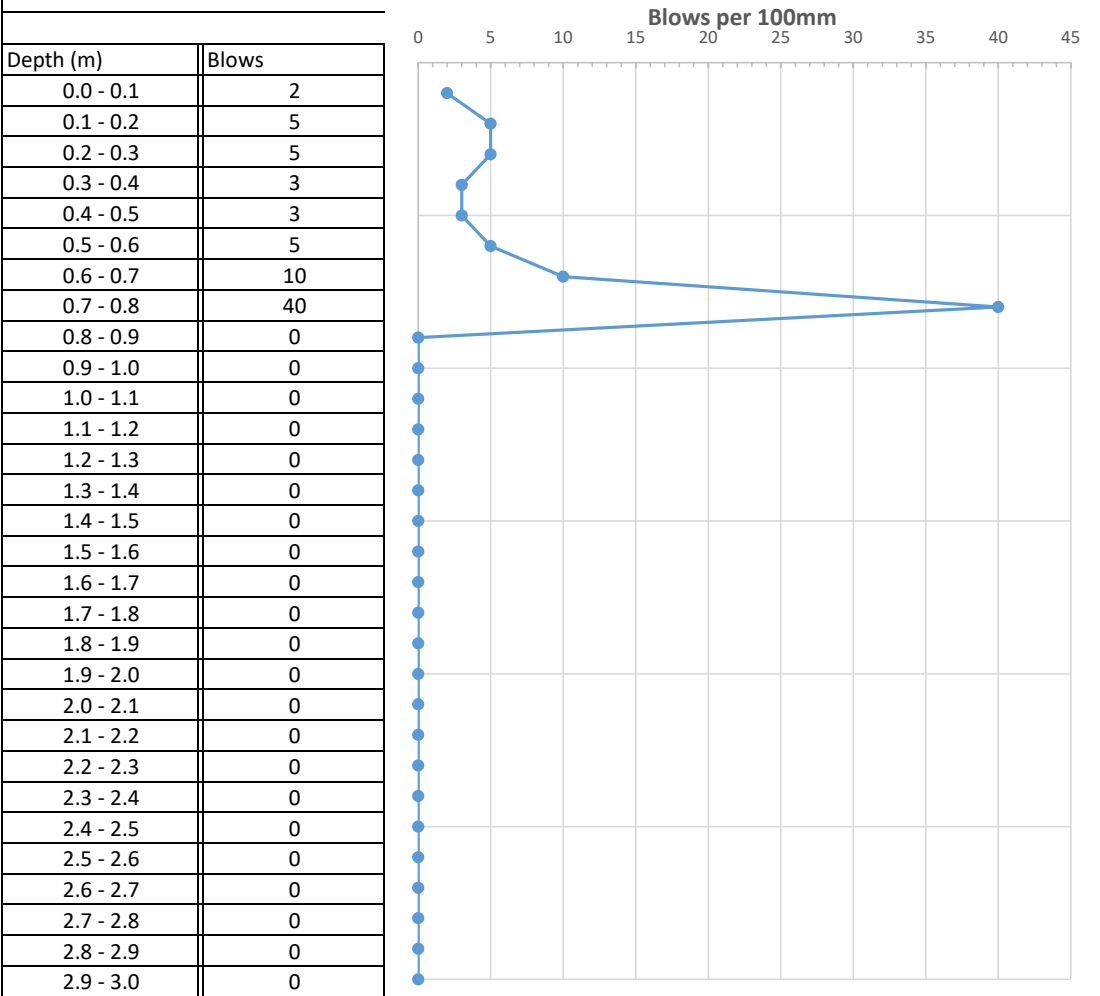
Depth (m)	Blows
0.0 - 0.1	1
0.1 - 0.2	1
0.2 - 0.3	4
0.3 - 0.4	2
0.4 - 0.5	3
0.5 - 0.6	2
0.6 - 0.7	5
0.7 - 0.8	7
0.8 - 0.9	10
0.9 - 1.0	10
1.0 - 1.1	8
1.1 - 1.2	8
1.2 - 1.3	8
1.3 - 1.4	11
1.4 - 1.5	12
1.5 - 1.6	12
1.6 - 1.7	12
1.7 - 1.8	14
1.8 - 1.9	15
1.9 - 2.0	0
2.0 - 2.1	0
2.1 - 2.2	0
2.2 - 2.3	0
2.3 - 2.4	0
2.4 - 2.5	0
2.5 - 2.6	0
2.6 - 2.7	0
2.7 - 2.8	0
2.8 - 2.9	0
2.9 - 3.0	0



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



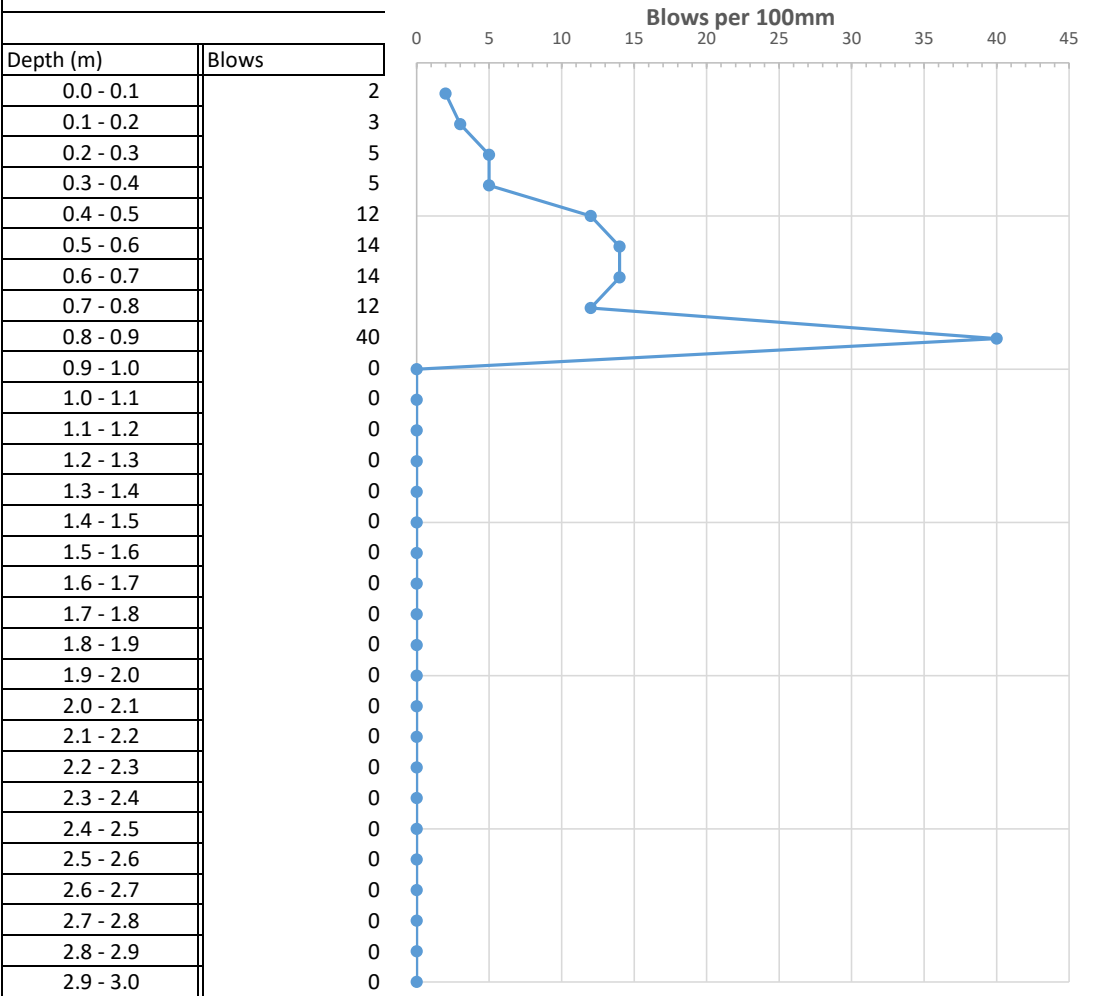
Scala Reference: 3 **GPS Location:** 0



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



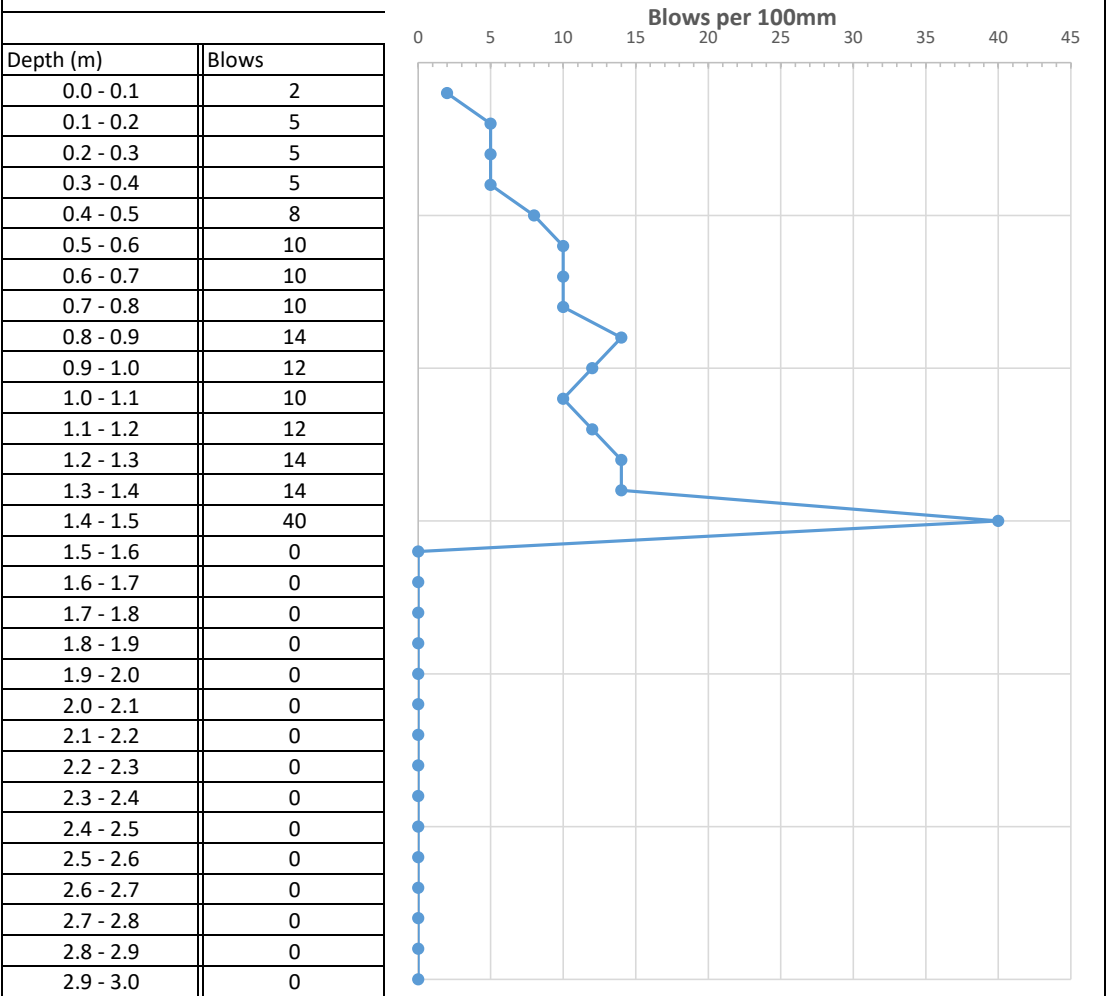
Scala Reference: 4 **GPS Location:** 0



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



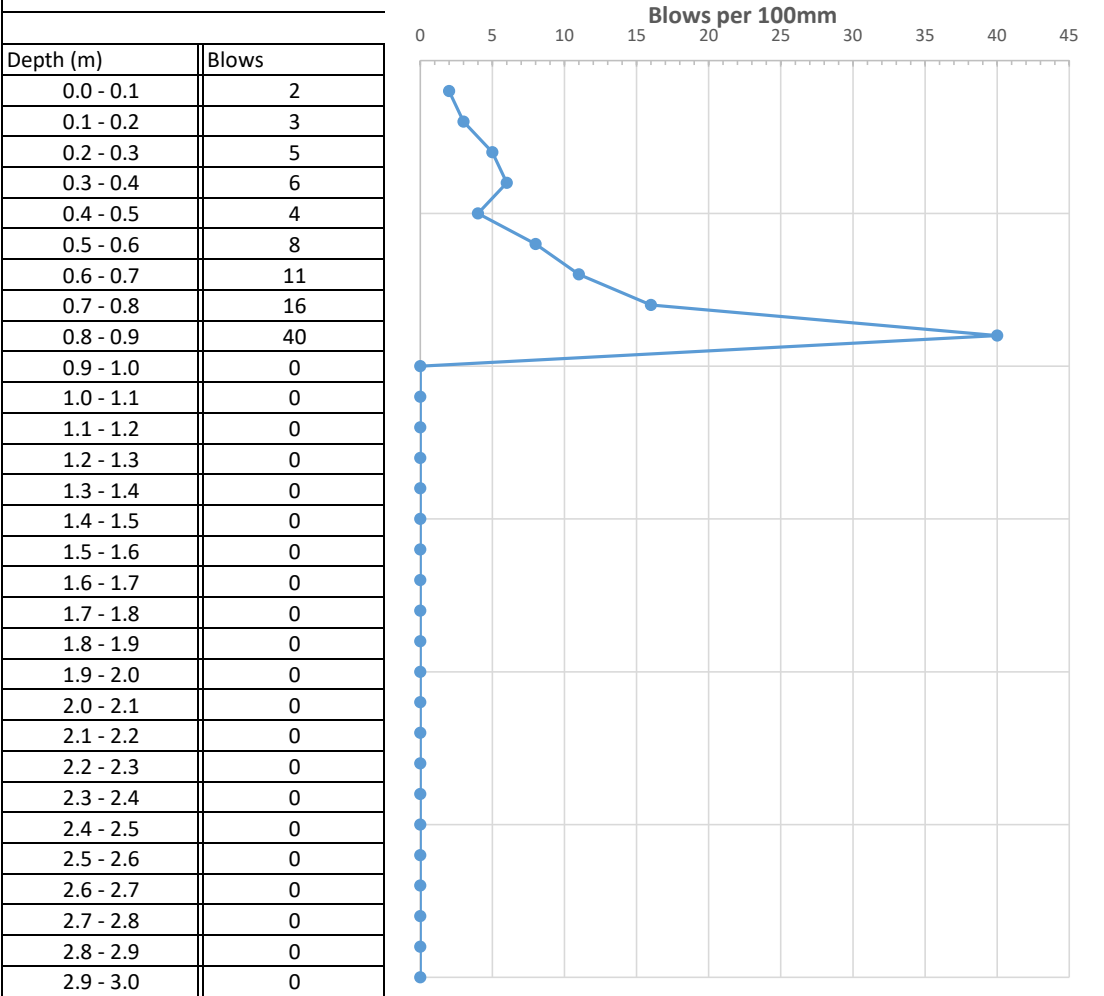
Scala Reference: 5 **GPS Location:** 0



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



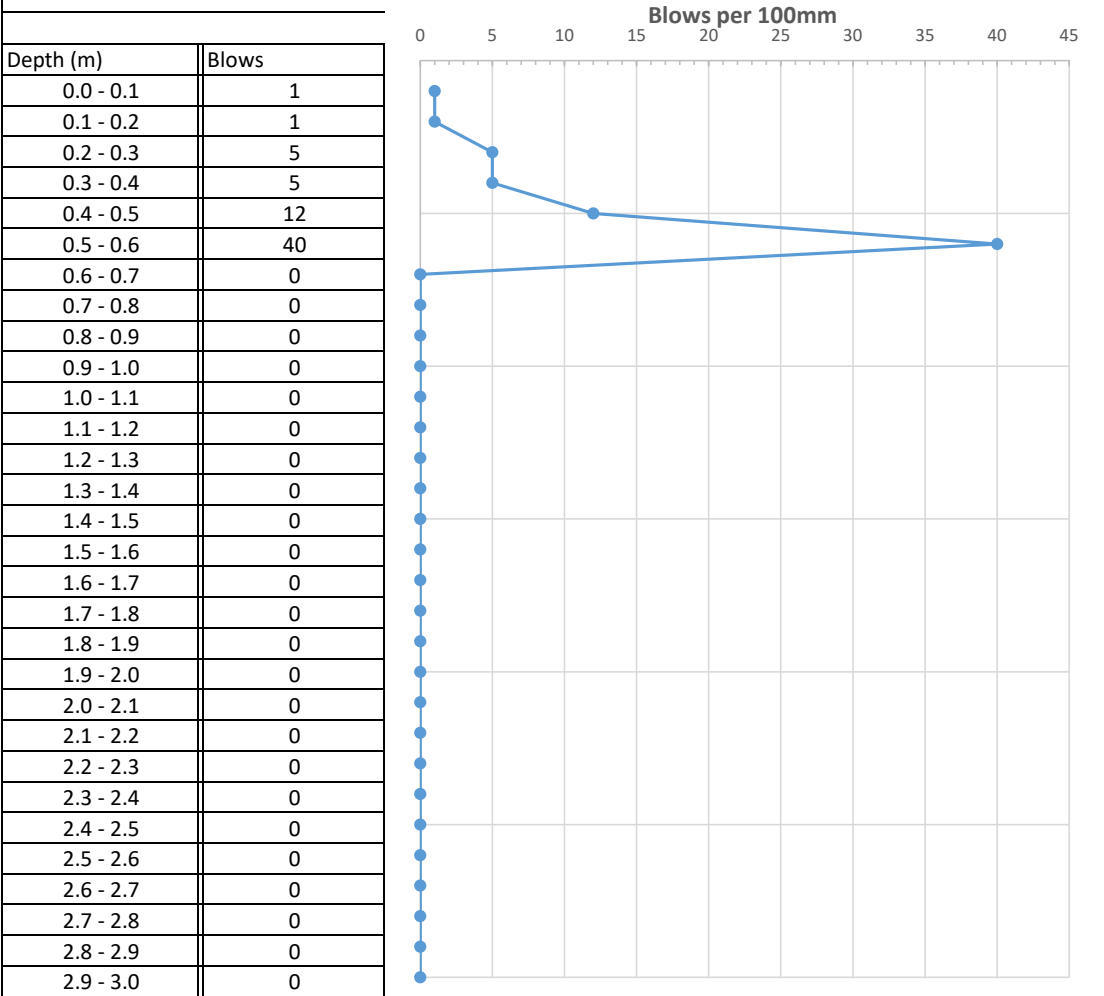
Scala Reference: 6 **GPS Location:** 0



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



Scala Reference: 7 **GPS Location:** -45.009448,169.1882942



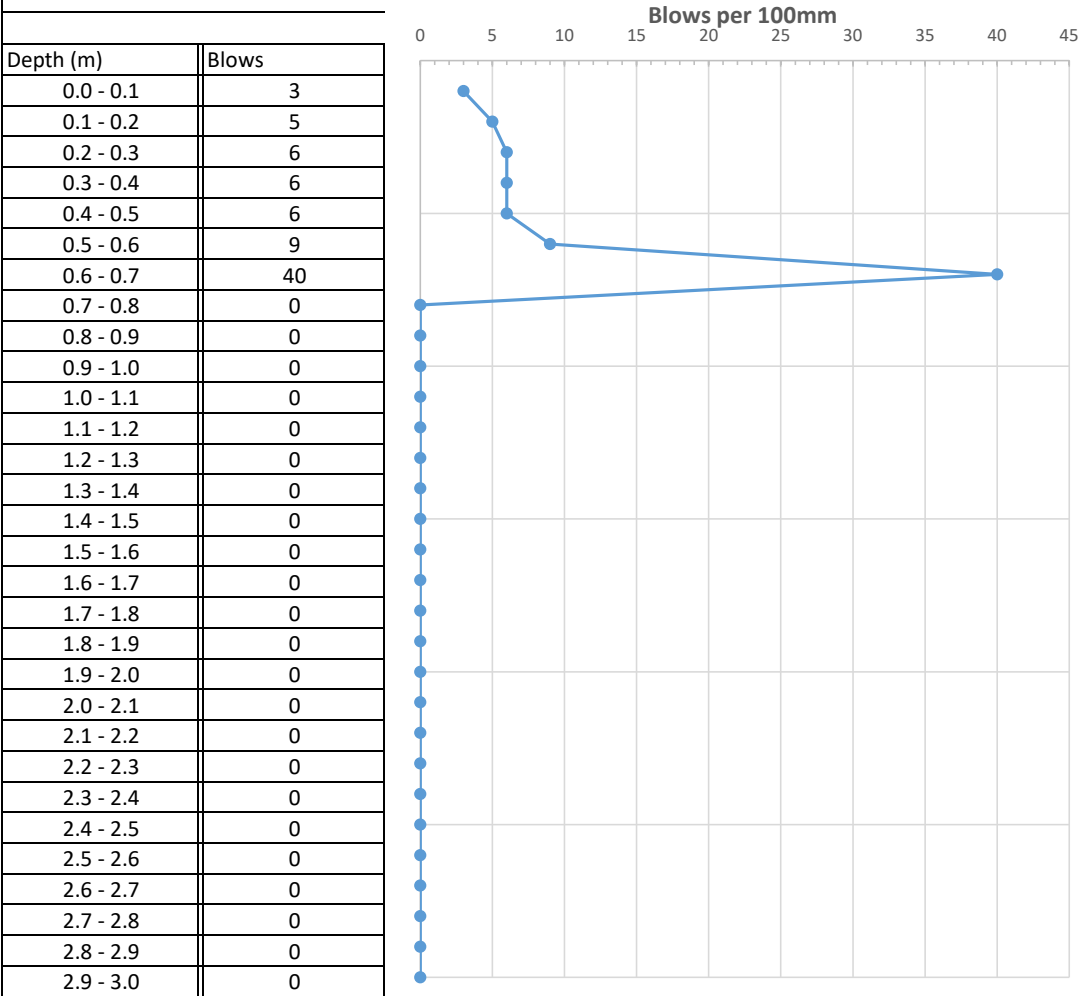
Project Name: 172 Burn Cottage Road Geotech & Civil Assessment

Project Number: 2022153

Date: 9/08/2022



Scala Reference: 8 **GPS Location:** 0



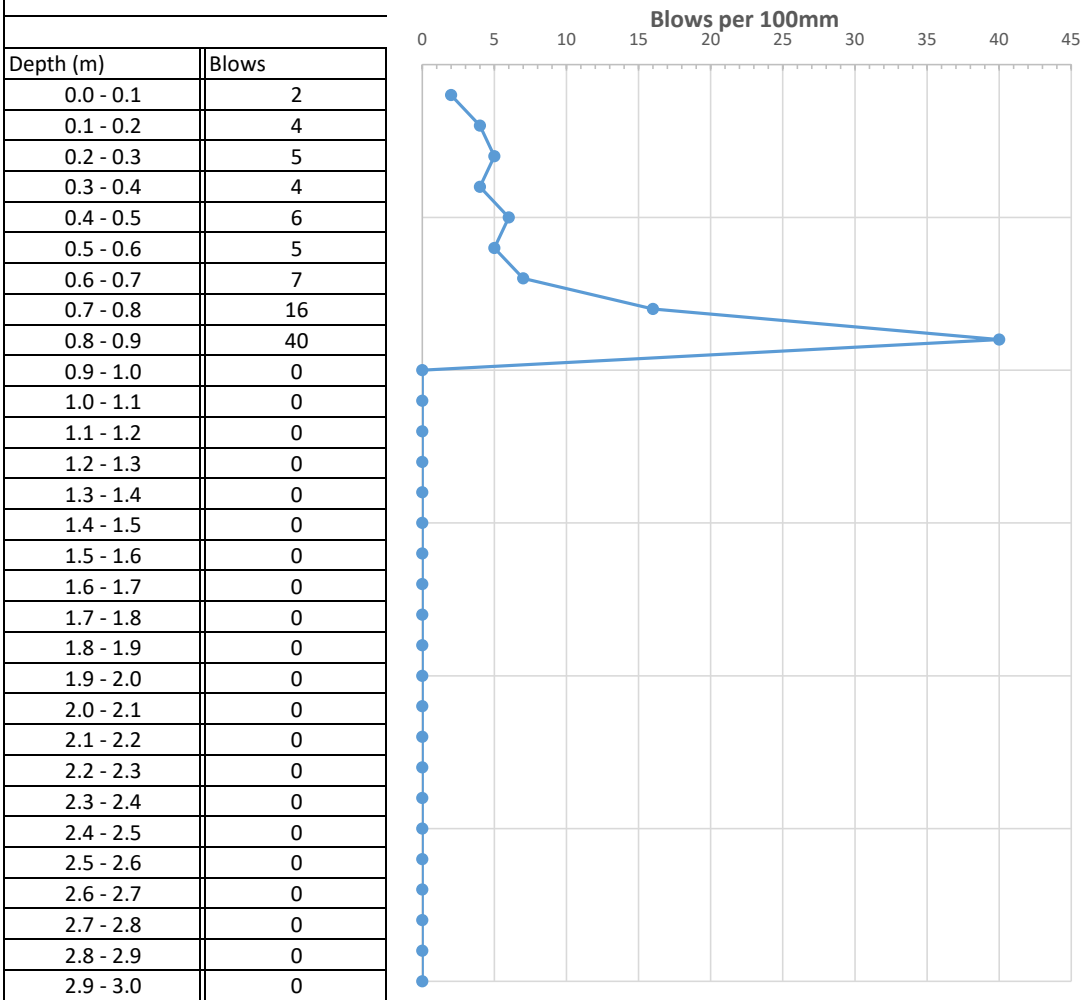
Project Name: 172 Burn Cottage Road Geotech & Civil Assessment

Project Number: 2022153

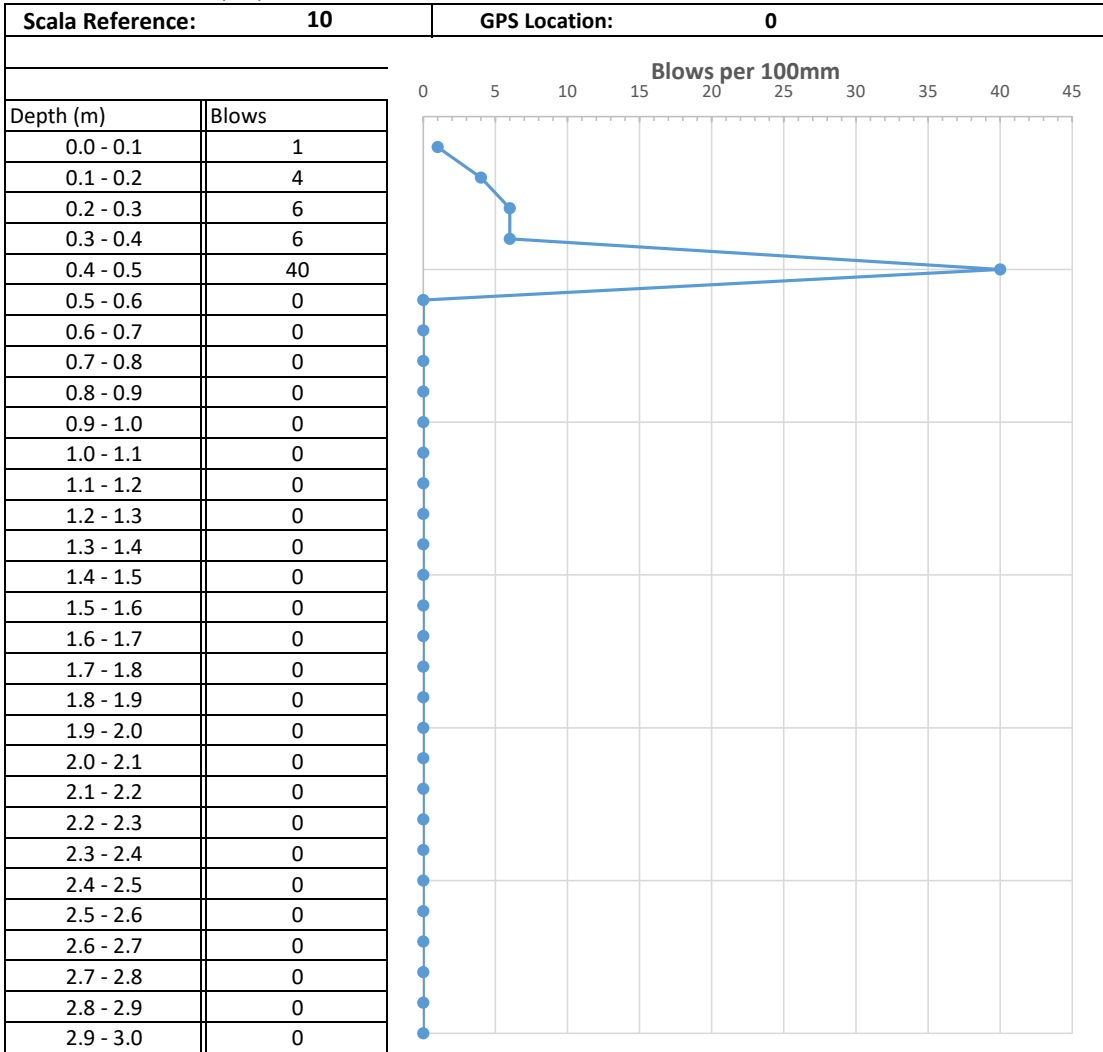
Date: 9/08/2022



Scala Reference: 9 **GPS Location:** 0



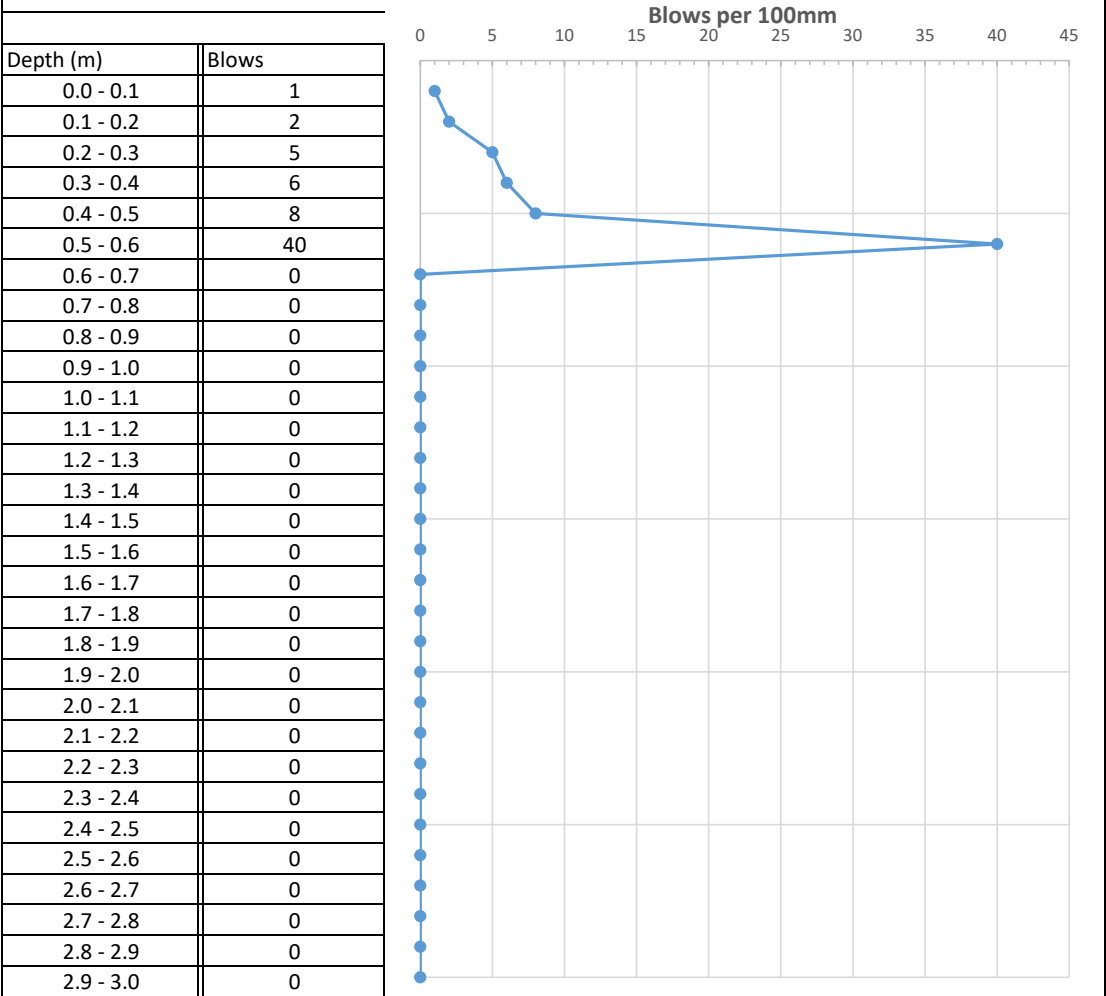
Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



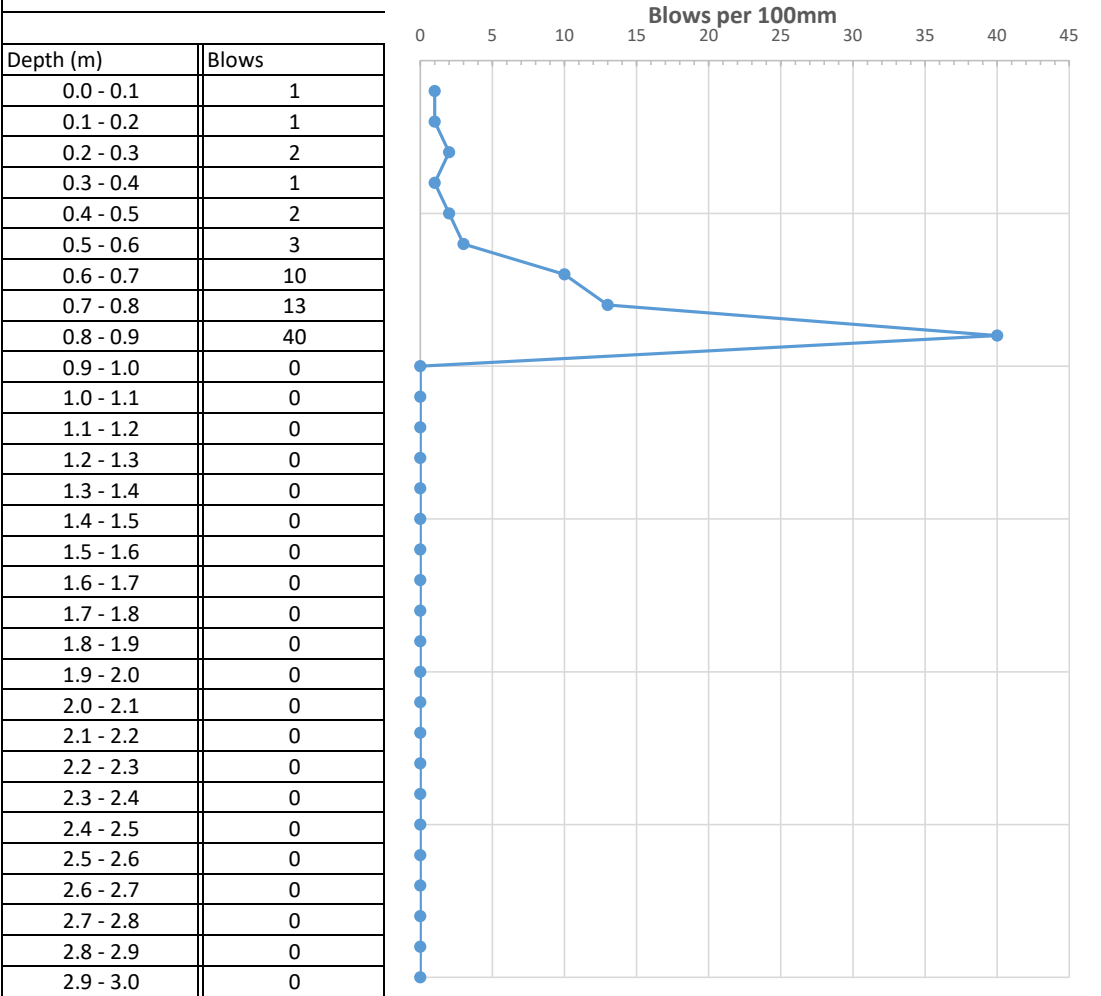
Scala Reference: 11 **GPS Location:** 0



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



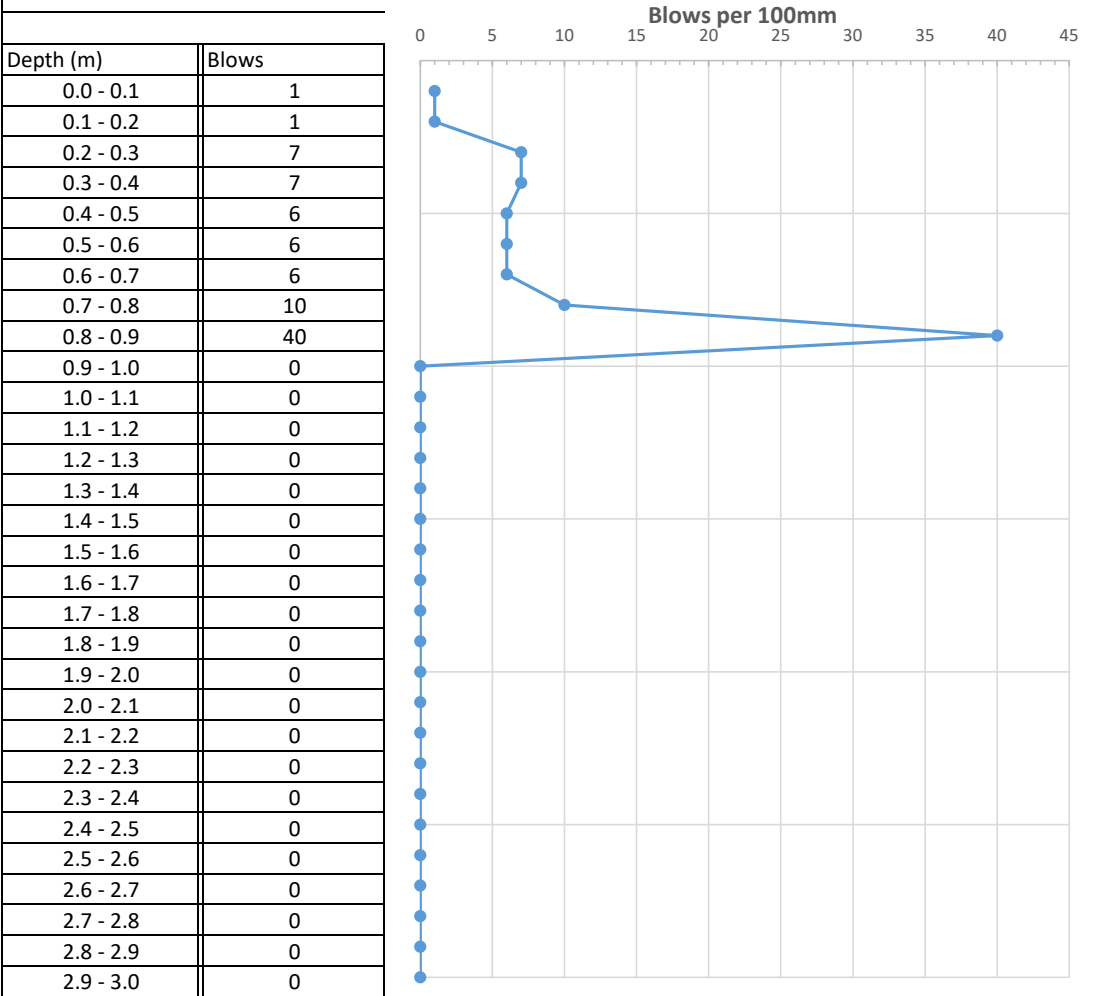
Scala Reference: 12 **GPS Location:** 0



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



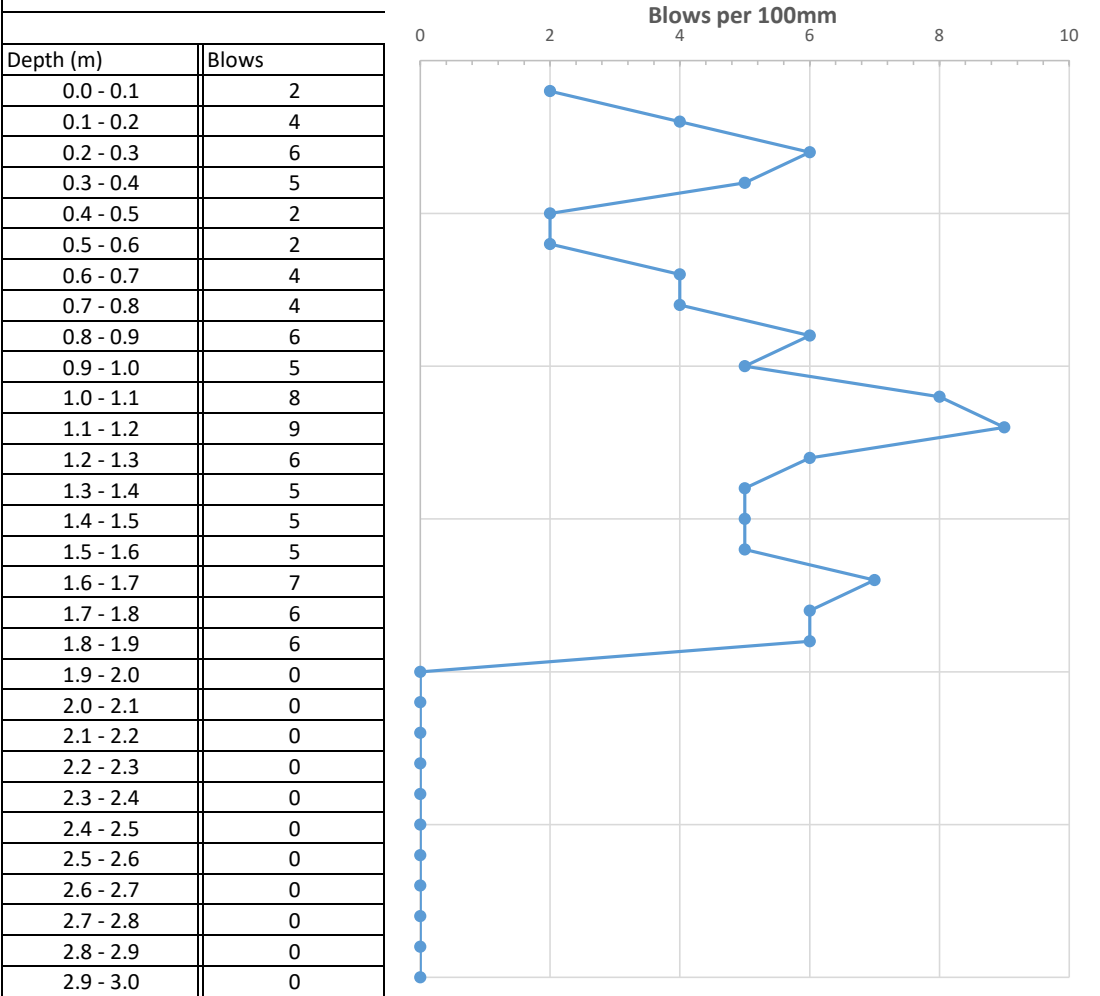
Scala Reference: 13 **GPS Location:** -45.0143832,169.1860997



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



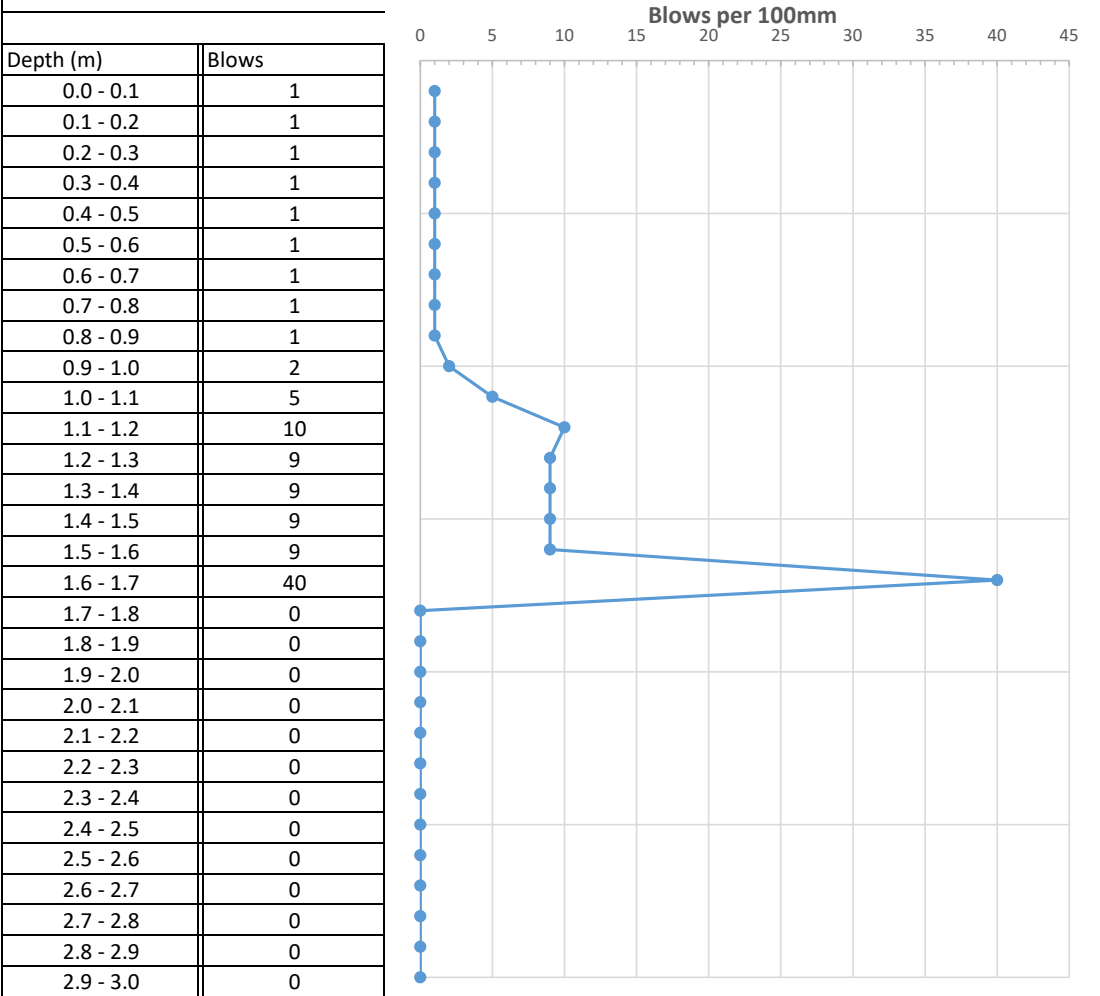
Scala Reference: 14 **GPS Location:** 0



Project Name: 172 Burn Cottage Road Geotech & Civil Assessment
Project Number: 2022153
Date: 9/08/2022



Scala Reference: 15 **GPS Location:** -45.0143701,169.1860767



Project Name: 172 Burn Cottage Road

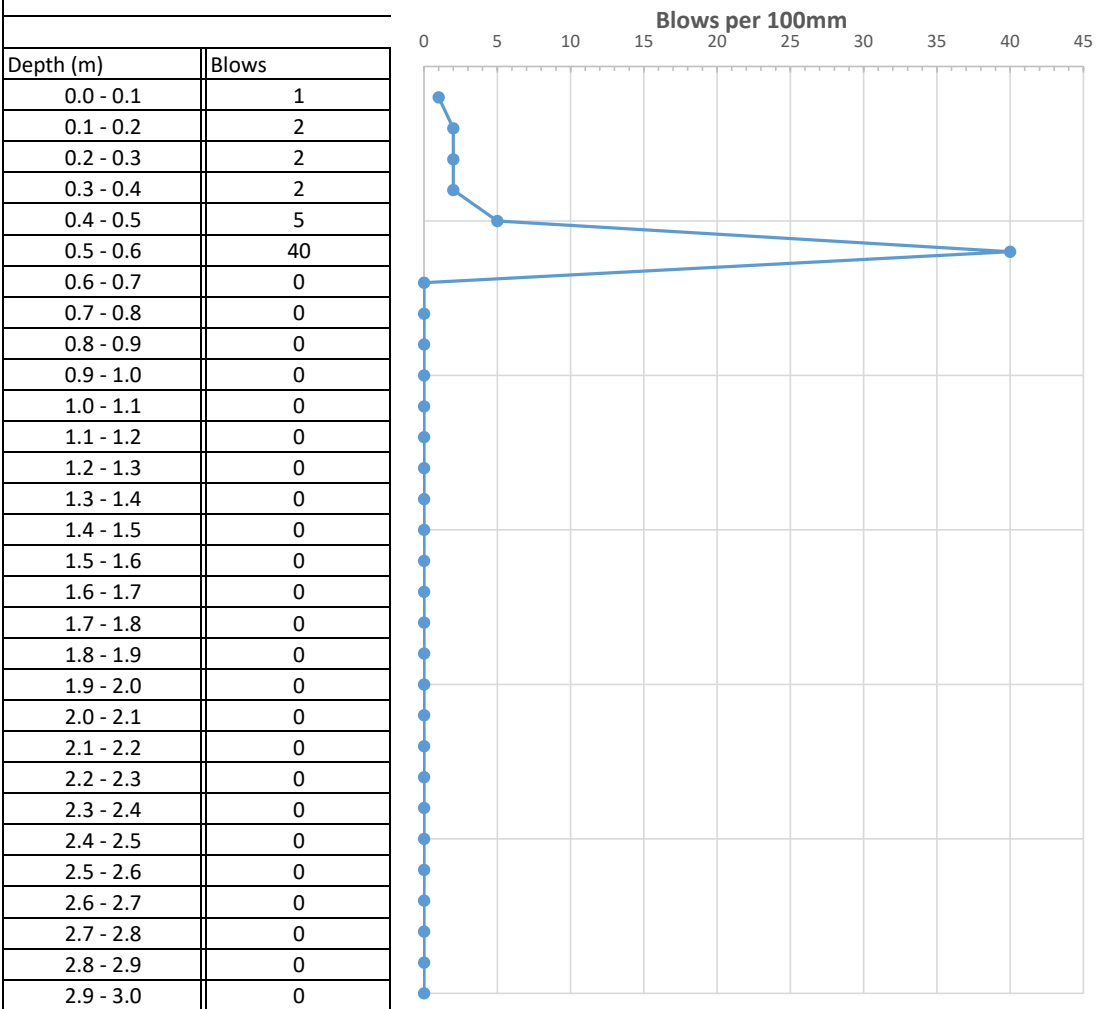
Project Number: 2022153

Date: 29/08/2022



Scala Reference: 16

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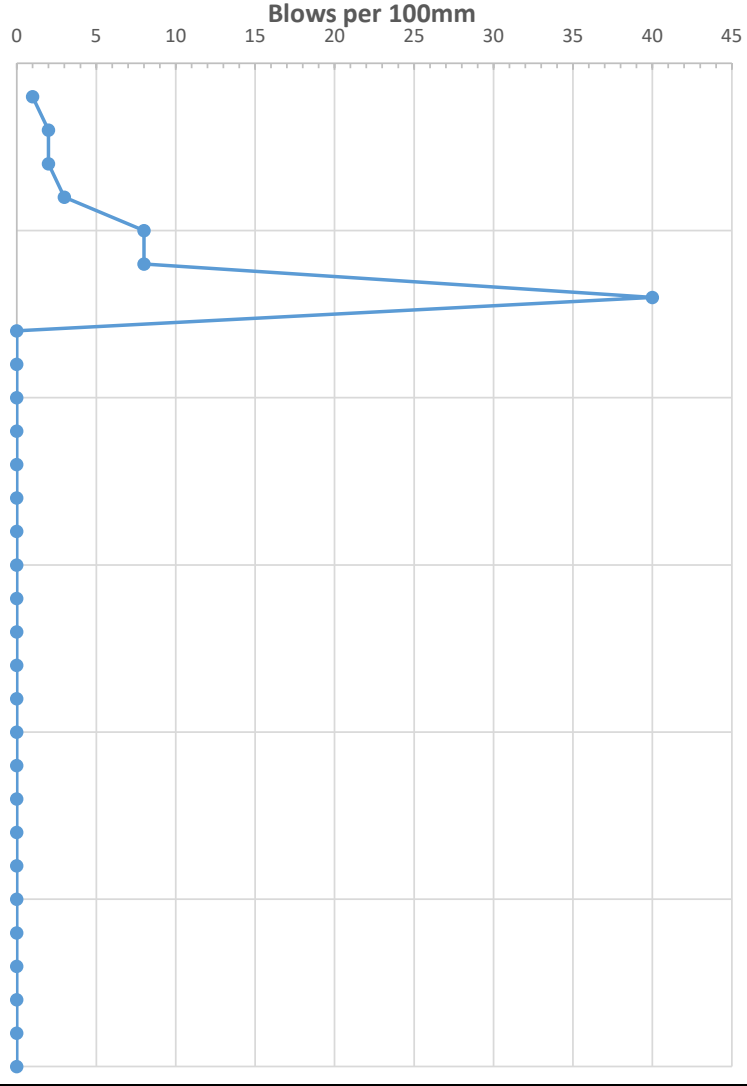


Project Name: 172 Burn Cottage Road
Project Number: 2022153
Date: 29/08/2022



Scala Reference: 17 **GPS Location:** 0

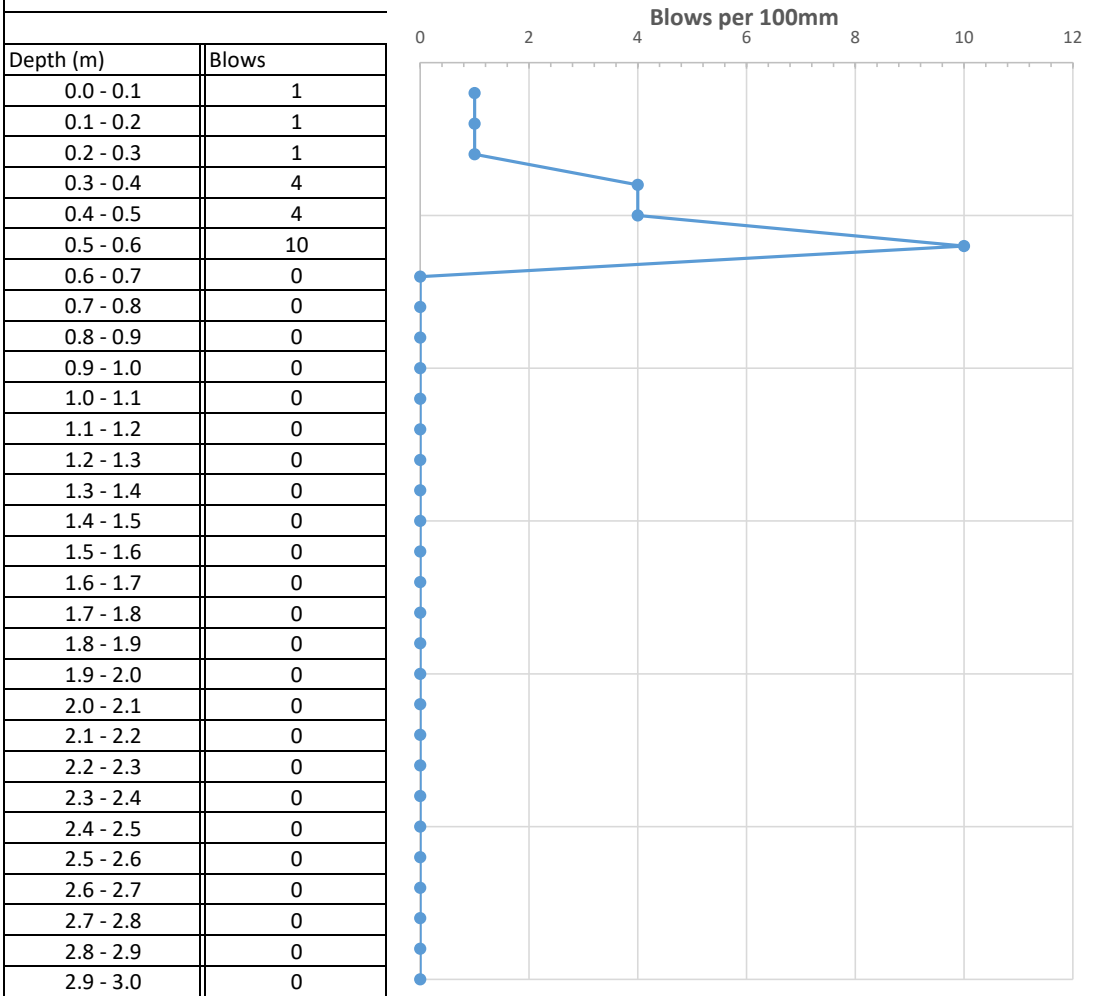
Depth (m)	Blows
0.0 - 0.1	1
0.1 - 0.2	2
0.2 - 0.3	2
0.3 - 0.4	3
0.4 - 0.5	8
0.5 - 0.6	8
0.6 - 0.7	40
0.7 - 0.8	0
0.8 - 0.9	0
0.9 - 1.0	0
1.0 - 1.1	0
1.1 - 1.2	0
1.2 - 1.3	0
1.3 - 1.4	0
1.4 - 1.5	0
1.5 - 1.6	0
1.6 - 1.7	0
1.7 - 1.8	0
1.8 - 1.9	0
1.9 - 2.0	0
2.0 - 2.1	0
2.1 - 2.2	0
2.2 - 2.3	0
2.3 - 2.4	0
2.4 - 2.5	0
2.5 - 2.6	0
2.6 - 2.7	0
2.7 - 2.8	0
2.8 - 2.9	0
2.9 - 3.0	0



Project Name: 172 Burn Cottage Road
Project Number: 2022153
Date: 29/08/2022



Scala Reference: 18 **GPS Location:** -45.0486985,169.196029



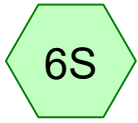
APPENDIX C - CATCHMENT PLAN & HYDROCAD MODELLING
CALCULATIONS



Figure 2- Length of Catchment



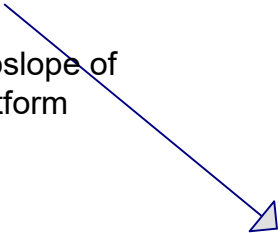
Figure 3 - Area of Catchment



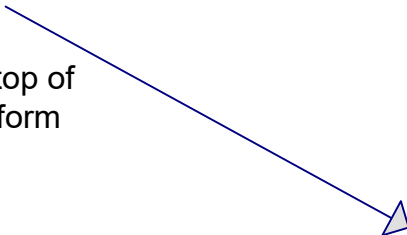
catchment above
building platform 4



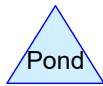
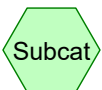
channel 25m upslope of
building platform



channel past top of
building platform



channel past bottom of
building platform



172 burn cottage-final

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Page 2

Area Listing (all nodes)

Area (hectares)	C	Description (subcatchment-numbers)
45.0000	0.25	(6S)
45.0000	0.25	TOTAL AREA

172 burn cottage-final

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Soil Listing (all nodes)

Area (hectares)	Soil Group	Subcatchment Numbers
0.0000	HSG A	
0.0000	HSG B	
0.0000	HSG C	
0.0000	HSG D	
45.0000	Other	6S
45.0000		TOTAL AREA

172 burn cottage-final

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Page 4

Ground Covers (all nodes)

HSG-A (hectares)	HSG-B (hectares)	HSG-C (hectares)	HSG-D (hectares)	Other (hectares)	Total (hectares)	Ground Cover	Subcatchment Numbers
0.0000	0.0000	0.0000	0.0000	45.0000	45.0000		6S
0.0000	0.0000	0.0000	0.0000	45.0000	45.0000	TOTAL AREA	

172 burn cottage-final*burn cottage 100-yr Duration=50 min, Inten=38.8 mm/hr*

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Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6S: catchment above Runoff Area=45.0000 ha 0.00% Impervious Runoff Depth=8 mm
Flow Length=1,500.0 m Tc=49.9 min C=0.25 Runoff=1.2118 m³/s 3.642 MI**Reach 3R: channel 25m** Avg. Flow Depth=0.20 m Max Vel=0.60 m/s Inflow=1.2118 m³/s 3.642 MI
x 0.10 n=0.030 L=30.00 m S=0.3000 m/m Capacity=78.8032 m³/s Outflow=1.2035 m³/s 3.642 MI**Reach 4R: channel past top of** Avg. Flow Depth=0.54 m Max Vel=0.47 m/s Inflow=1.2035 m³/s 3.642 MI
x 0.10 n=0.030 L=30.00 m S=0.1167 m/m Capacity=289.8747 m³/s Outflow=1.1960 m³/s 3.642 MI**Reach 5R: channel past** Avg. Flow Depth=0.24 m Max Vel=0.33 m/s Inflow=1.1960 m³/s 3.642 MI
x 0.10 n=0.030 L=30.00 m S=0.0833 m/m Capacity=206.0569 m³/s Outflow=1.1870 m³/s 3.642 MI**Total Runoff Area = 45.0000 ha Runoff Volume = 3.642 MI Average Runoff Depth = 8 mm**
100.00% Pervious = 45.0000 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 6S: catchment above building platform 4

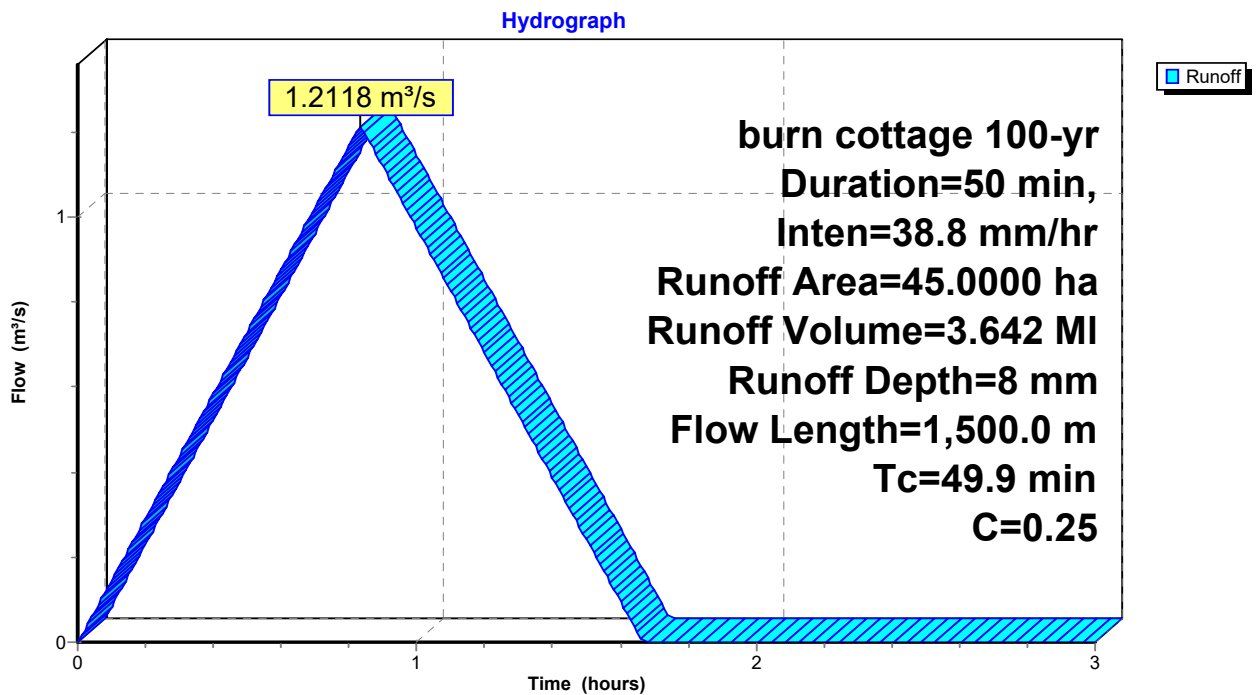
Runoff = 1.2118 m³/s @ 0.83 hrs, Volume= 3.642 MI, Depth= 8 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 burn cottage 100-yr Duration=50 min, Inten=38.8 mm/hr

Area (ha)	C	Description
45.0000	0.25	
45.0000		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
48.0	700.0	0.0130	0.24		Shallow Concentrated Flow, top of catchment Short Grass Pasture Kv= 2.13 m/s
1.9	800.0	0.1330	7.08	28.3189	Channel Flow, gully flow Area= 4.00 m² Perim= 9.00 m r= 0.44 m n= 0.030 Earth, grassed & winding
49.9	1,500.0	Total			

Subcatchment 6S: catchment above building platform 4



Summary for Reach 3R: channel 25m upslope of building platform

Inflow Area = 45.0000 ha, 0.00% Impervious, Inflow Depth = 8 mm for 100-yr event
 Inflow = 1.2118 m³/s @ 0.83 hrs, Volume= 3.642 MI
 Outflow = 1.2035 m³/s @ 0.85 hrs, Volume= 3.642 MI, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.60 m/s, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.37 m/s, Avg. Travel Time= 1.4 min

Peak Storage= 60.7 m³ @ 0.84 hrs
 Average Depth at Peak Storage= 0.20 m , Surface Width= 10.84 m
 Bank-Full Depth= 2.00 m Flow Area= 35.00 m², Capacity= 78.8032 m³/s

A factor of 0.10 has been applied to the discharge capacity and velocity
 Custom cross-section, Length= 30.00 m Slope= 0.3000 m/m
 Constant n= 0.030 Earth, grassed & winding
 Inlet Invert= 302.000 m, Outlet Invert= 293.000 m



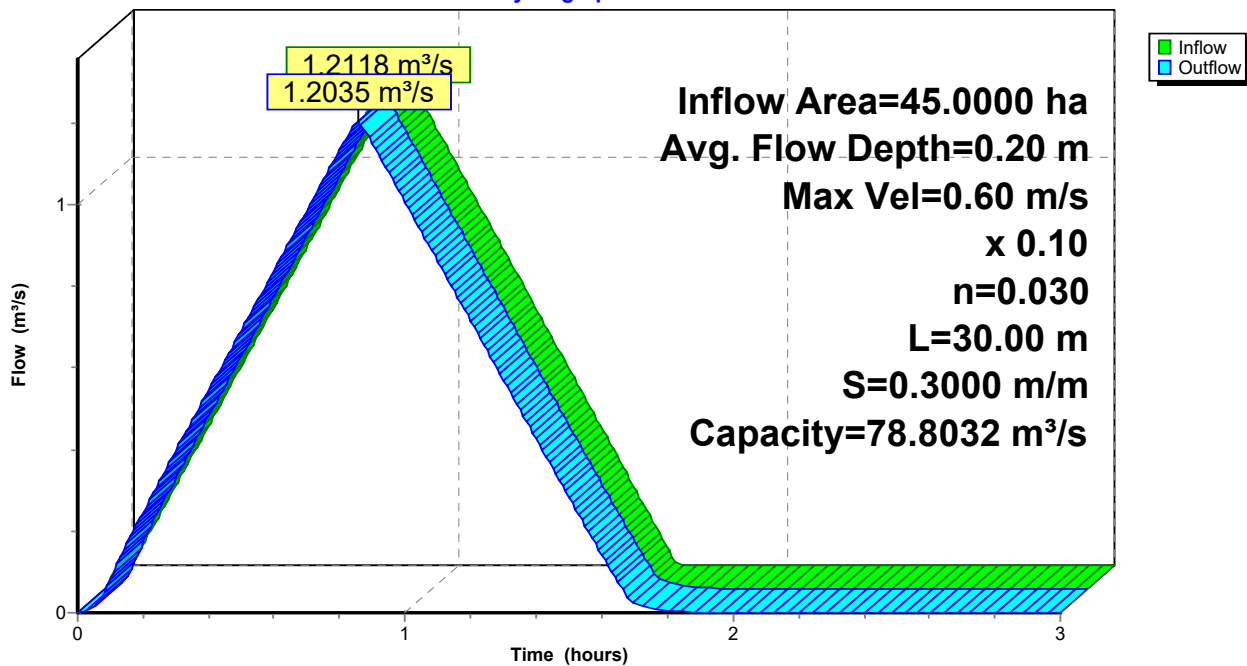
‡

Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	295.000	0.00
5.000	294.000	1.00
10.000	293.000	2.00
19.000	293.000	2.00
23.000	294.000	1.00
25.000	295.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	9.00	0.00	0.0	0.0000
1.00	13.50	18.22	18.00	405.0	20.1804
2.00	35.00	25.56	25.00	1,050.0	78.8032

Reach 3R: channel 25m upslope of building platform

Hydrograph



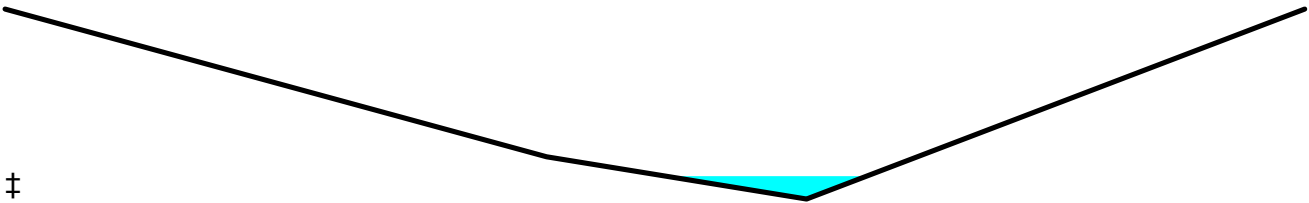
Summary for Reach 4R: channel past top of building platform

Inflow Area = 45.0000 ha, 0.00% Impervious, Inflow Depth = 8 mm for 100-yr event
 Inflow = 1.2035 m³/s @ 0.85 hrs, Volume= 3.642 MI
 Outflow = 1.1960 m³/s @ 0.88 hrs, Volume= 3.642 MI, Atten= 1%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.47 m/s, Min. Travel Time= 1.1 min
 Avg. Velocity = 0.29 m/s, Avg. Travel Time= 1.7 min

Peak Storage= 75.6 m³ @ 0.87 hrs
 Average Depth at Peak Storage= 0.54 m , Surface Width= 9.28 m
 Bank-Full Depth= 4.50 m Flow Area= 143.50 m², Capacity= 289.8747 m³/s

A factor of 0.10 has been applied to the discharge capacity and velocity
 Custom cross-section, Length= 30.00 m Slope= 0.1167 m/m (101 Elevation Intervals)
 Constant n= 0.030 Earth, grassed & winding
 Inlet Invert= 293.000 m, Outlet Invert= 289.500 m

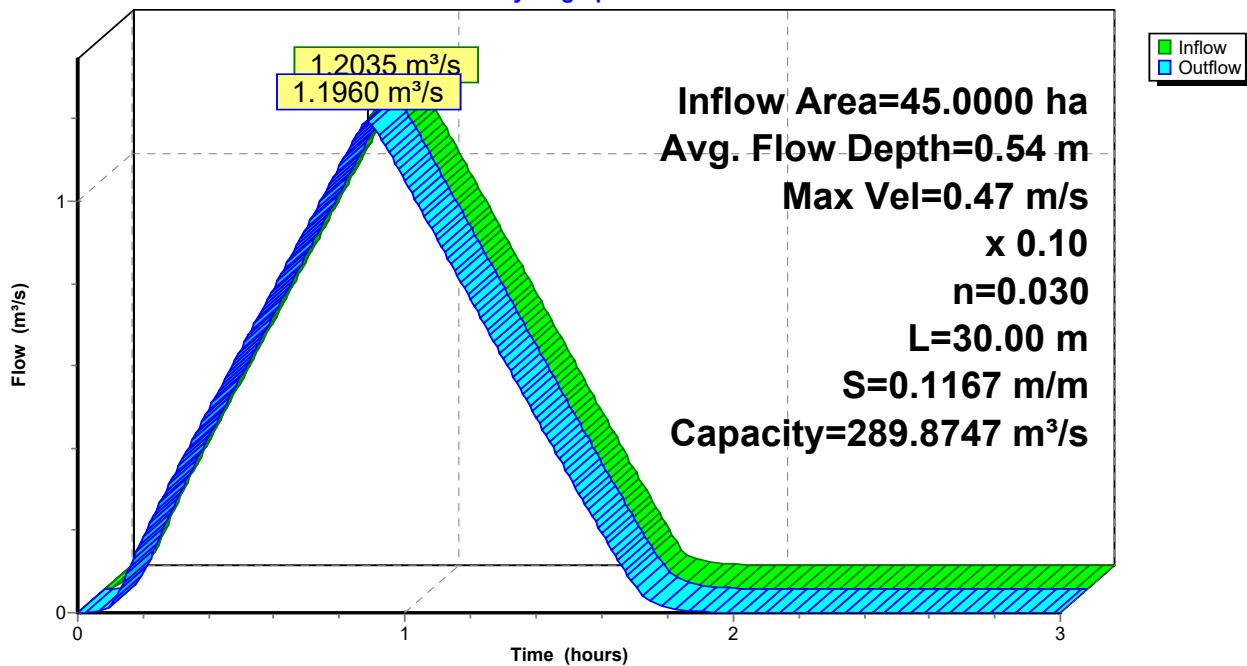


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	294.000	0.00
25.000	290.500	3.50
37.000	289.500	4.50
60.000	294.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
1.00	8.56	17.25	17.11	256.7	6.1035
4.50	143.50	60.72	60.00	4,305.0	289.8747

Reach 4R: channel past top of building platform

Hydrograph



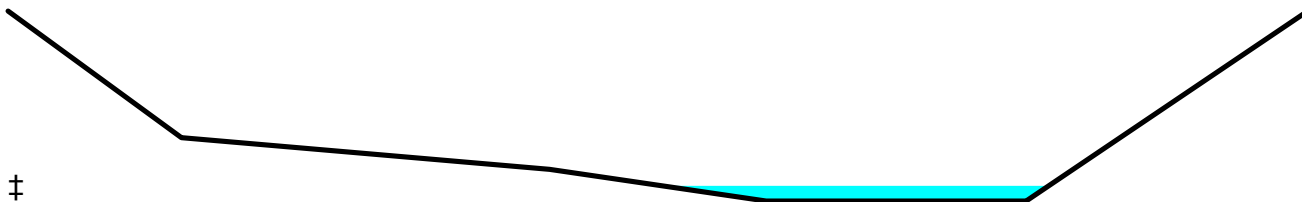
Summary for Reach 5R: channel past bottom of building platform

Inflow Area = 45.0000 ha, 0.00% Impervious, Inflow Depth = 8 mm for 100-yr event
 Inflow = 1.1960 m³/s @ 0.88 hrs, Volume= 3.642 MI
 Outflow = 1.1870 m³/s @ 0.93 hrs, Volume= 3.642 MI, Atten= 1%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.33 m/s, Min. Travel Time= 1.5 min
 Avg. Velocity = 0.19 m/s, Avg. Travel Time= 2.6 min

Peak Storage= 107.9 m³ @ 0.90 hrs
 Average Depth at Peak Storage= 0.24 m , Surface Width= 17.86 m
 Bank-Full Depth= 3.00 m Flow Area= 129.25 m², Capacity= 206.0569 m³/s

A factor of 0.10 has been applied to the discharge capacity and velocity
 Custom cross-section, Length= 30.00 m Slope= 0.0833 m/m (102 Elevation Intervals)
 Constant n= 0.030 Earth, grassed & winding
 Inlet Invert= 289.500 m, Outlet Invert= 287.000 m

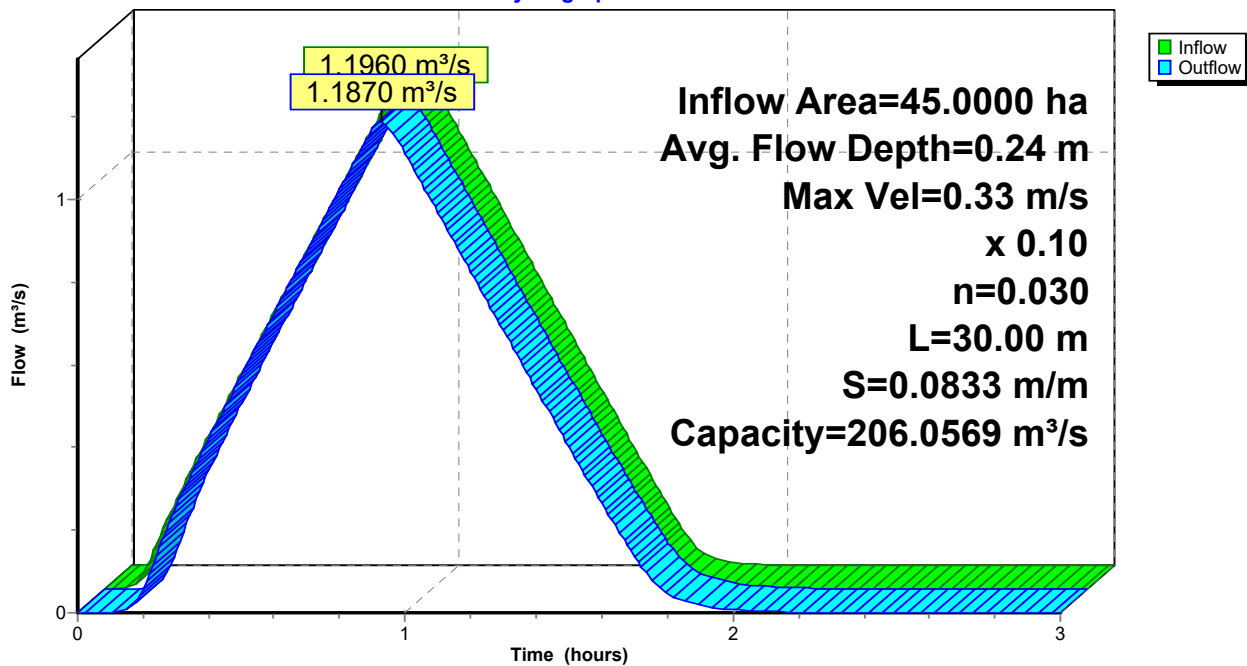


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	290.000	0.00
8.000	288.000	2.00
25.000	287.500	2.50
35.000	287.000	3.00
47.000	287.000	3.00
60.000	290.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	12.00	0.00	0.0	0.0000
0.50	9.04	24.24	24.17	271.3	4.5088
1.00	25.92	43.47	43.33	777.5	17.6663
3.00	129.25	60.61	60.00	3,877.5	206.0569

Reach 5R: channel past bottom of building platform

Hydrograph



172 burn cottage-final*burn cottage 250-yr Duration=50 min, Inten=47.9 mm/hr*

Prepared by {enter your company name here}

Printed 19/12/2022

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Page 5

Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 6S: catchment above Runoff Area=45.0000 ha 0.00% Impervious Runoff Depth=10 mm
Flow Length=1,500.0 m Tc=49.9 min C=0.25 Runoff=1.4932 m³/s 4.487 MI**Reach 3R: channel 25m** Avg. Flow Depth=0.23 m Max Vel=0.64 m/s Inflow=1.4932 m³/s 4.487 MI
x 0.10 n=0.030 L=30.00 m S=0.3000 m/m Capacity=78.8032 m³/s Outflow=1.4838 m³/s 4.487 MI**Reach 4R: channel past top of** Avg. Flow Depth=0.59 m Max Vel=0.50 m/s Inflow=1.4838 m³/s 4.487 MI
x 0.10 n=0.030 L=30.00 m S=0.1167 m/m Capacity=289.8747 m³/s Outflow=1.4746 m³/s 4.487 MI**Reach 5R: channel past** Avg. Flow Depth=0.27 m Max Vel=0.35 m/s Inflow=1.4746 m³/s 4.487 MI
x 0.10 n=0.030 L=30.00 m S=0.0833 m/m Capacity=206.0569 m³/s Outflow=1.4645 m³/s 4.487 MI**Total Runoff Area = 45.0000 ha Runoff Volume = 4.487 MI Average Runoff Depth = 10 mm**
100.00% Pervious = 45.0000 ha 0.00% Impervious = 0.0000 ha

Summary for Subcatchment 6S: catchment above building platform 4

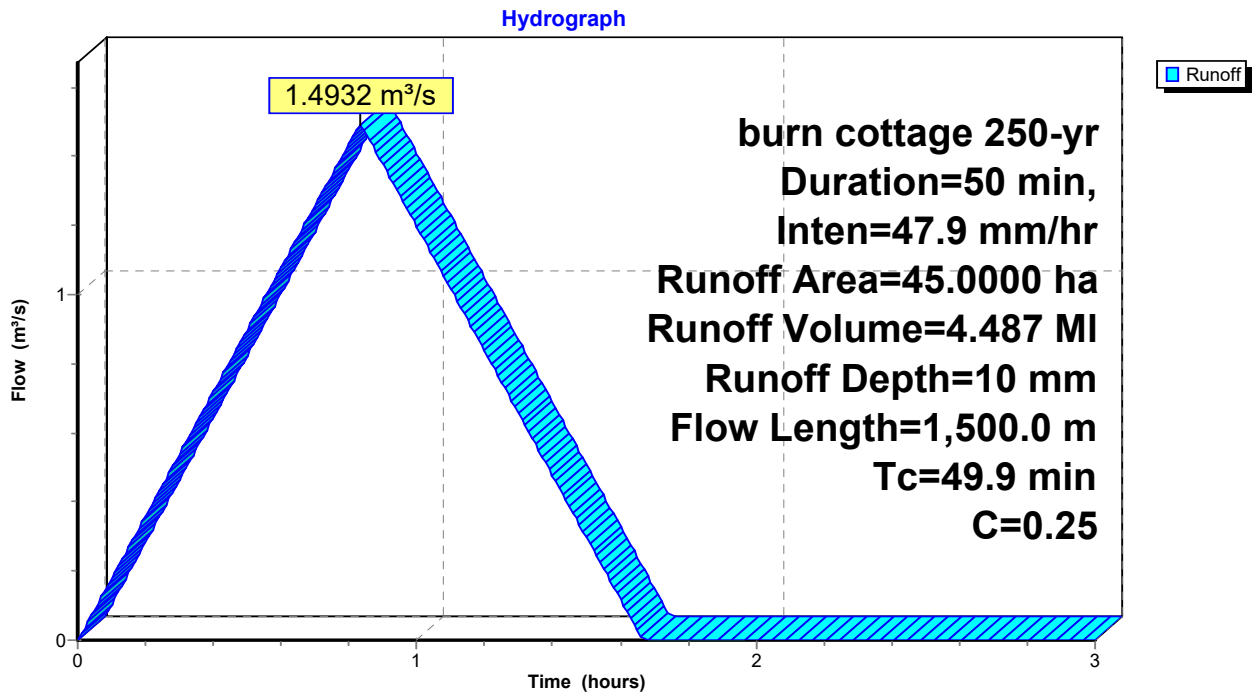
Runoff = 1.4932 m³/s @ 0.83 hrs, Volume= 4.487 MI, Depth= 10 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 burn cottage 250-yr Duration=50 min, Inten=47.9 mm/hr

Area (ha)	C	Description
45.0000	0.25	
45.0000		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
48.0	700.0	0.0130	0.24		Shallow Concentrated Flow, top of catchment Short Grass Pasture Kv= 2.13 m/s
1.9	800.0	0.1330	7.08	28.3189	Channel Flow, gully flow Area= 4.00 m² Perim= 9.00 m r= 0.44 m n= 0.030 Earth, grassed & winding
49.9	1,500.0	Total			

Subcatchment 6S: catchment above building platform 4



Summary for Reach 3R: channel 25m upslope of building platform

Inflow Area = 45.0000 ha, 0.00% Impervious, Inflow Depth = 10 mm for 250-yr event
 Inflow = 1.4932 m³/s @ 0.83 hrs, Volume= 4.487 MI
 Outflow = 1.4838 m³/s @ 0.85 hrs, Volume= 4.487 MI, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.64 m/s, Min. Travel Time= 0.8 min
 Avg. Velocity = 0.39 m/s, Avg. Travel Time= 1.3 min

Peak Storage= 69.5 m³ @ 0.84 hrs
 Average Depth at Peak Storage= 0.23 m , Surface Width= 11.08 m
 Bank-Full Depth= 2.00 m Flow Area= 35.00 m², Capacity= 78.8032 m³/s

A factor of 0.10 has been applied to the discharge capacity and velocity
 Custom cross-section, Length= 30.00 m Slope= 0.3000 m/m
 Constant n= 0.030 Earth, grassed & winding
 Inlet Invert= 302.000 m, Outlet Invert= 293.000 m

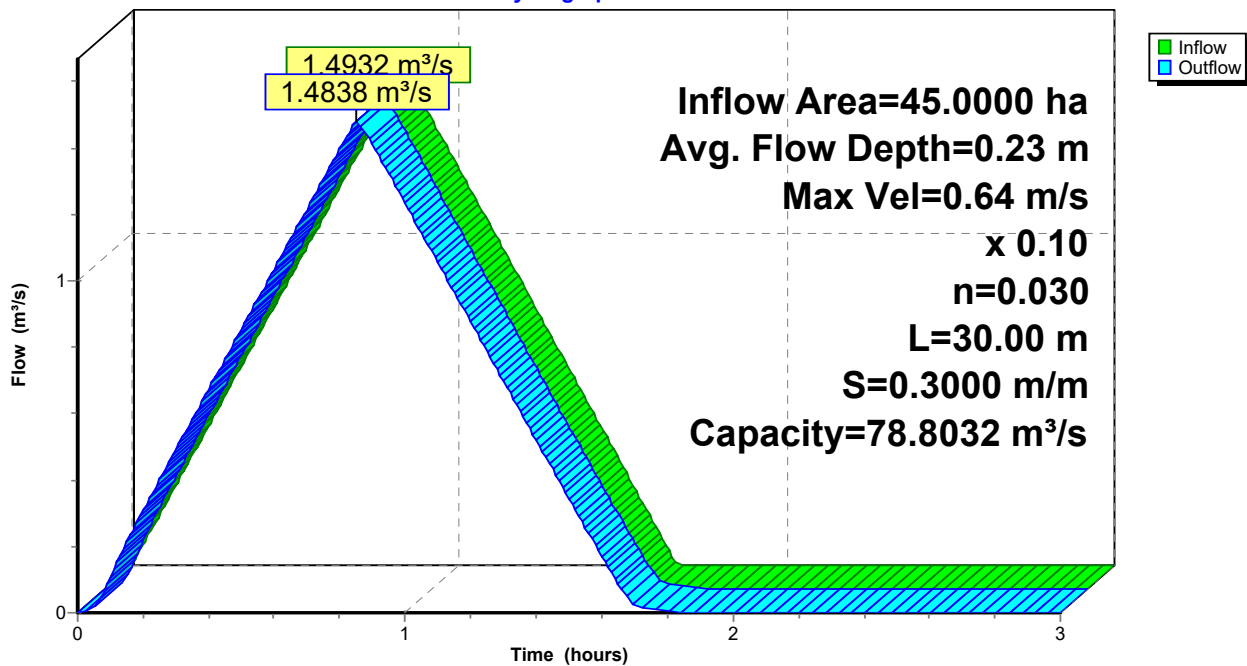


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	295.000	0.00
5.000	294.000	1.00
10.000	293.000	2.00
19.000	293.000	2.00
23.000	294.000	1.00
25.000	295.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	9.00	0.00	0.0	0.0000
1.00	13.50	18.22	18.00	405.0	20.1804
2.00	35.00	25.56	25.00	1,050.0	78.8032

Reach 3R: channel 25m upslope of building platform

Hydrograph



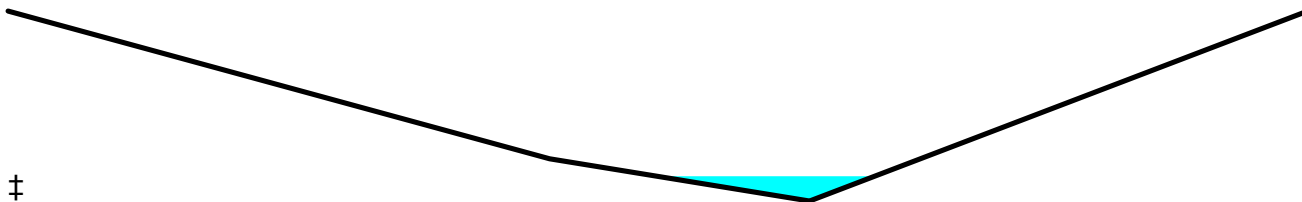
Summary for Reach 4R: channel past top of building platform

Inflow Area = 45.0000 ha, 0.00% Impervious, Inflow Depth = 10 mm for 250-yr event
 Inflow = 1.4838 m³/s @ 0.85 hrs, Volume= 4.487 MI
 Outflow = 1.4746 m³/s @ 0.88 hrs, Volume= 4.487 MI, Atten= 1%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.50 m/s, Min. Travel Time= 1.0 min
 Avg. Velocity = 0.31 m/s, Avg. Travel Time= 1.6 min

Peak Storage= 88.5 m³ @ 0.86 hrs
 Average Depth at Peak Storage= 0.59 m , Surface Width= 10.05 m
 Bank-Full Depth= 4.50 m Flow Area= 143.50 m², Capacity= 289.8747 m³/s

A factor of 0.10 has been applied to the discharge capacity and velocity
 Custom cross-section, Length= 30.00 m Slope= 0.1167 m/m (101 Elevation Intervals)
 Constant n= 0.030 Earth, grassed & winding
 Inlet Invert= 293.000 m, Outlet Invert= 289.500 m

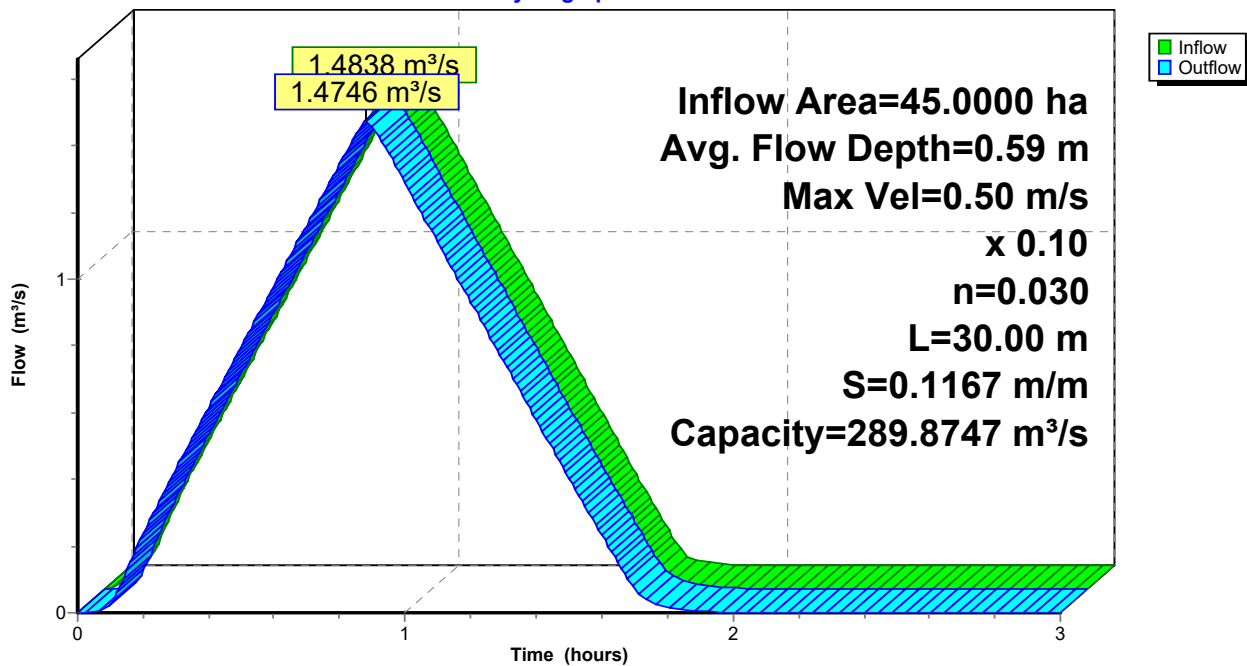


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	294.000	0.00
25.000	290.500	3.50
37.000	289.500	4.50
60.000	294.000	0.00

Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	0.00	0.00	0.0	0.0000
1.00	8.56	17.25	17.11	256.7	6.1035
4.50	143.50	60.72	60.00	4,305.0	289.8747

Reach 4R: channel past top of building platform

Hydrograph



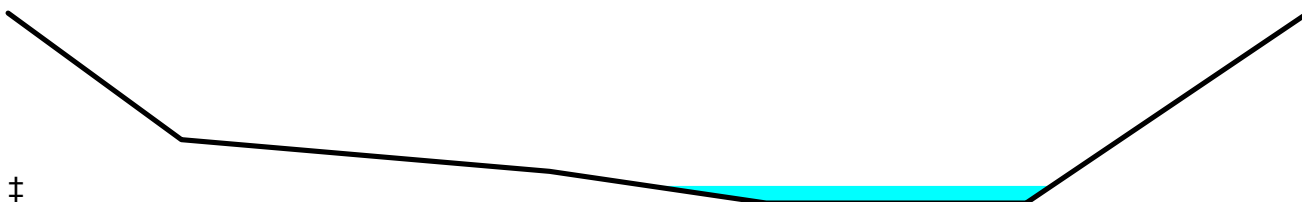
Summary for Reach 5R: channel past bottom of building platform

Inflow Area = 45.0000 ha, 0.00% Impervious, Inflow Depth = 10 mm for 250-yr event
 Inflow = 1.4746 m³/s @ 0.88 hrs, Volume= 4.487 MI
 Outflow = 1.4645 m³/s @ 0.92 hrs, Volume= 4.487 MI, Atten= 1%, Lag= 2.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.35 m/s, Min. Travel Time= 1.4 min
 Avg. Velocity = 0.20 m/s, Avg. Travel Time= 2.5 min

Peak Storage= 124.4 m³ @ 0.90 hrs
 Average Depth at Peak Storage= 0.27 m , Surface Width= 18.59 m
 Bank-Full Depth= 3.00 m Flow Area= 129.25 m², Capacity= 206.0569 m³/s

A factor of 0.10 has been applied to the discharge capacity and velocity
 Custom cross-section, Length= 30.00 m Slope= 0.0833 m/m (102 Elevation Intervals)
 Constant n= 0.030 Earth, grassed & winding
 Inlet Invert= 289.500 m, Outlet Invert= 287.000 m

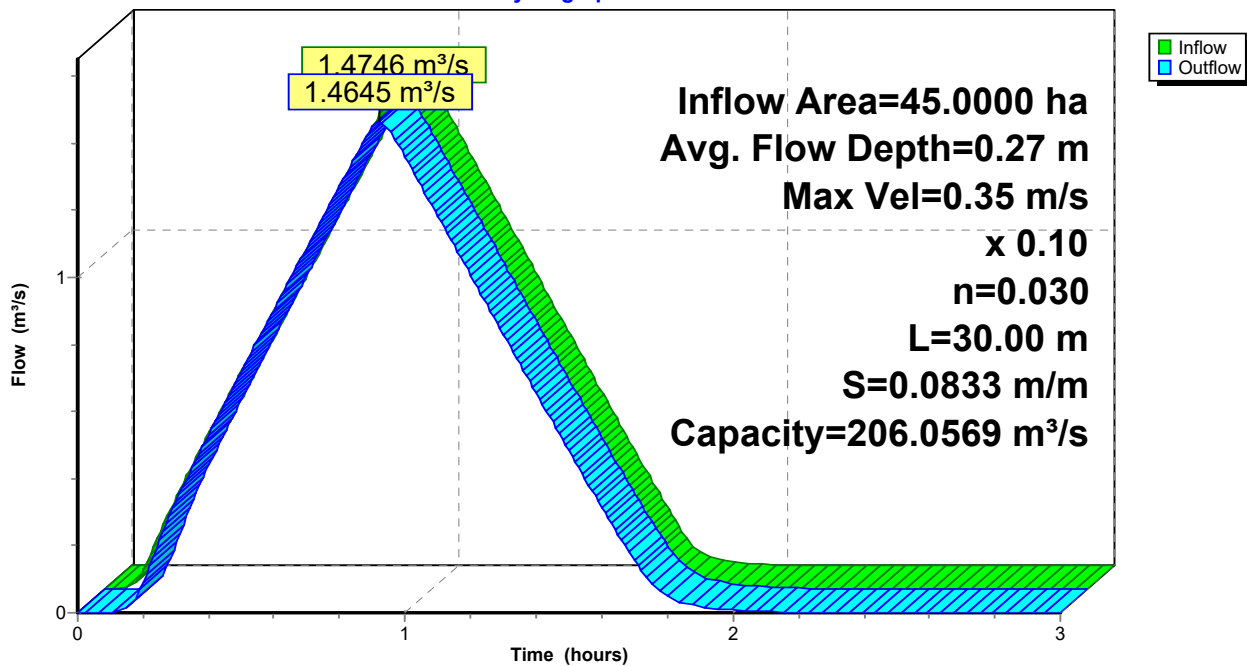


Offset (meters)	Elevation (meters)	Chan.Depth (meters)
0.000	290.000	0.00
8.000	288.000	2.00
25.000	287.500	2.50
35.000	287.000	3.00
47.000	287.000	3.00
60.000	290.000	0.00

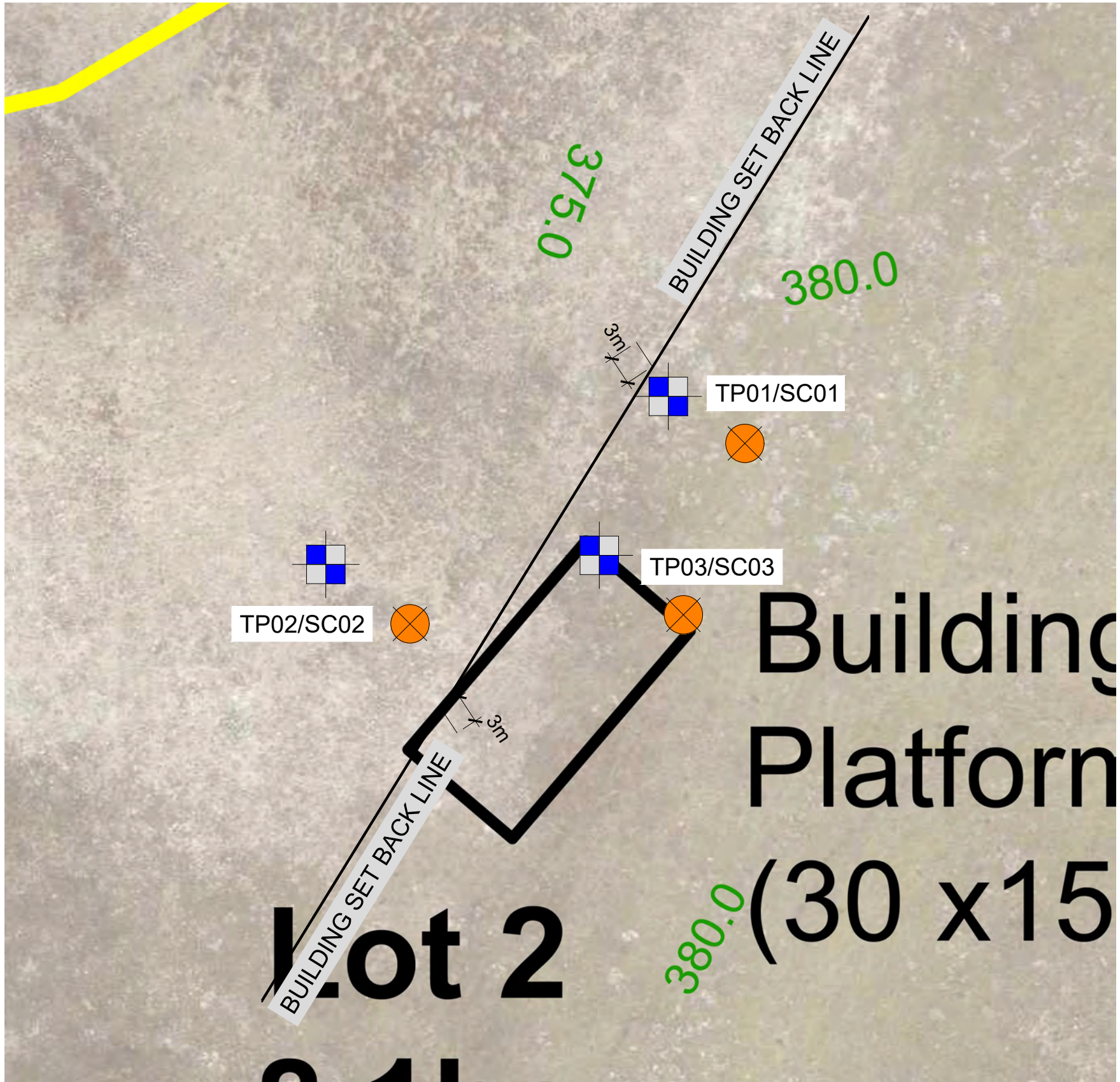
Depth (meters)	End Area (sq-meters)	Perim. (meters)	Width (meters)	Storage (cubic-meters)	Discharge (m³/s)
0.00	0.00	12.00	0.00	0.0	0.0000
0.50	9.04	24.24	24.17	271.3	4.5088
1.00	25.92	43.47	43.33	777.5	17.6663
3.00	129.25	60.61	60.00	3,877.5	206.0569

Reach 5R: channel past bottom of building platform

Hydrograph



APPENDIX D1 – BUILDING SETBACK LINE FOR LOT 2 BUILDING PLATFORM



01 | SITE PLAN
SCALE: 1:500 @ A3



MEYERCRUDEN

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Wanaka

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🌐 www.mcengineering.co.nz

Dated 14 April 2022

WATER SUPPLY AGREEMENT

BETWEEN

**BRIAR RIDGE MANAGEMENT
COMPANY LIMITED**

AND

BURN COTTAGE ROAD JV LIMITED

WATER SUPPLY AGREEMENT

Dated 14 April 2022

BETWEEN **BRIAR RIDGE MANAGEMENT COMPANY LIMITED** having its registered office at Findex 173 Spey Street, Invercargill (called "the Company")

AND The Water User described in the Schedule (called "the Water User")

BACKGROUND TO THIS AGREEMENT

- A. The Company is the owner of the Briar Ridge Management Company Scheme (called "the Scheme").
- B. The Water User is as named in the Schedule.
- C. The Water User is the registered proprietor of the land described in the Schedule (called "the land").
- D. The Company and Water User wish to enter into this Agreement for the supply of irrigation and potable water to the land, for the consideration described in the Schedule.

TERMS OF THIS AGREEMENT

1. DURATION OF AGREEMENT, TRANSFER AND DIVISION

- 1.1 This Agreement shall commence on the date it is signed and shall continue during the time that the Water User is the registered proprietor of the land.
- 1.2 This Agreement and any rights or obligations pertaining to it vest with the Water User named in the Schedule for the purpose of potable and irrigation requirements exclusively for the land as described in the Schedule.
- 1.3 Unless otherwise agreed to in writing by the Company, this Agreement and the rights to which it relates for the land as described in the Schedule shall not be divided in any way.
- 1.4 Upon the sale of the land the company agrees to transfer this agreement to the new registered proprietor of the land described in the Schedule (called "the land").
- 1.5 Subject to the terms of this Agreement, water from this Scheme shall be supplied by the Company to the land as described in the Schedule in the amount as set out in the Schedule until the expiry of this Agreement.

2. SUPPLY OF WATER

- 2.1 Subject to the terms of this Agreement the company shall supply water to the Water User, in the amount described in the Schedule (called the "Water Quota").



- 2.2 The Company may, by agreement, supply water to the Water User in excess of the Water Quota provided that:
- (a) There is sufficient water available; and
 - (b) The Water User gives the Company twenty four hours (24 hours) notice of the extra water requirement; and
 - (c) The Water User pays the variable cost rate as set out in the Schedule and which rate is subject to review by the Company in accordance with this Agreement.
- 2.3 If the Water Users cannot reach agreement between themselves and the Company as to the time of supply the Company shall, in its absolute discretion, determine the time of supply of irrigation water to the Water Users and the rotation of the irrigation supply.
- 2.4 The Company shall supply the irrigation water to the boundary of the land or at such more distant point as the Company's distribution system and rights of access shall extend.
- 2.5 Water shall be supplied through a measuring device ("water meter") to be provided by the Company to the Water User's connection point and maintained by the Company. The Water User shall not, nor allow any person to, alter or interfere with the water meter. The Water User shall not take or attempt to take, or allow any person under the Water User's control to take or attempt to take, any water otherwise than through the water meter and in accordance with the terms of this Agreement. See clause 6.2 regarding a default under this clause 2.5.
- 2.6 The Company shall operate the water meter and ensure the water is available to the Water User's property through the device.
- 2.7 The Water User shall be responsible for the distribution of water from the water meter and takes all liability with respect to the water from that point.
- 2.8 The Water User must have a tank or dam or other facility for holding the water together with a non return valve arrangement. The Water User acknowledges that if they do not have such a storage facility then accumulation of water, and therefore full entitlement of the Water Quota, may not be possible to supply.

3. PAYMENT OF WATER CHARGES

- 3.1 (a) The Water User shall pay to the Company the charges for water contracted to be taken under this Agreement at the rates detailed in the Schedule (called the "water charges") plus GST which rates are subject to review by the Company in accordance with this Agreement.
- (b) The water charges comprise of both fixed charges, which are payable regardless of how many litres of water the Water User uses, and variable charges which are charged for every cubic meter of water used per day.
- (c) The water charges shall be paid by the Water User by the specified dates in the Schedule (called "the due dates for payment").
- (d) If the water charges are not paid within 28 days of the due dates for payment (time being of the essence) then, without prejudice to the Company's other rights the water charges shall incur interest at 10% until paid.
- (e) If there is any amount payable to the Company which is outstanding for more than 60 days from the date it was due then the Company may cease the water supply.
- 3.2 The fixed charges for water shall be payable by the Water User to the Company whether or not the Water User takes the water throughout the term of this Agreement (whether due to the Company's inability to supply the water or the Water User's election not to take the water) and notwithstanding that the Water Supply may be cut off from the land pursuant to Clause 6.1.



4. FAILURE OF SUPPLY AND WATER SHORTAGE

- 4.1 (a) If for any reason, the water supply to the Water User is diminished or shall fail then:
- (1) The company will act promptly to rectify the water supply to the Water User; and
 - (2) The water shall be divided amongst those Water Users with a quota under a signed up Water Supply Agreement, on a pro-rata basis in accordance with their signed up quota.
- (b) If the water supply to the Water User is diminished or shall fail temporarily for reasons the Water User shall not be entitled to a reduction in, or refund of, the charge which the water user has paid or is required to pay with respect to the water not supplied.
- 4.2 If the water supply to the Water User is permanently discontinued, other than due to the default of the Water User, then the Water User shall not be liable for any further payment for water charges apart from all money due up to the time of the permanent discontinuation of supply.

5. RIGHT OF ACCESS

- 5.1 (a) The Company shall have the right at any time with necessary vehicles, implements and machinery, and without payment of compensation, to enter onto the land to get to the point of connection to the water scheme and thereon to inspect, maintain, repair, or re-construct all drains, pipes and other works which the Company deems necessary or desirable for the supply of water to the land up to and including the point of connection. PROVIDED HOWEVER that the Company shall not, if constructing new works (other than re-construction) unduly interfere with the Water User's economic operation on the land or such aesthetics of the land which are important to the Water User without the consent of the Water User (which shall not be unreasonably withheld).
- (b) The company shall cause as little damage and disruption as is reasonably possible in carrying out the above work.
- 5.2 (a) Where, pursuant to Clause 5.1 entry is required for major construction or major repair works, the Company shall where practicable, give reasonable notice of 24 hours by letter or telephone to the Water User prior to such work being undertaken.

- (b) If the Water User has received such notice and in turn notifies the Company, prior to such work being undertaken, of the presence of pipes or other underground facilities and these are damaged in the course of the construction or repair, then the Company will compensate the Water User for such damage.

6. WATER USER'S DEFAULT

- 6.1 (a) In the event of the Water User being in breach of any of the terms under this Agreement and such breach continues for a period of not less than 21 days after notice by the Company to the Water User of the default, the Company may, without payment of any compensation to the Water User or any other person, and without prejudice to its other rights and remedies, cut off the water supply to the land and may remove the measuring device and thereafter no person shall be entitled to be supplied with any further water for the land from the Scheme until the default has been made good.

(b) Notwithstanding Sub-clause 6.1 (a) above, the Company may terminate the water supply without notice if the circumstances of the Water User's default renders this action necessary, considering the Scheme's operation as a whole and the Water User shall be immediately notified accordingly.

6.2 If a Water User breaches clause 2.5 then the company may, without payment of any compensation to the Water User or any other person, and without prejudice to its other rights and remedies, cut off the water supply to the land either permanently or for any lesser period that the company may determine and remove the measuring device and thereafter no person shall be entitled to be supplied with any further water for the land from this Scheme until authorised by the company. The Water User shall be notified of the termination of the Water User's supply.

6.3 All reasonable costs (including legal costs on a Solicitor own client basis) incurred by the Company pursuant to Clauses 6.1 and 6.2 above, and in re-instating the water supply and measuring device and in seeking to recover money due and unpaid and interest thereon, from the Water User, shall be added to the debt owing by the Water User to the Company and shall be paid by the Water User.

7. USE OF WATER

7.1 The Water User shall ensure that all water taken by the Water User from the Scheme is used only on the land and is used in an efficient manner without undue waste.

7.2 The Company shall not be responsible or liable in any way for the infliction, spread, cause or control of any infection, disease or harm to anything or anyone which is directly or indirectly associated with or attributable to the Water Supply.

7.3 The Company makes no undertaking as to the condition or quality of the water and the Water User acknowledges that the Water User uses the water at the Water User's own risk.

7.4 The Water User shall be solely liable for and shall indemnify the Company against any actions, claims, damages and proceedings whatsoever arising out of the Water User's use of the Water.

7.5 The Water User acknowledges that for potable water, it is the Water User's responsibility to test and/or treat the water as is necessary to meet the required New Zealand drinking water standards set out by the Central Otago District Council or any other person or organisation or legislation or regulations.

8. PIPELINES AND EQUIPMENT

8.1 The Water User:

(a) shall protect the Company's pipelines and equipment against damage from the Water Users stock (if any) or use of the land for viticulture and cropping purposes, and shall immediately remedy any such damage caused by the Water Users stock;

(b) shall prevent the irrigation water in the Company's pipelines from becoming contaminated by the Water Users stock or Water Users management practices relating to spraying on any viticultural or crop plantings; and

(c) shall not allow obstacles to be placed or to accumulate in or around the Company's pipelines or equipment within the Water User's land, which damage or restrict access/maintenance to the irrigation works, or restrict the flow of water in the pipelines.

8.2 The term "contaminated" in clause 8.1 (b) includes:

(a) a discharge, leak, or leaching into the Company's pipelines of any substance or disease (including gas, liquid, solid and micro-organisms) or energy or heat; or

(b) stock contamination, induced water discolouration and chemical contamination;

to such an extent as to render the Company's pipeline water undesirable for downstream irrigation use. Any dispute between the Company and the Water User as to whether or not the water is "undesirable for downstream irrigation use" shall be referred to the Company's Board for a determination which determination shall be binding on the Water User.

8.3 The Company shall not be responsible or liable for the spread or control of noxious or other weeds, which may be attributable to the Water Users use of the Company's irrigation water.

9. REVIEW OF WATER CHARGES

9.1 The Company shall have the right to review any of the water charges detailed in the schedule based on increased costs, which review shall be binding on the Water User.

9.2 (a) The Company may at any time by not less than 1 month prior written notice detailing the variation (called "the Variation Notice") to the Water User, vary the terms of the water charges as per schedule based on the increased costs, for Otago Regional Council monitoring, Insurance premiums and power charges, the base price of these costs is set out in the schedule

(b) The variation will take effect from the date the increased costs have been incurred by the company.

(c) If the variation will create more than a minor detrimental effect on the Water User, the Water User may, but no later than 2 months after receipt of the Variation Notice, give written notice to the Company of the termination of this Agreement. Such termination of this Agreement shall not prejudice either party's rights against the other party for any breach under this Agreement prior to the date of termination.

10. WATER USER COMMITTEE

A water user committee, consisting of two (2) directors or appointees and three (3) water user representatives duly appointed by all the water users, be established to cover any issues arising from the management and operation of the water scheme.

11. GUARANTOR

11.1 If the Water User is a Company and Guarantors are recorded in the Schedule and have signed this Agreement then, in consideration of the Water User entering into this Agreement at the request of the Guarantors described in the Schedule, the Guarantors jointly and severally guarantee that:

(a) They shall pay all money owing by the Water User under this Agreement and shall perform all of the Water User's obligations contained or implied under this Agreement; and

(b) As between the Guarantors and the Company, the Guarantors shall be deemed principal debtors and liable as if they themselves were the Water User.

12. FORCE MAJEURE

12.1 In the event of inability of any of the party(s) to this agreement to perform its obligations under this agreement by reason of riot, earthquake, volcanic activity, fire, storm, operation of law or other like cause beyond the control of that party ("force majeure event"), such party(s) shall, upon service of written notice specifying the force majeure event (including due particulars of the time the force majeure event commenced having effect) ("force majeure notice") on all other parties to this agreement, be released from its obligations under this agreement if and to the extent that such party(s) is prevented or delayed from performing such obligations by reason of that force majeure event ("release"), but without prejudice to any pre-existing claim or pre-existing liability in respect of this agreement.

- 12.2 No force majeure notice will be effectual unless it is served within a reasonable time of the occurrence of the force majeure event, such time to be determined having regard to the circumstances then prevailing.
- 12.3 The non-performing party shall forthwith upon the cessation of a force majeure event, serve each party to this agreement with written notice specifying the cessation of the force majeure event (including due particulars of the time the force majeure event ceased having effect) ("cessation notice").
- 12.4 For the avoidance of doubt:
- (i) the service of a force majeure notice is a condition precedent to the non-performing parties' reliance upon any release pursuant to this clause.
 - (ii) A release shall continue only for such time as the nonperforming party is incapable of performing its obligations by virtue of the force majeure event.
 - (iii) Any dispute concerning whether an event constitutes a force majeure event shall be resolved pursuant to the dispute resolutions provisions of this agreement.

13. INTERPRETATION

- 13.1 The reference to the "Company" shall include its agents, employees and contractors.
- 13.2 The water quota is that referred to in the Schedule.
- 13.3 An obligation in this Agreement making a party responsible for that party's omission, neglect or default extends to the omission, neglect or default of any person for whom that party is responsible.
- 13.4 A covenant requiring a party not to do a certain act shall include a covenant not to suffer, cause or permit another person to do such act.

14. NOTICES

- 14.1 A written notice to be sent pursuant to the terms of this Agreement shall be:
- (a) delivered to that person; or
 - (b) posted by ordinary mail to that person's address if it is an actual person, and if it is a Company then to its registered office; or
 - (c) sent by facsimile machine to a telephone number used by that person for the transmission of documents by facsimile; or
 - (d) sent by email to an email address used by that person; or
- 14.2
- (a) A notice delivered to a natural person shall be served by handing the notice to that person. A Notice delivered to a company shall be served by handing the notice to a director of the company.
 - (b) A posted notice is deemed to have been received three working days after it is posted.
 - (c) A notice sent by facsimile machine is deemed to have been received on the working day following the day on which it was properly transmitted.
 - (d) A notice sent by email is deemed to have been received on the working day following the day on which it was properly sent.

SIGNED by: Briar Ridge Management Company Limited
in the presence of:

Alison Methereell (Director)

Witness to signature:

Alison Methereell
Signature of Witness

Alison Methereell
Name of Witness

Office Admin
Occupation of Witness

8 Scott Place, Queenstown
Place of Residence

SIGNED by: Burn Cottage Road JV Limited

in the presence of:

Witness to signature:

Signature of Witness

Name of Witness

Occupation of Witness

Place of Residence

SCHEDULE

WATER USER:

Burn Cottage Road JV Limited

GUARANTORS:

N/A

THE LAND:

172 Burn Cottage Road, Cromwell
Lot 2 DP 306317

WATER QUOTA:

Thirty (30) cubic meters per 24 hour day. One company water connection.

WATER CHARGES:

No water charges apply until water is connected then is to be charged based on Cubic Meterage (m³) as follows:

- Water Line - Fixed Charge of \$2.60 plus GST per day
- Water used - Variable Charge of 35cents plus GST per m³

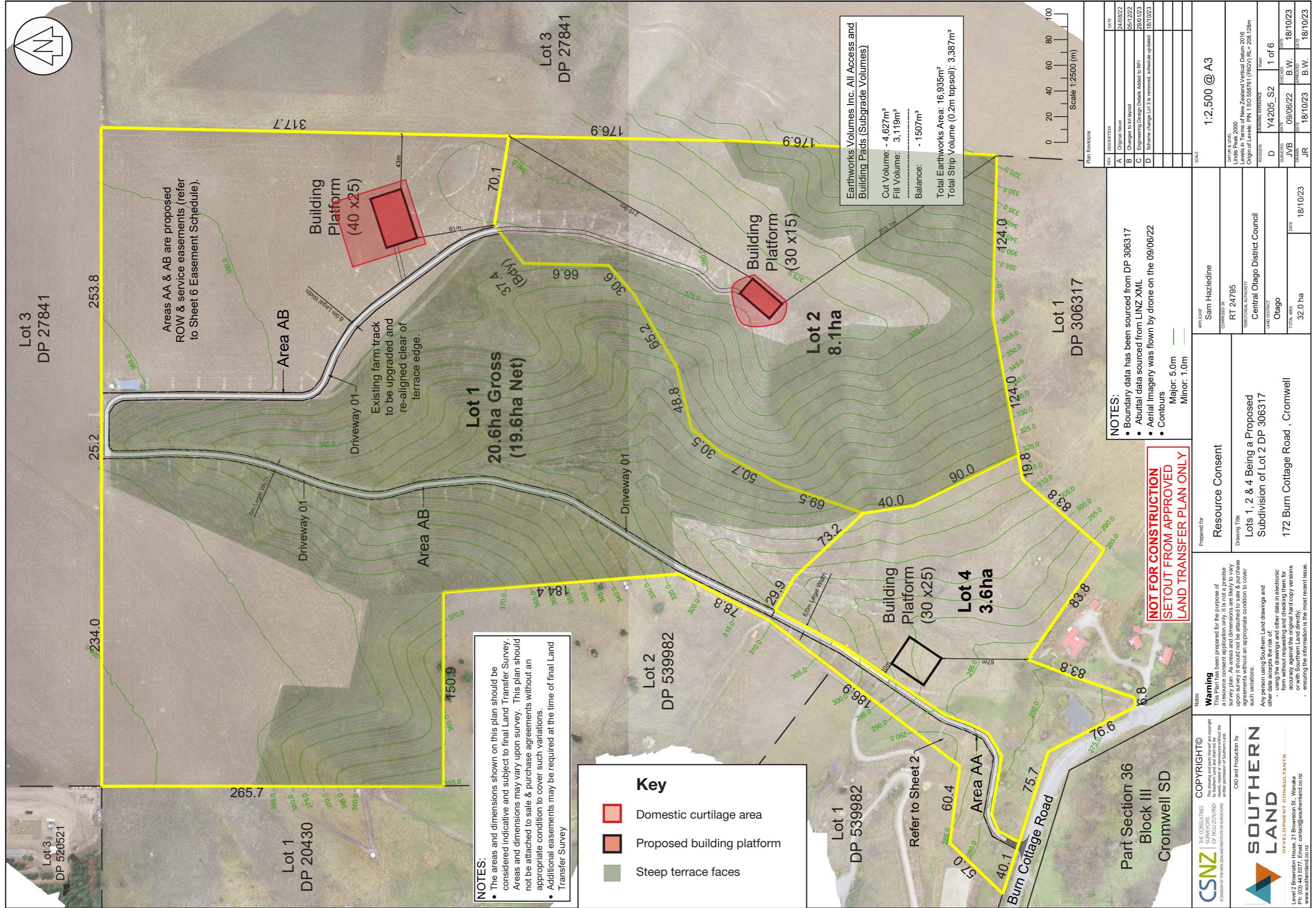
DUE DATES FOR PAYMENT:

By the 30th Day of the month following issue of monthly invoice.

CONSIDERATION:

Twenty Five Thousand Dollars (\$25,000.00) Plus GST for the supply of one water connection from the company.





NOTES:

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- Additional easements may be required at the time of final Land Transfer Survey

Key

- Domestic curtilage area
- Proposed building platform
- Steep terrace faces

Earthworks Volumes Inc. All Access and Building Pads (Subgrade Volumes)

Cut Volume: - 4,627m³
 Fill Volume: 3,119m³
 Balance: - 1507m³

Total Earthworks Area: 16,935m²
 Total Strip Volume (0.2m topsoil): 3,387m³

NOTES:

- Boundary data has been sourced from DP 306317
- Abutment data sourced from LINZ XML
- Aerial imagery was flown by drone on the 09/06/22
- Contours
 - Major: 5.0m
 - Minor: 1.0m

**NOT FOR CONSTRUCTION
 SETOUT FROM APPROVED
 LAND TRANSFER PLAN ONLY**

REV.	DESCRIPTION	DATE
A	Original Issue	24/09/22
B	Changes to sit layout	05/12/22
C	Engineering Design Details Added to RFI	29/01/23
D	Scheme change Lot 3 to be removed, schedule updated	18/10/23

APPLICANT	Sam Hazledine
CONVEYED IN	RT 24795
TERRITORIAL AUTHORITY	Central Otago District Council
LAND DISTRICT	Otago
TOTAL AREA	32.0 ha
DATE	18/10/23

Prepared for
Resource Consent

Drawing Title
Lots 1, 2 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

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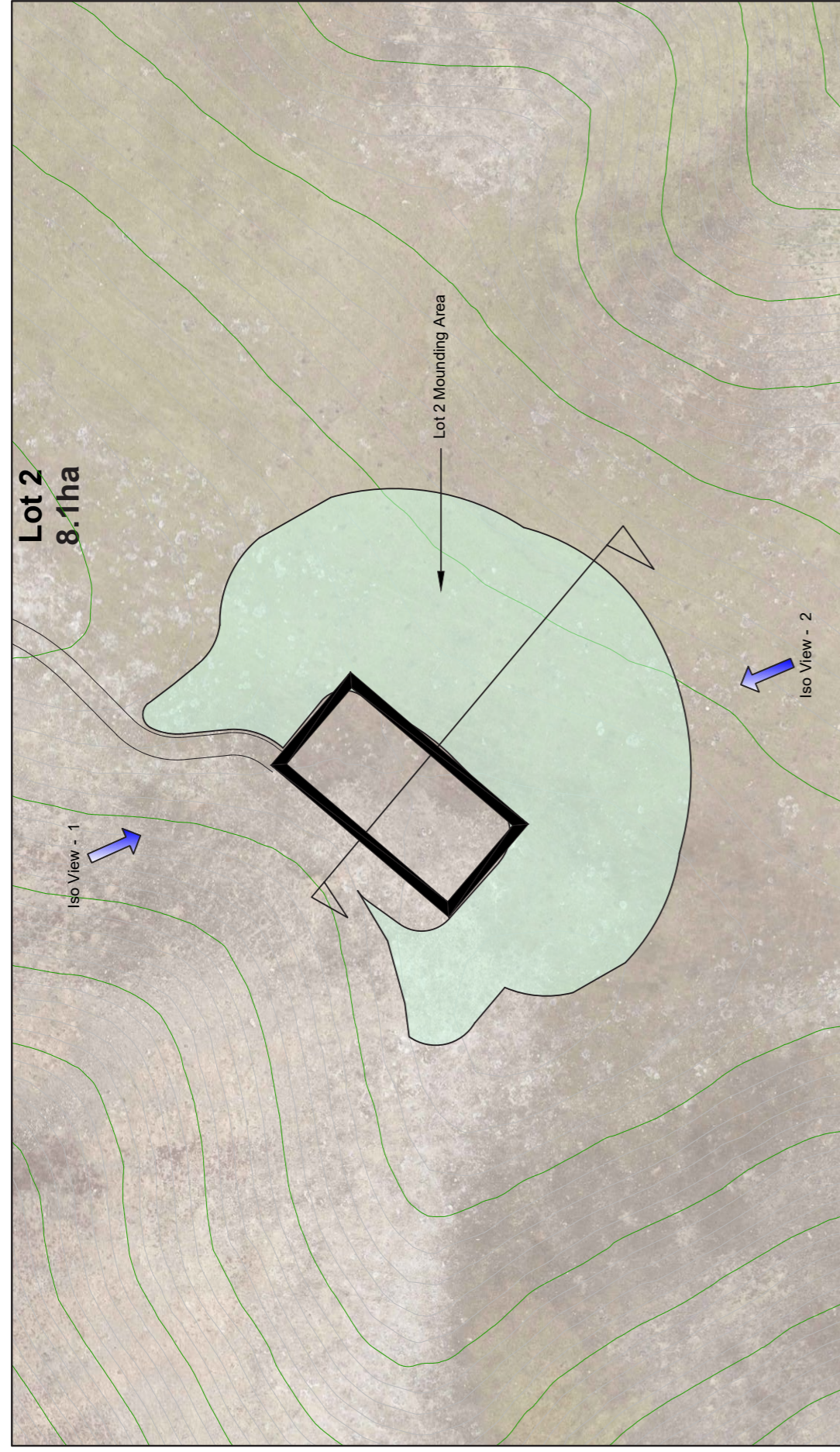
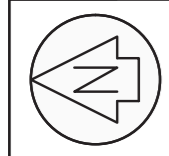
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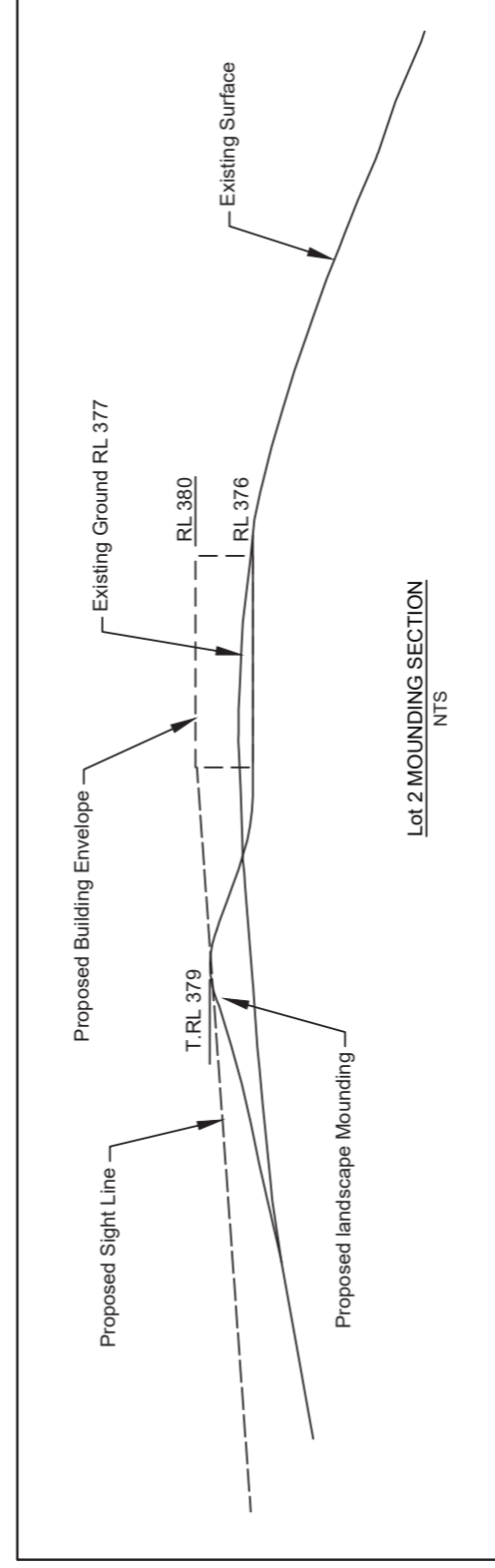
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 Ph: (03) 443 5577. Email: contact@southernland.co.nz
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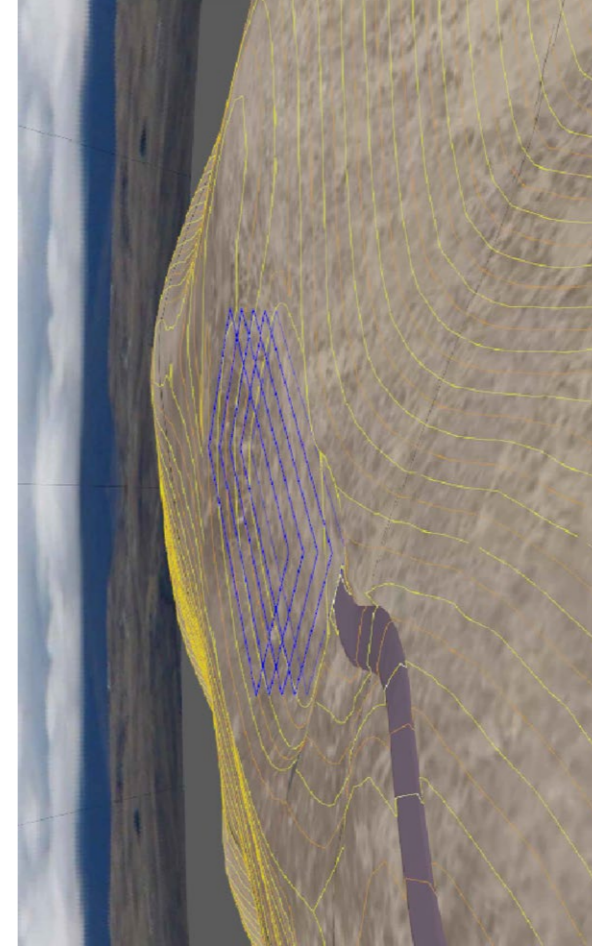
Figure 13: Proposed subdivision concept (Updated October 2023)



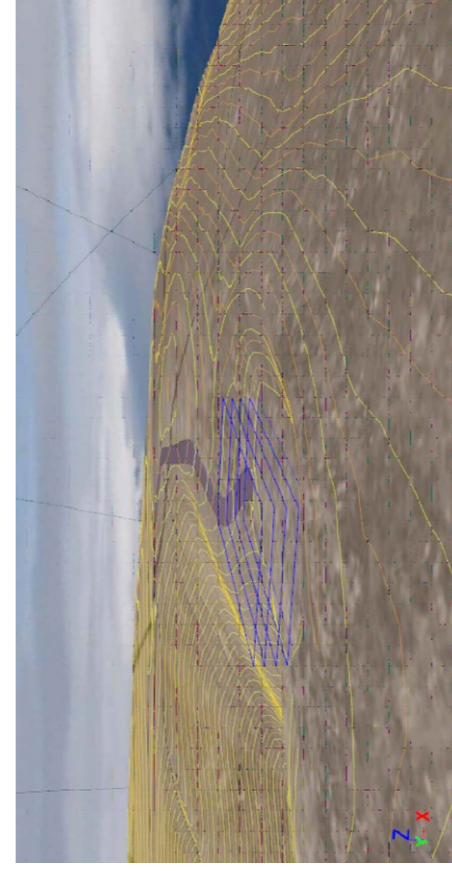
Lot 2 LANDSCAPE MOUNDING - PLAN
Scale 1:400



Lot 2 MOUNDING SECTION
NTS



Iso View - 1



Iso View - 2

NOTES:

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- Abuttal data sourced from LINZ XML
- Aerial Imagery was flown by drone on the 09/06/22
- Contours

Major: 5.0m
Minor: 1.0m

Prepared for
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172 Burn Cottage Road, Cromwell

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CAO and Production by

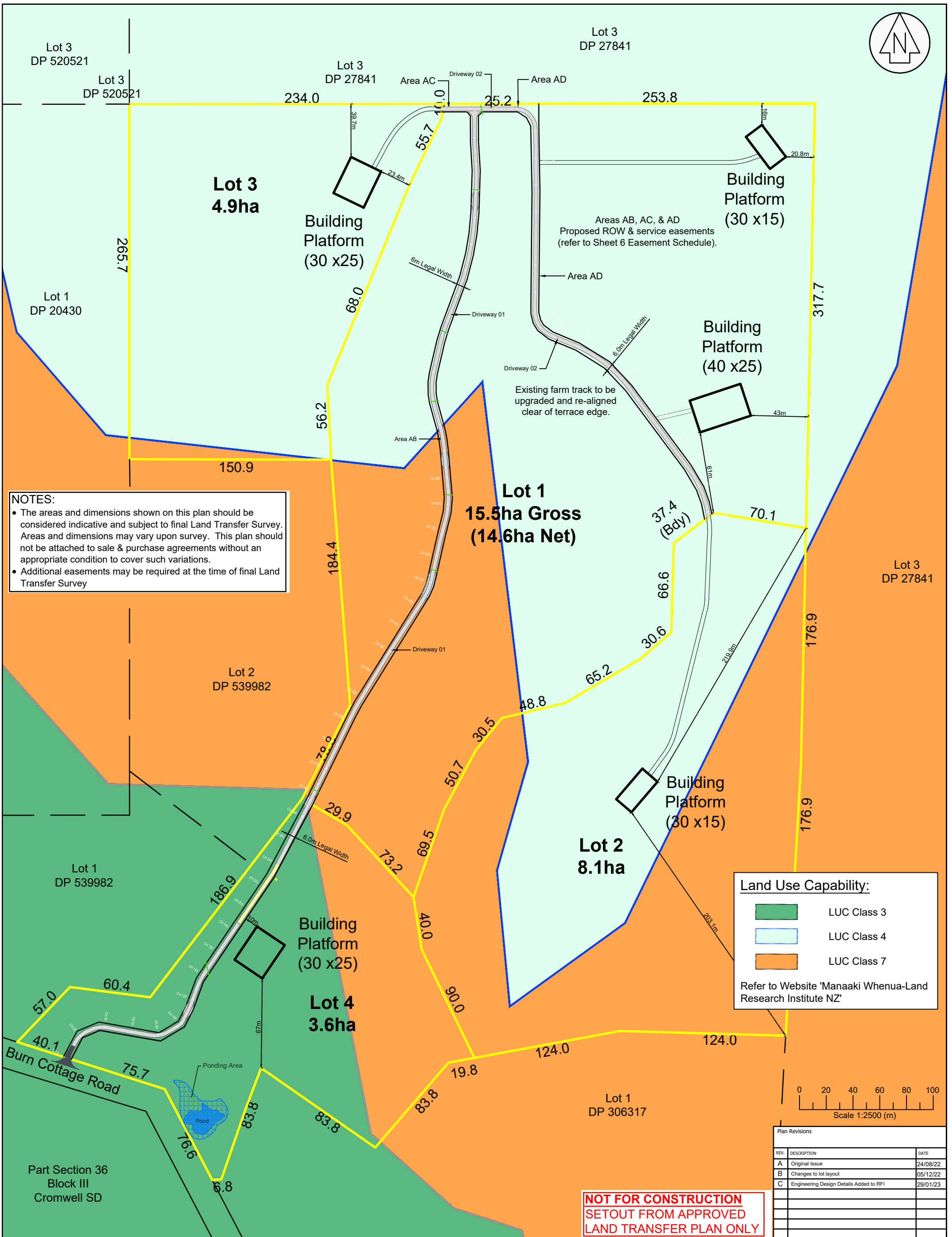
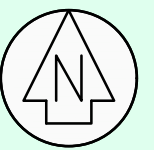
APPLICANT	Sam Hazledine
COMPRESSOR	RT 24795
TERRITORIAL AUTHORITY	Central Otago District Council
LAND DISTRICT	Otago
TOTAL AREA	32.0 ha
DATE	18/10/23

REV	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22
C	Engineering design details added for RFI	29/01/23
D	Scheme change Lot 3 is removed, schedule updated	18/10/23

SCALE
AS SHOWN

REVISION	DATE	CHECKED	DATE	APPROVED	DATE
D	Y4205_E1				10
JVB	09/06/22	B.W.	18/10/23		
JR	18/10/23	B.W.	18/10/23		

Figure 14: Lot 2 Building Platform Landscape Mitigation Concept (Updated October 2023)



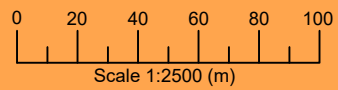
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Land Use Capability:

- LUC Class 3
- LUC Class 4
- LUC Class 7

Refer to Website 'Manaaki Whenua-Land Research Institute NZ'



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REV.	DESCRIPTION	DATE
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B	Changes to lot layout	05/12/22
C	Engineering Design Details Added to RFI	29/01/23

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172 Burn Cottage Road, Cromwell

APPLICANT
Sam Hazledine

COMPRISED IN
RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

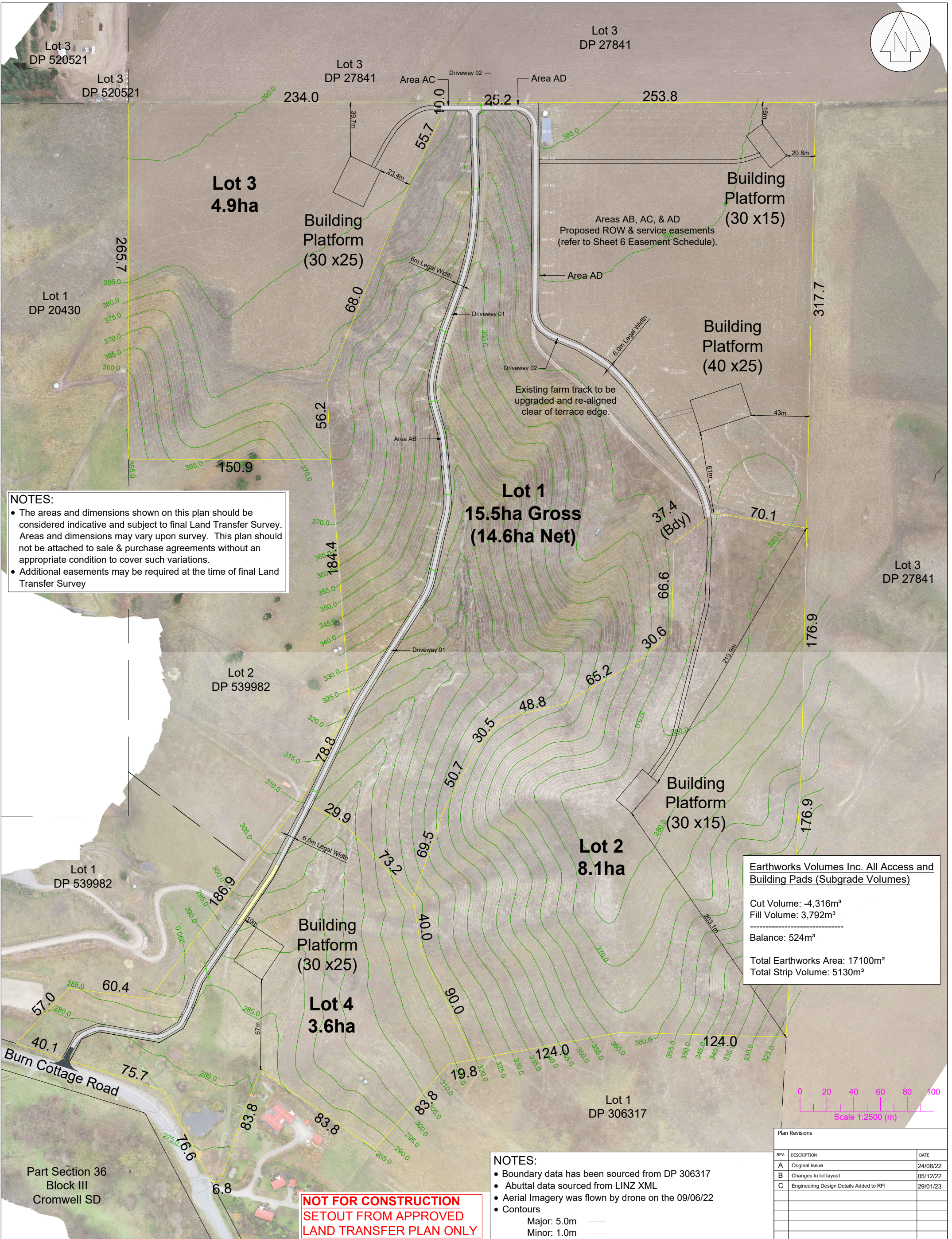
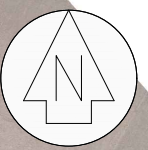
DATE
06/03/23

SCALE
1:2,500 @ A3

DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION
C **Y4205_E1** **SHT 10**

SURVEYED JVB	DATE 09/06/22	CHECKED B.W.	DATE 06/03/23
DRAWN JR	DATE 06/03/23	APPROVED B.W.	DATE 06/03/23



NOTES:

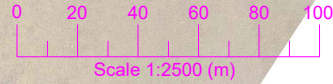
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Earthworks Volumes Inc. All Access and Building Pads (Subgrade Volumes)

Cut Volume: -4,316m³
 Fill Volume: 3,792m³

Balance: 524m³

Total Earthworks Area: 17100m²
 Total Strip Volume: 5130m³



NOTES:

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- Contours
 - Major: 5.0m
 - Minor: 1.0m

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REV.	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22
C	Engineering Design Details Added to RFI	29/01/23

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Prepared for
Resource Consent

Drawing Title
Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

APPLICANT
 Sam Hazledine

COMPRISED IN
 RT 24795

TERRITORIAL AUTHORITY
 Central Otago District Council

LAND DISTRICT
 Otago

TOTAL AREA
 32.0 ha

DATE
 29/01/23

SCALE
1:2,500 @ A3

DATUM & LEVEL
 Lindis Peak 2000
 Levels in Terms of New Zealand Vertical Datum 2016
 Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

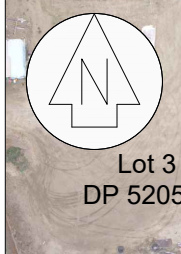
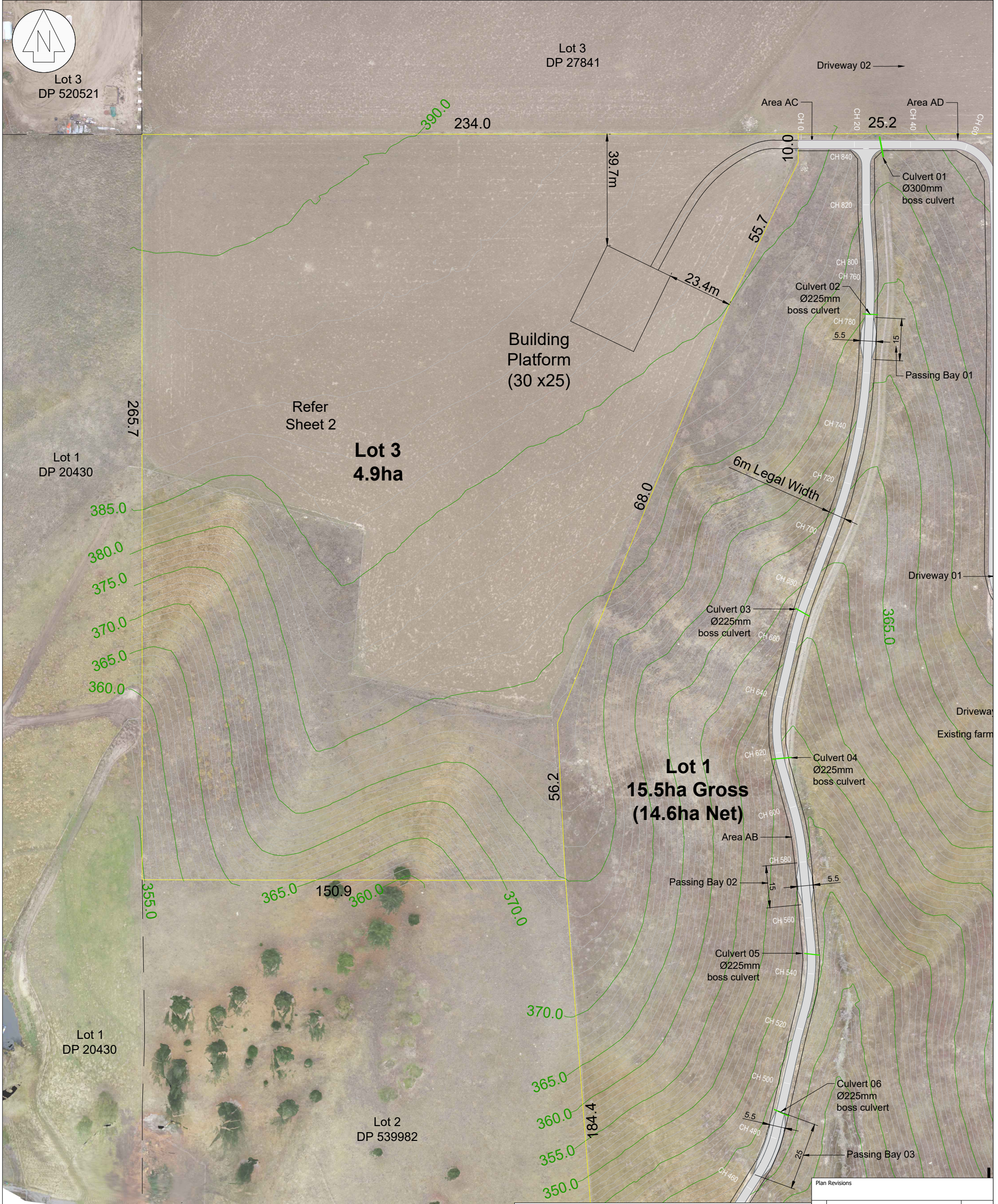
REVISION
 C Y4205_S2 1 of 6

SURVEYED
 JVB 09/06/22

CHECKED
 B.W. 29/01/23

DRAWN
 JR 14/11/22

APPROVED
 B.W. 29/01/23



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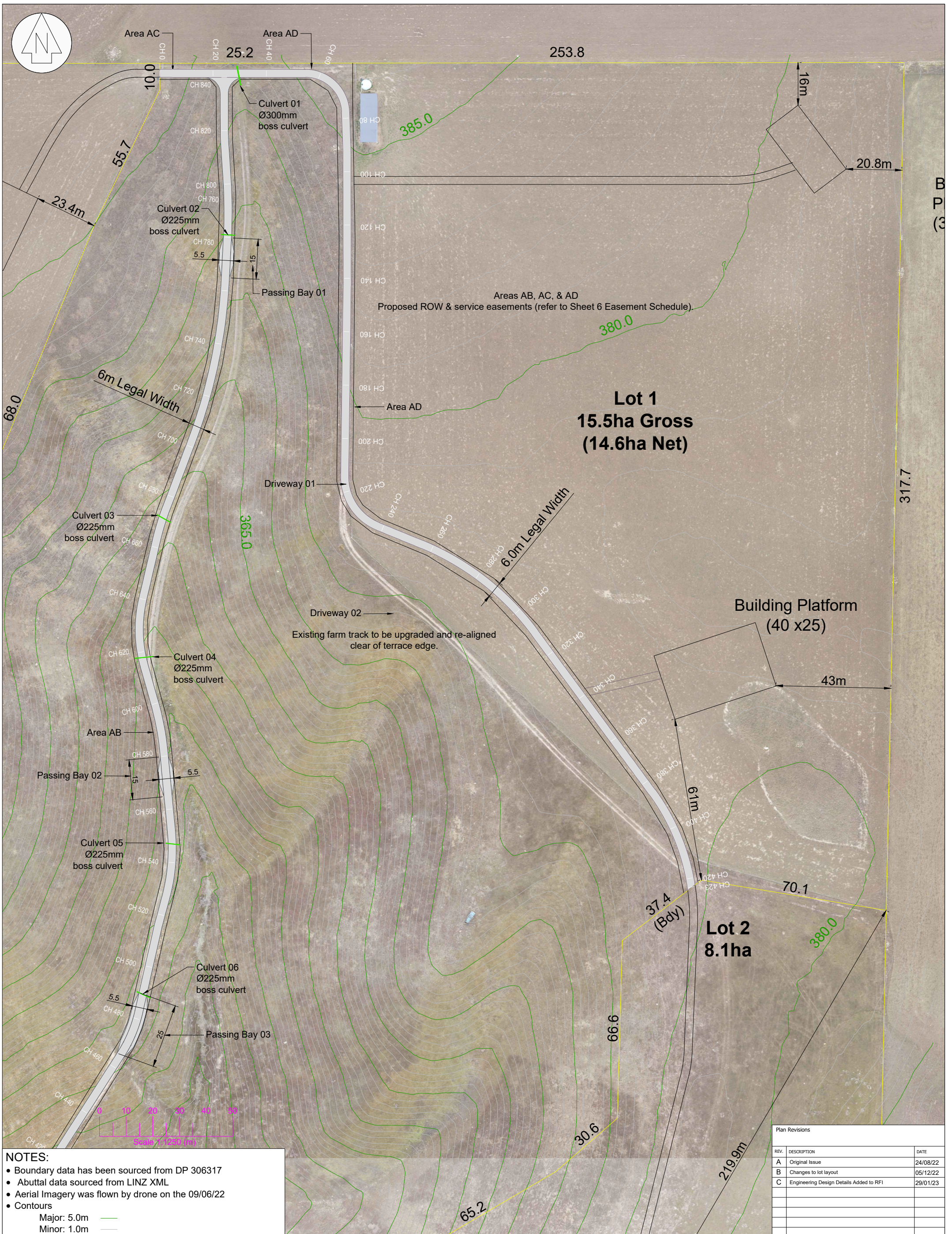
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Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

APPLICANT Sam Hazledine
COMPRISED IN RT 24795
TERRITORIAL AUTHORITY Central Otago District Council
LAND DISTRICT Otago
TOTAL AREA 32.0 ha
DATE 29/01/23

SCALE 1:1,250 @ A3	
DATUM & LEVEL Lindis Peak 2000 Levels in Terms of New Zealand Vertical Datum 2016 Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m	
REVISION C	DRAWING REFERENCE Y4205_S2
SHEET 2 of 6	
SURVEYED JV/B	DATE 09/06/22
CHECKED B.W.	DATE 29/01/23
DRAWN JR	DATE 24/08/22
APPROVED B.W.	DATE 29/01/23



NOTES:

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172 Burn Cottage Road, Cromwell

APPLICANT
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COMPRISED IN
RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

DATE
29/01/23

REV.	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22
C	Engineering Design Details Added to RFI	29/01/23

SCALE	1:1,250 @ A3	
DATUM & LEVEL	Lindis Peak 2000 Levels in Terms of New Zealand Vertical Datum 2016 Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m	
REVISION	DRAWING REFERENCE	SHEET
C	Y4205_S2	3 of 6
SURVEYED	DATE	CHECKED
JVB	09/06/22	B.W.
DRAWN	DATE	APPROVED
JR	24/08/22	B.W.
		DATE
		29/01/23



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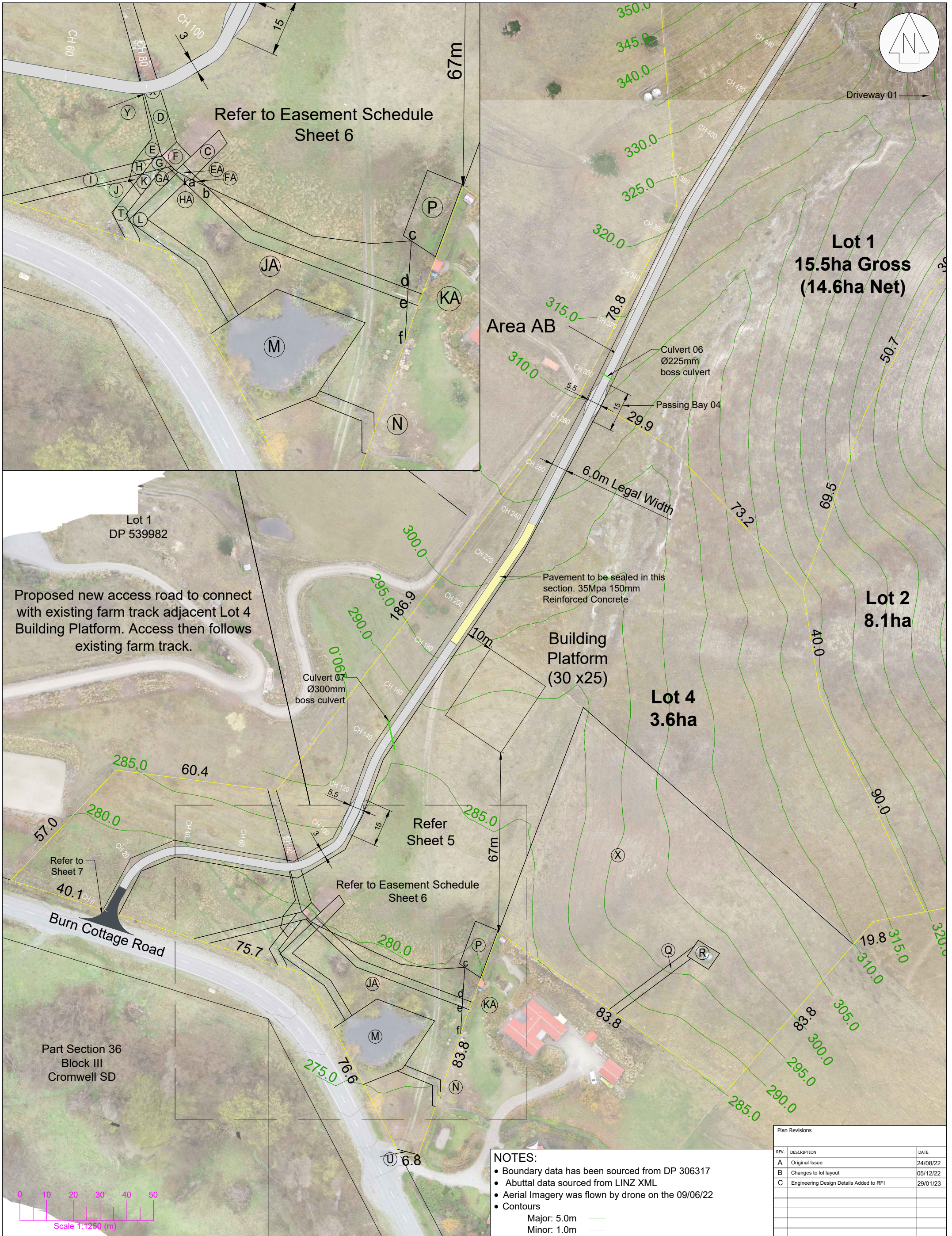
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Drawing Title
Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

APPLICANT	Sam Hazledine
COMPRISED IN	RT 24795
TERRITORIAL AUTHORITY	Central Otago District Council
LAND DISTRICT	Otago
TOTAL AREA	32.0ha
DATE	29/01/23

SCALE		1:1,250 @ A3	
DATUM & LEVEL Lindis Peak 2000 Levels in Terms of New Zealand Vertical Datum 2016 Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m			
REVISION	DRAWING REFERENCE	Sheet	
C	Y4205_S2	4 of 6	
SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	29/01/23
DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	29/01/23



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LAND DISTRICT
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DATE
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REVISION	DRAWING REFERENCE	SHEET
C	Y4205_S2	5 of 6

SURVEYED	DATE	CHECKED	DATE
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DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	29/01/23

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 - Minor: 1.0m



EASEMENT SCHEDULE

Schedule of Proposed Easements			
Purpose	Shown	Servient Tenement (Burdened Land)	Dominant Tenement (Benefited Land)
Right of Way, Right to convey water & electricity	AA	Lot 1 Hereon	Lot 2, 3 Hereon
	AB	Lot 1 Hereon	Lot 2, 3 Hereon
	AC	Lot 1 Hereon	Lot 3 Hereon
	AD	Lot 1 Hereon	Lot 2, 3 Hereon

Schedule of Existing Easements			
Purpose	Shown	Servient Tenement (Burdened Land)	Creating Document
Right to convey water	E, G, H, J, K	Lot 4 Hereon	EI 11579049.7
	EA, FA, GA, HA, JA, KA, L, N, Q, F	Lot 4 Hereon	EC 5280259.3
	HA, L, N, a-b-c-d-e-f	Lot 4 Hereon	T 5010357.2
	D	Lot 4 Hereon	EC 5116837.2
Right to take water	C, EA, P	Lot 4 Hereon	T 5010357.2
	C, EA	Lot 4 Hereon	EC 5116837.2
	C, EA	Lot 4 Hereon	EC 5280259.3
Right to store water	M	Lot 4 Hereon	T 5010357.2
	M, R	Lot 4 Hereon	EC 5280259.3
Right to pump water	F	Lot 4 Hereon	EC 5280259.3
Right to pump water and a transformer site	F	Lot 4 Hereon	EC 5116837.2
Right to convey electricity	F	Lot 4 Hereon	EI 11579049.7
	EA, FA, GA, HA, JA, KA, F	Lot 4 Hereon	EC 5280259.3
	D, G, H, I	Lot 4 Hereon	EC 5116837.2
Right of Way	U	Lot 4 Hereon	EC 5280259.3

Schedule of Existing Easements in Gross				
Purpose	Shown	Servient Tenement (Burdened Land)	Grantee	Creating Document
Right to convey water	D, F, G, K, T	Lot 4 Hereon	Briar Ridge Management	EI 11579049.8
Right to convey electricity	D, E, G, H, I	Lot 4 Hereon	Aurora Energy Limited	EI 11579049.9
	F, G, H, I	Lot 4 Hereon	Dunedin Electricity Limited	T 5116837.3
Right to establish & maintain an electricity transformer	F	Lot 4 Hereon	Dunedin Electricity Limited	T 5116837.3

Table of Existing Covenants			
Purpose	Shown	Servient Tenement (Burdened Land)	Creating Document
No structure will be built or placed	Q, R, X	Lot 4 Hereon	T 5280259.5
No structure will be built or placed	Q, R, X	Lot 4 Hereon	T 5116837.4

REV.	DESCRIPTION	DATE
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Resource Consent

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APPLICANT
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TERRITORIAL AUTHORITY
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32.0 ha

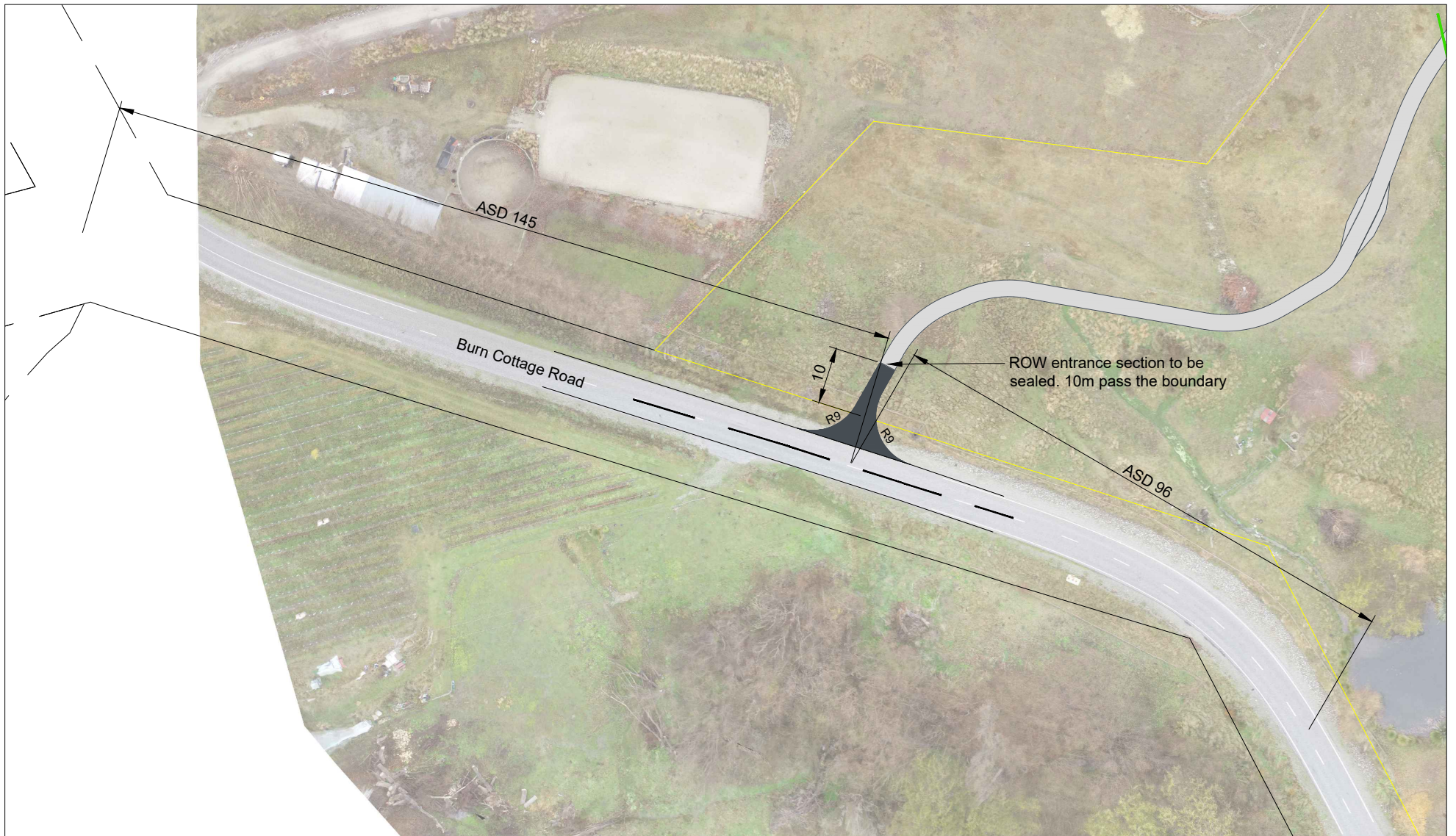
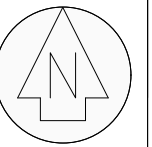
DATE
29/01/23

SCALE
Not To Scale

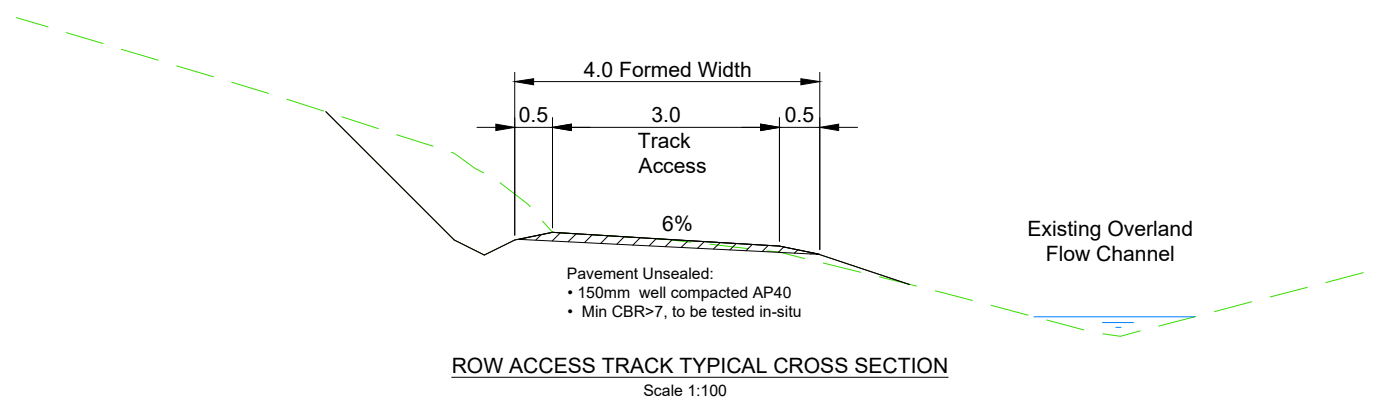
DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION C DRAWING REFERENCE Y4205_S2 Sheet 6 of 6

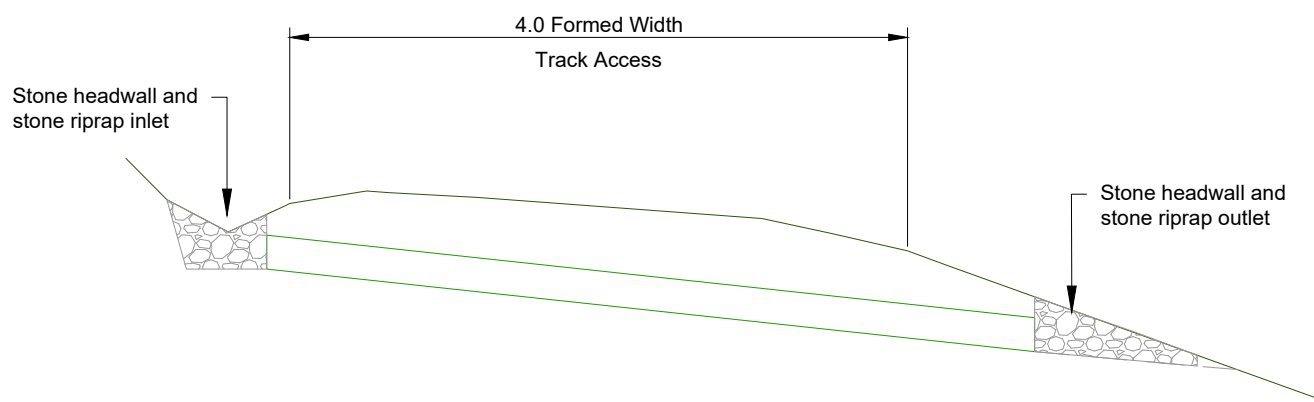
SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	29/01/23
DRAWN	DATE	APPROVED	DATE
JR	15/06/22	B.W.	29/01/23



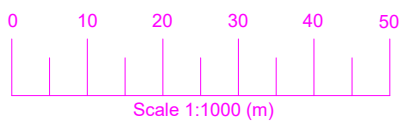
ROW ENTRANCE DETAILS AND SIGHT DISTANCES
Scale 1:1000



ROW ACCESS TRACK TYPICAL CROSS SECTION
Scale 1:100



ACCESS TRACK TYPICAL CULVERT CROSSING
Scale 1:50



- NOTES:**
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 - Abuttal data sourced from LINZ XML
 - Aerial Imagery was flown by drone on the 09/06/22
 - Contours
 - Major: 5.0m
 - Minor: 1.0m

Plan Revisions		
REV.	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22
C	Engineering design details added for RFI	29/01/23

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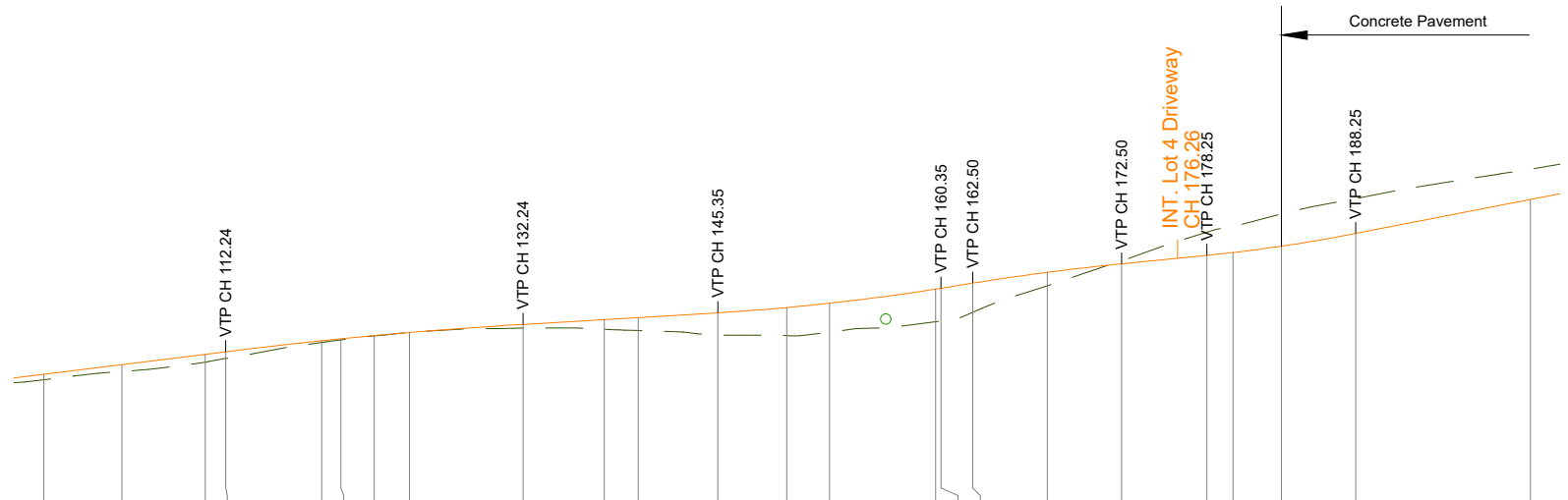
Prepared for
Resource Consent

Drawing Title
Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

APPLICANT Sam Hazledine
COMPRISED IN RT 24795
TERRITORIAL AUTHORITY Central Otago District Council
LAND DISTRICT Otago
TOTAL AREA 32.0 ha
DATE 29/01/23

SCALE AS SHOWN			
DATUM & LEVEL Lindis Peak 2000 Levels in Terms of New Zealand Vertical Datum 2016 Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m			
REVISION B	DRAWING REFERENCE Y4205_E1	Sheet 1 of 9	
SURVEYED JVB	DATE 09/06/22	CHECKED B.W.	DATE 29/01/23
DRAWN JR	DATE 24/08/22	APPROVED B.W.	DATE 29/01/23

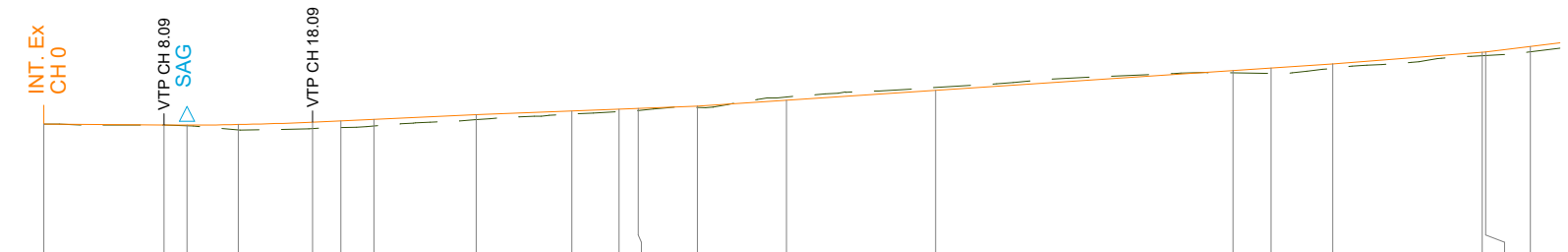


DATUM 274.00

VERTICAL GEOMETRY																								
HORIZONTAL GEOMETRY	R -10.0m					R -50.0m					R 50.0m													
DESIGN SURFACE	283.16	283.81	284.51	285.41	286.52	286.85	286.98	287.30	287.65	287.94	288.90	288.95	289.30	290.02	290.60	291.17	291.36	291.79	292.64	294.92				
EXISTING SURFACE	282.79	283.35	283.98	284.22	285.30	285.48	285.55	285.76	285.97	286.28	286.19	286.10	285.80	285.76	286.00	286.70	286.74	288.95	289.14	291.36	296.98			
CUT/FILL	0.36	0.46	0.53	0.45	0.11	0.07	0.01	-0.00	0.25	0.65	0.88	1.50	1.89	1.94	2.20	2.21	1.96	0.90	-0.19	-1.56	-2.06			
CHAINAGES	100.00	105.25	110.86	112.24	118.69	120.00	122.24	124.61	132.24	137.71	140.00	145.35	149.98	152.85	160.00	160.35	162.50	167.50	172.50	178.25	180.00	183.25	188.25	200.00

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cl01



DATUM 269.00

VERTICAL GEOMETRY																								
HORIZONTAL GEOMETRY	R 20.0m					R 20.0m					R -20.0m													
DESIGN SURFACE	277.95	277.88	277.88	277.91	278.07	278.16	278.26	278.57	278.82	278.94	278.99	279.14	279.54	280.20	281.53	281.70	281.97	282.76	282.78	283.16				
EXISTING SURFACE	277.95	277.88	277.83	277.54	277.64	277.70	277.81	278.24	278.62	278.78	278.86	279.06	279.76	280.39	281.38	281.36	281.71	282.53	282.55	282.79	283.16			
CUT/FILL	0.00	0.00	0.04	0.37	0.43	0.45	0.45	0.33	0.20	0.16	0.13	0.09	-0.22	-0.19	0.15	0.34	0.27	0.23	0.24	0.36	0.36			
CHAINAGES	0.00	8.09	9.64	13.09	18.09	20.00	22.21	29.09	35.53	38.71	40.00	43.97	49.96	60.00	80.00	82.56	86.72	96.76	96.99	100.00				

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cl01

- NOTES:**
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 - Aerial Imagery was flown by drone on the 09/06/22
 - Contours
 - Major: 5.0m
 - Minor: 1.0m

REV.	DESCRIPTION	DATE
A	Original Issue	24/08/22
B	Changes to lot layout	05/12/22
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APPLICANT
Sam Hazledine

COMPRISED IN
RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

DATE
29/01/23

SCALE
1:500 @ A3

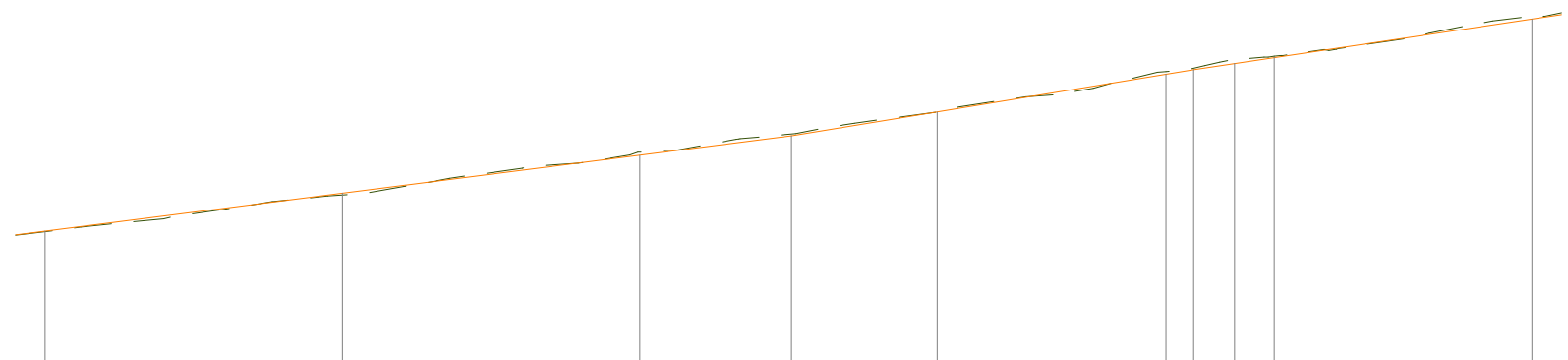
DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION
C

DRAWING REFERENCE
Y4205_E1

SHEET
2 of 9

SURVEYED JVB	DATE 09/06/22	CHECKED B.W.	DATE 29/01/23
DRAWN JR	DATE 24/08/22	APPROVED B.W.	DATE 29/01/23

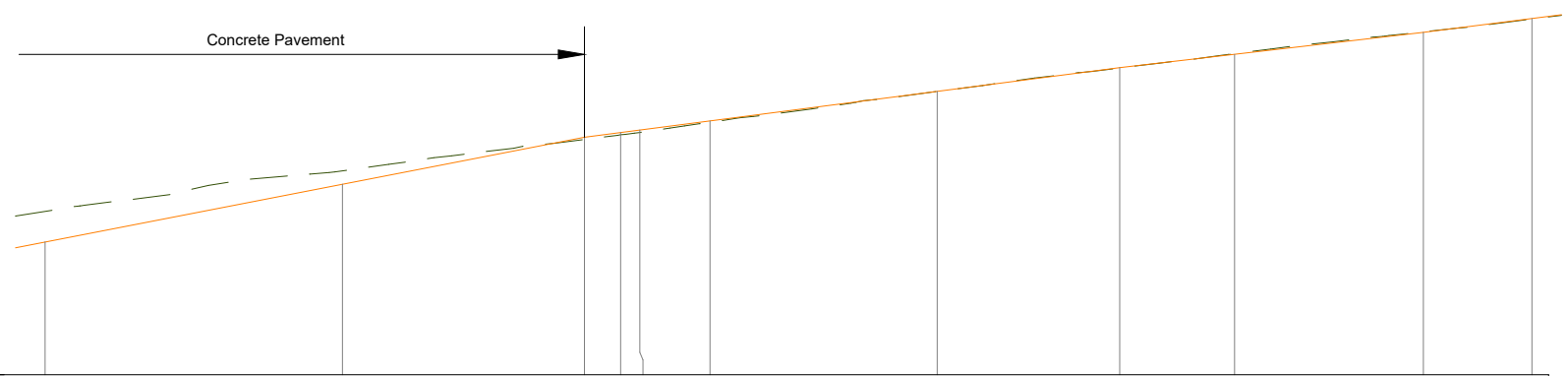


DATUM301.00

VERTICAL GEOMETRY	12.8%										16.5%			14.9%	
HORIZONTAL GEOMETRY											R 80.0m				
DESIGN SURFACE	309.93	312.48	315.04	316.34	317.95	320.49	320.79	321.20	321.60	324.19					
EXISTING SURFACE	309.90	312.35	315.24	316.46	317.95	320.67	320.88	321.48	321.69	324.36					
CUT/FILL	0.03	0.13	-0.20	-0.12	0.00	-0.18	-0.09	-0.28	-0.08	-0.17					
CHAINAGES	300.00	320.00	340.00	350.20	360.00	375.39	377.24	380.00	382.67	400.00					

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cI01



DATUM286.00

VERTICAL GEOMETRY	19.4%					13.0%					11.6%		12.8%	
HORIZONTAL GEOMETRY						R -50.0m								
DESIGN SURFACE	294.92	298.80	301.96	302.28	302.45	303.06	305.04	306.63	307.53	309.00	309.93			
EXISTING SURFACE	296.98	299.70	301.81	302.12	302.28	302.97	305.03	306.61	307.57	309.04	309.90			
CUT/FILL	-2.06	-0.90	0.15	0.16	0.16	0.09	0.01	0.03	-0.04	-0.04	0.03			
CHAINAGES	200.00	220.00	236.28	238.72	240.00	244.72	260.00	272.28	280.00	292.70	300.00			

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cI01

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REV.	DESCRIPTION	DATE
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APPLICANT
Sam Hazledine

COMPRISED IN
RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

DATE
29/01/23

SCALE
1:500 @ A3

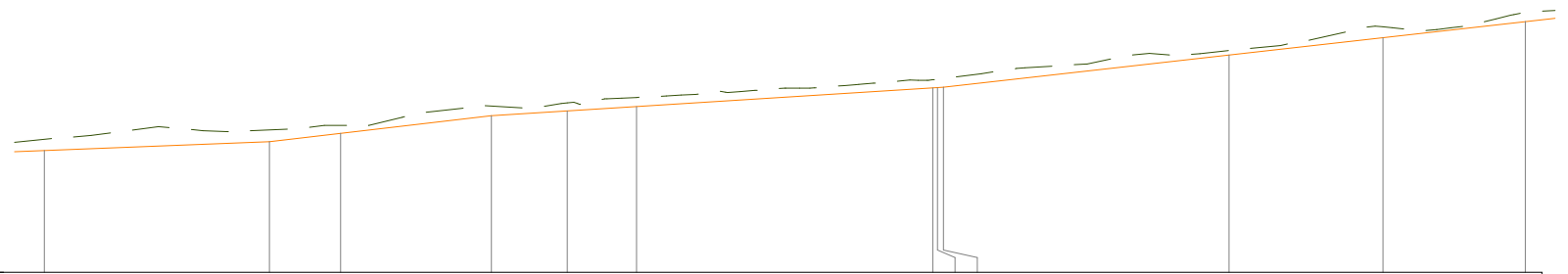
DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION
C

DRAWING REFERENCE
Y4205_E1

SHEET
3 of 9

SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	29/01/23
DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	29/01/23

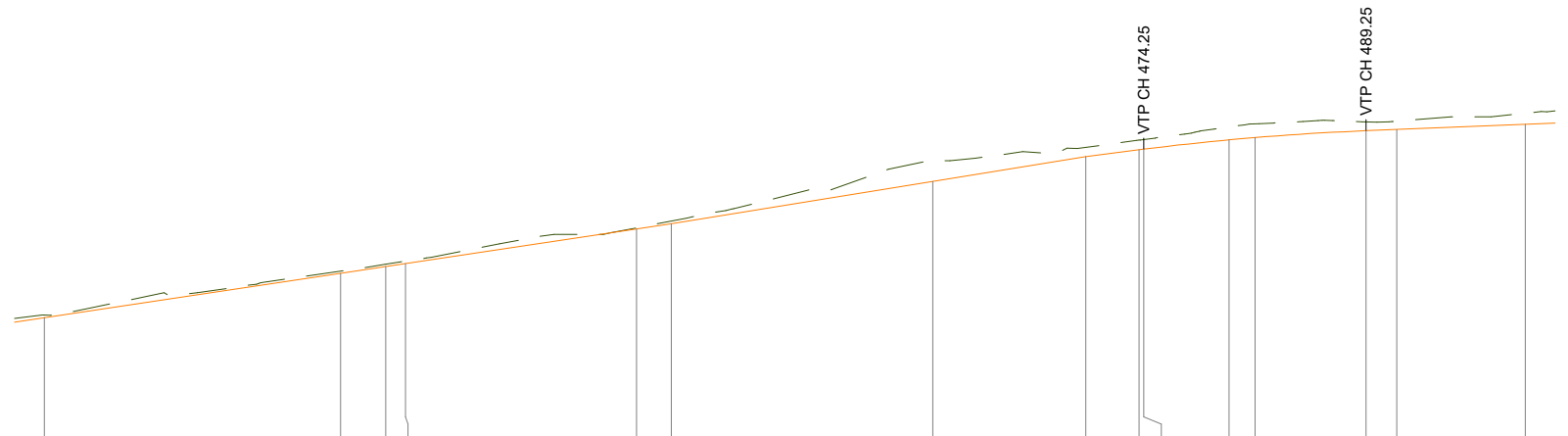


DATUM329.00

VERTICAL GEOMETRY	4.0% 11.6% 6.3% 11.3%													
HORIZONTAL GEOMETRY	R -70.0m										R -100.0m			
DESIGN SURFACE	337.24	337.84	338.40	339.59	339.91	340.20	341.46	341.48	341.51	343.69	344.87	345.96	346.55	346.55
EXISTING SURFACE	337.99	338.63	338.94	340.24	340.46	340.83	342.01	342.05	342.10	343.99	345.59	346.55	346.55	346.55
CUT/FILL	-0.75	-0.79	-0.54	-0.65	-0.55	-0.62	-0.55	-0.57	-0.59	-0.30	-0.72	-0.60	-0.60	-0.60
CHAINAGES	500.00	515.20	520.00	530.19	535.31	540.00	560.00	560.30	560.71	580.00	590.39	600.00	600.00	600.00

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cl01



DATUM316.00

VERTICAL GEOMETRY	14.9% 16.2% 12.6% 4.0%														
HORIZONTAL GEOMETRY	R 50.0m							K = 1.7 VC 15.0m							
DESIGN SURFACE	324.19	327.33	327.18	327.64	327.84	330.17	330.52	333.39	335.07	335.52	335.57	336.20	336.35	336.81	337.24
EXISTING SURFACE	324.36	327.33	327.64	328.00	327.84	330.26	330.71	334.77	335.68	336.17	336.22	337.06	337.27	337.41	337.99
CUT/FILL	-0.17	-0.14	-0.15	-0.16	-0.16	-0.08	-0.18	-1.37	-0.61	-0.65	-0.65	-0.86	-0.92	-0.60	-0.75
CHAINAGES	400.00	420.00	423.06	424.39	440.00	442.34	460.00	470.31	473.93	474.25	480.00	481.75	489.25	491.33	500.00

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cl01

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 - Abuttal data sourced from LINZ XML
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 - Contours
 - Major: 5.0m
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REV.	DESCRIPTION	DATE
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B	Changes to lot layout	05/12/22
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LAND DISTRICT
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TOTAL AREA
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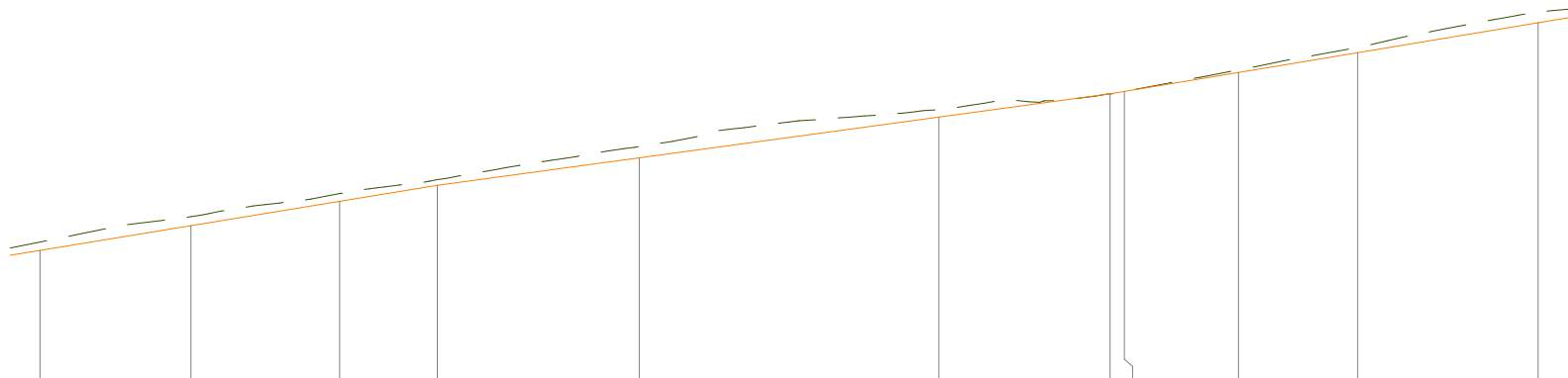
DATE
29/01/23

SCALE
1:500 @ A3

DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION	DRAWING REFERENCE	Sheet
C	Y4205_E1	4 of 9

SURVEYED	DATE	CHECKED	DATE
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DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	29/01/23

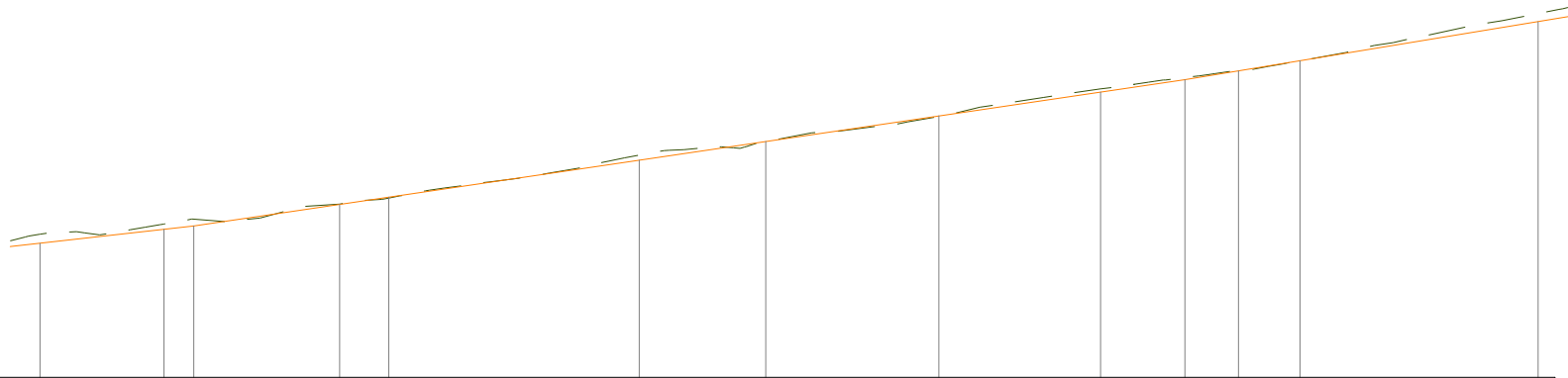


DATUM352.00

VERTICAL GEOMETRY	16.4%											13.6%											16.6%										
HORIZONTAL GEOMETRY	R -200.0m											R -200.0m											R -200.0m										
DESIGN SURFACE	700.00	710.08	720.00	726.53	740.00	760.00	771.43	772.39	780.00	787.96	800.00	360.76	362.42	364.04	365.11	366.95	369.68	371.23	371.39	372.66	373.98	375.98											
EXISTING SURFACE	361.31	363.02	364.55	365.48	367.70	370.17	371.22	371.39	372.82	374.31	376.70	361.31	363.02	364.55	365.48	367.70	370.17	371.22	371.39	372.82	374.31	376.70											
CUT/FILL	-0.55	-0.60	-0.51	-0.37	-0.75	-0.49	0.01	0.01	-0.16	-0.33	-0.72	-0.55	-0.60	-0.51	-0.37	-0.75	-0.49	0.01	0.01	-0.16	-0.33	-0.72											
CHAINAGES	700.00	710.08	720.00	726.53	740.00	760.00	771.43	772.39	780.00	787.96	800.00	700.00	710.08	720.00	726.53	740.00	760.00	771.43	772.39	780.00	787.96	800.00											

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cI01



DATUM337.00

VERTICAL GEOMETRY	11.3%											14.8%											16.4%										
HORIZONTAL GEOMETRY	R -100.0m											R 50.0m											R 100.0m										
DESIGN SURFACE	600.00	608.28	610.26	620.00	623.27	640.00	648.45	660.00	670.81	676.43	680.00	684.11	700.00	345.96	346.89	347.12	348.56	349.04	351.51	352.76	354.47	356.07	356.90	357.48	358.16	360.76							
EXISTING SURFACE	346.55	347.24	347.57	348.57	348.97	351.85	352.76	354.43	356.27	357.03	357.49	358.16	361.31	346.55	347.24	347.57	348.57	348.97	351.85	352.76	354.43	356.27	357.03	357.49	358.16	361.31							
CUT/FILL	-0.60	-0.34	-0.45	-0.01	0.07	-0.34	0.00	0.04	-0.20	-0.14	-0.01	-0.00	-0.55	-0.60	-0.34	-0.45	-0.01	0.07	-0.34	0.00	0.04	-0.20	-0.14	-0.01	-0.00	-0.55							
CHAINAGES	600.00	608.28	610.26	620.00	623.27	640.00	648.45	660.00	670.81	676.43	680.00	684.11	700.00	600.00	608.28	610.26	620.00	623.27	640.00	648.45	660.00	670.81	676.43	680.00	684.11	700.00							

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cI01

NOTES:

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 - Minor: 1.0m —

REV.	DESCRIPTION	DATE
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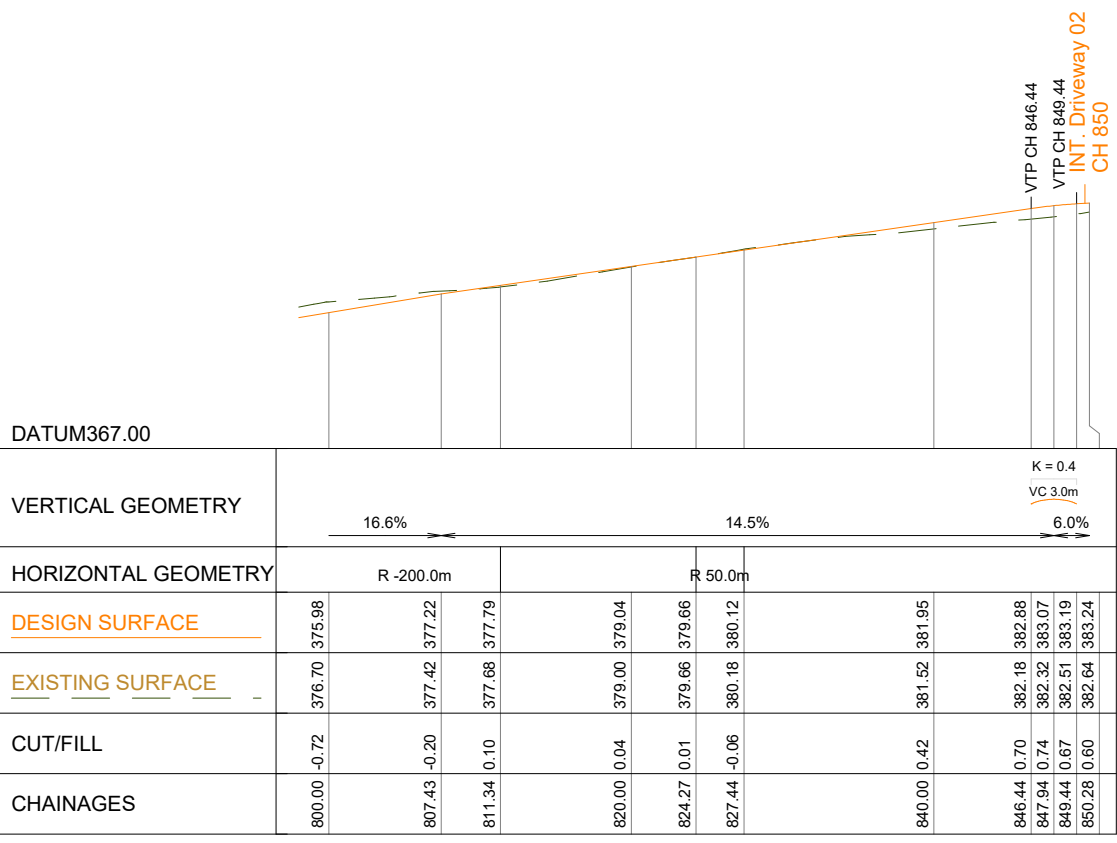
DATE
29/01/23

SCALE
1:500 @ A3

DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION
C
DRAWING REFERENCE
Y4205_E1
Sheet
5 of 9

SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	29/01/23
DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	29/01/23



VERTICAL GEOMETRY	16.6%		14.5%		6.0%		K = 0.4 VC 3.0m	
HORIZONTAL GEOMETRY	R -200.0m			R 50.0m				
DESIGN SURFACE	376.70	375.98	377.22	377.79	379.04	379.66	380.12	381.95
EXISTING SURFACE	376.70	377.42	377.68	377.79	379.04	379.66	380.18	381.52
CUT/FILL	-0.72	-0.20	0.10		0.04	0.01	-0.06	0.42
CHAINAGES	800.00	807.43	811.34		820.00	824.27	827.44	840.00
								846.44
								847.94
								849.44
								850.28

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500
Long Section c101

- NOTES:**
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 - Abuttal data sourced from LINZ XML
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 - Contours
 - Major: 5.0m —
 - Minor: 1.0m —

REV.	DESCRIPTION	DATE
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B	Changes to lot layout	05/12/22
C	Engineering design details added for RFI	29/01/23

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Prepared for
Resource Consent

Drawing Title
Lots 1, 2, 3 & 4 Being a Proposed Subdivision of Lot 2 DP 306317

172 Burn Cottage Road, Cromwell

APPLICANT
Sam Hazledine

COMPRISED IN
RT 24795

TERRITORIAL AUTHORITY
Central Otago District Council

LAND DISTRICT
Otago

TOTAL AREA
32.0 ha

DATE
29/01/23

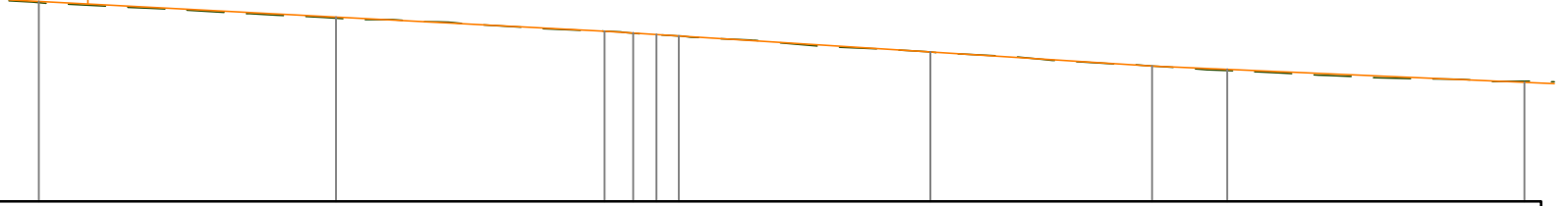
SCALE
1:500 @ A3

DATUM & LEVEL
Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m

REVISION	DRAWING REFERENCE	Sheet
C	Y4205_E1	6 of 9

SURVEYED	DATE	CHECKED	DATE
JVB	09/06/22	B.W.	29/01/23
DRAWN	DATE	APPROVED	DATE
JR	24/08/22	B.W.	29/01/23

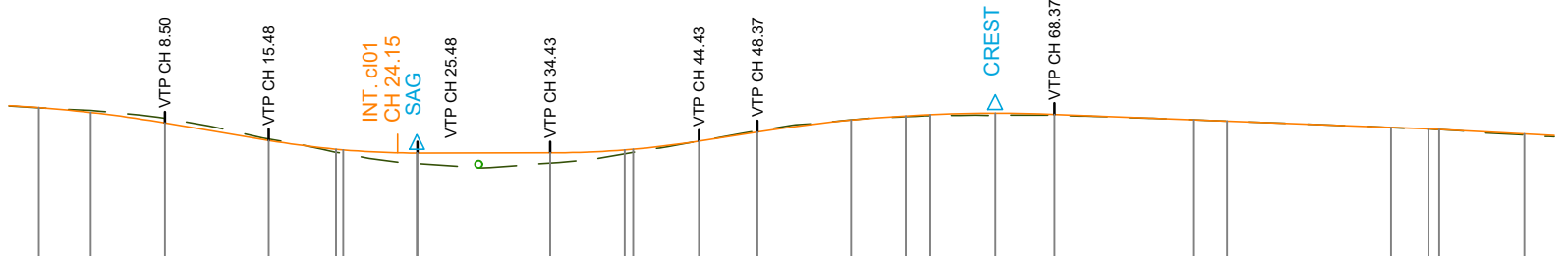
INT. Lot 1a Driveway
CH 103.31



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HORIZONTAL GEOMETRY	R 100.0m
DESIGN SURFACE	384.48 383.43 382.49 382.36 382.26 382.17 381.09 380.14 379.92 379.04
EXISTING SURFACE	384.41 383.37 382.49 382.34 382.24 382.16 381.08 380.14 379.83 379.12
CUT/FILL	0.07 0.07 0.00 0.02 0.02 0.01 0.01 0.00 0.09 -0.08
CHAINAGES	100.00 120.00 138.09 140.00 141.58 143.08 160.00 174.93 180.00 200.00

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cl02



DATUM374.00	
VERTICAL GEOMETRY	-5.9% -16.9% 0.1% 15.7% -3.9% -5.2%
HORIZONTAL GEOMETRY	R 15.0m R 100.0m
DESIGN SURFACE	386.27 385.94 385.23 384.05 383.46 383.42 383.21 383.21 383.21 384.00 384.62 385.42 385.71 385.79 385.88 385.81 385.44 385.35 384.92 384.82 384.78 384.48
EXISTING SURFACE	386.25 386.07 385.53 384.14 383.26 383.17 382.50 382.50 382.53 383.16 383.41 383.46 383.26 383.46 384.00 384.70 385.44 385.66 385.72 385.75 385.76 385.45 384.92 384.82 384.78 384.41
CUT/FILL	0.01 -0.14 -0.30 -0.09 0.20 0.25 0.71 0.71 0.68 0.26 0.20 0.20 -0.02 0.05 0.07 0.14 -0.04 -0.01 -0.00 0.00 -0.00 -0.00 -0.00 -0.00 0.07
CHAINAGES	0.00 3.50 8.50 15.48 20.00 20.48 25.45 25.48 34.43 39.43 40.00 44.43 48.37 54.68 60.00 64.39 68.37 77.71 80.00 91.03 93.54 94.25 100.00

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cl02

NOTES:

- Boundary data has been sourced from DP 306317
- Abuttal data sourced from LINZ XML
- Aerial Imagery was flown by drone on the 09/06/22
- Contours
Major: 5.0m
Minor: 1.0m

REV.	DESCRIPTION	DATE
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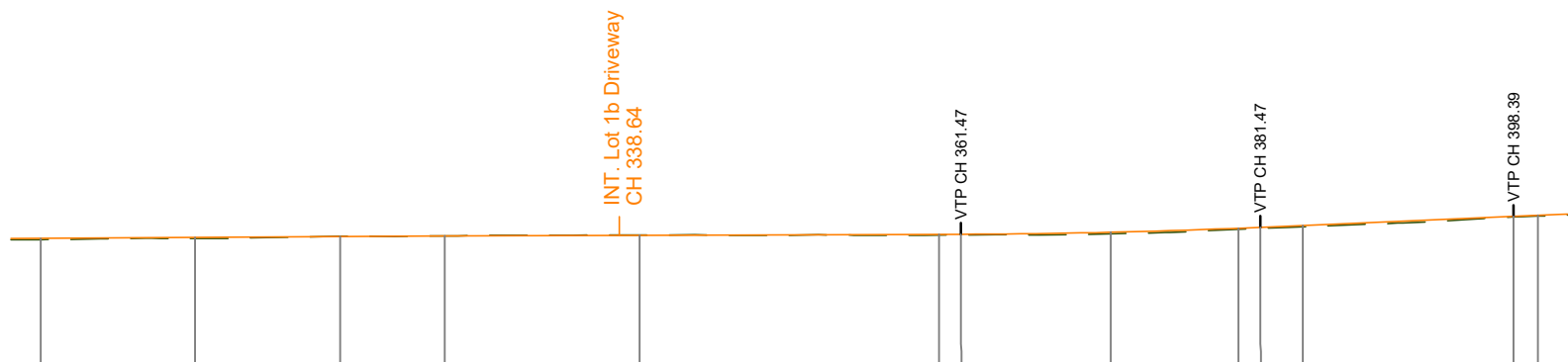
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172 Burn Cottage Road, Cromwell

APPLICANT Sam Hazledine
COMPRISED IN RT 24795
TERRITORIAL AUTHORITY Central Otago District Council
LAND DISTRICT Otago
TOTAL AREA 32.0 ha
DATE 29/01/23

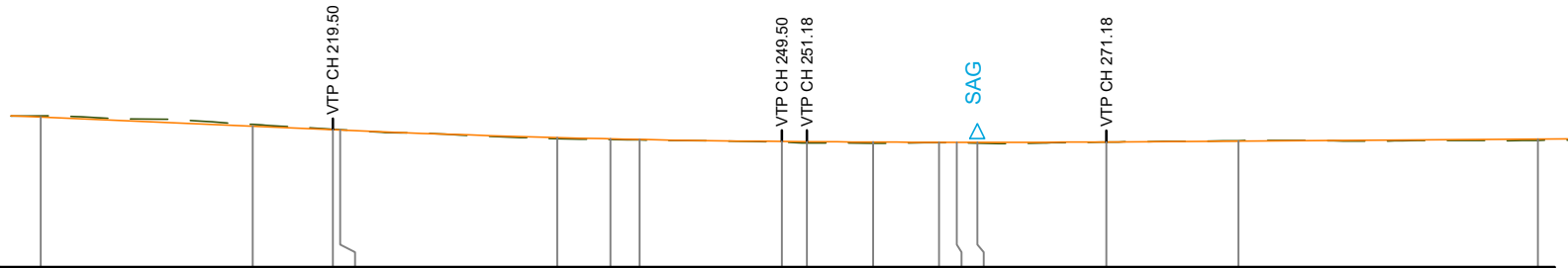
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DATUM & LEVEL Linds Peak 2000 Levels in Terms of New Zealand Vertical Datum 2016 Origin of Levels: PIN 1 SO 558761 (F6GV) RL= 208.128m			
REVISION C	DRAWING REFERENCE Y4205_E1	Sheet 7 of 9	
SURVEYED JVB	DATE 09/06/22	CHECKED B.W.	DATE 29/01/23
DRAWN JR	DATE 24/08/22	APPROVED B.W.	DATE 29/01/23



VERTICAL GEOMETRY	K = 5.0 VC 20.0m										K = 7.4 VC 20.0m			
HORIZONTAL GEOMETRY	R 100.0m										R 80.0m			
DESIGN SURFACE	377.55	377.62	377.68	377.72	377.76	377.77	377.83	377.83	377.96	378.23	378.29	378.42	379.02	379.09
EXISTING SURFACE	377.47	377.56	377.69	377.72	377.78	377.77	377.78	377.83	377.86	378.16	378.22	378.33	378.99	379.05
CUT/FILL	0.08	0.06	-0.02	0.00	-0.02	0.05	0.05	0.05	0.10	0.08	0.07	0.09	0.03	0.05
CHAINAGES	300.00	310.31	320.00	326.99	340.00	360.00	361.47	371.47	380.00	381.47	384.31	398.39	400.00	

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cI02



VERTICAL GEOMETRY	K = 8.4 VC 30.0m										K = 13.7 VC 20.0m					
HORIZONTAL GEOMETRY	R -20.0m										R 100.0m					
DESIGN SURFACE	379.04	378.42	378.19	378.17	377.66	377.59	377.58	377.54	377.40	377.39	377.36	377.35	377.34	377.37	377.43	377.55
EXISTING SURFACE	379.12	378.54	378.22	378.19	377.59	377.53	377.51	377.54	377.36	377.31	377.39	377.32	377.31	377.34	377.45	377.47
CUT/FILL	-0.08	-0.12	-0.03	-0.02	0.07	0.05	0.03	0.03	0.05	0.08	0.08	0.03	0.04	0.06	-0.03	0.08
CHAINAGES	200.00	214.16	219.50	220.00	234.50	238.05	240.00	249.50	251.18	255.61	260.00	261.18	262.56	271.18	280.00	300.00

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:500

Long Section cI02

NOTES:

- Boundary data has been sourced from DP 306317
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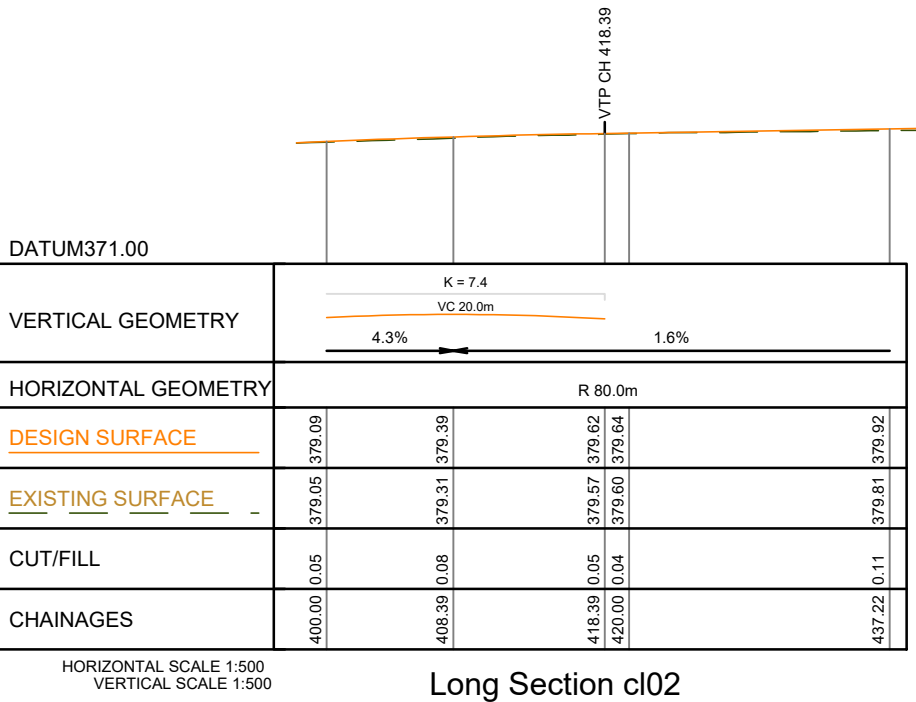
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Lindis Peak 2000
Levels in Terms of New Zealand Vertical Datum 2016
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REVISION
C

DRAWING REFERENCE
Y4205_E1

Sheet
8 of 9

SURVEYED JVB	DATE 09/06/22	CHECKED B.W.	DATE 29/01/23
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172 Burn Cottage Road

**Agricultural productivity and commercial
viability report encompassing relevant
matters in the NPS-HPL framework**

26th June, 2023

172 Burn Cottage Road, Cromwell

Summary of land asset

Lot 2 DP 306317

Applicant

Dr Sam Hazeldiene

Scope

Ben Trotter (Agronomist) has been asked to prepare a land use capability assessment and report for 172 Burn Cottage Road, Cromwell. The report will also focus on relevant matters in the NPS-HPL framework. The focus considers the property as a productive farming asset, with particular attention to the soil types and aspect of the site.

Overview of subject site

The site itself is 32.0624ha gross and consists of a range of aspects and soil types characteristic with the general vicinity of Burn Cottage Road. The land surrounding the site is predominately lifestyle sized allotments between 3 and 30ha, many of which are uneconomic farming units. The closest land assets which will be generating an operating surplus from agricultural or horticultural production are geographically close to this property, however are on flat lying lower terrace blocks.

The land within the general area of Burn Cottage Road is classified as “semi arid dryland” due to the low and sporadic annual rainfall and limited soil moisture holding capacity.

The Burn Cottage Road area which was once an extensive series of terraces has over time become populated with many residents who have a wider scope of income. Most of the residents along Burn Cottage Road have little financial connection or reliance on income from primary production.

A number of the smaller land parcels are owned by people who work in town and often it’s easier for them not to run animals and instead let the land revert, this has created some issues with pest pressure in the surrounding land pockets, specifically relating to rabbits.

There are a few niche activities such as saffron and peonie production and agritourism happening in the general vicinity of Burn Cottage Road, however it’s difficult to determine if these entities are profitable or sustainable land uses.

Site specific characteristics

The primary species growing on this land parcel are a range of introduced species, such as annual native grasses, some small leaf legumes and woody weeds such as borage spp. Their agricultural utility is limited

due to the limited seasonality of production and low nutritive value from a ruminant production perspective. While these species could be re sown with more productive species, this process involves heavy cultivation and the use of a lot of herbicides to kill resident weeds. Cultivation of this country is challenging due to wind blowing away topsoil and the use of herbicides is also a little challenging with a number of sensitive crops nearby on flat areas being prone to spray drift and consequently reverse sensitivity is a real challenge.



Photo 1. A general photo of the species on the parcel.

The most characteristic part of Photo 1 is the vegetation and a low biological function of the soil is. In healthy agricultural production areas plants typically are upright and ready for defoliation by animals, even during dry conditions. In this photo we have an example of a semi arid environment whereby everything dies and relies on seed to re germinate in the autumn to survive.

The subject site has rolling to steep hill faces with approximately 60% of the title being of a greater gradient than 10 degrees slope. Assuming access to irrigation, this precludes a large portion land from being able to be cropped without a winter grazing consent and adequate mitigation controls.

The soils across the entire site in general based on my field observations are Class 7 soil types. These soils are defined as unsuitable for irrigation. They have at least two serious and one less serious impediments, or an even greater degree of drawbacks for irrigation. I would define these impediments to be firstly a risk of down fan seepage and secondly a risk of leaching and or waterlogging.

Part of the proposed lot 4 has been identified as a LUC 3 soil type and this is defined as highly productive in the NPS. This specific area needed a specific assessment. Based on my field observations of this specific area of lot 4 I was able to conclude that this area has significant constraints over 50% of the LUC 3 land. These include a pond, a free flowing open water body, and a swamp area which contains a number of species consistent with a wetland. On the remaining area I conducted a soil type assessment and while the soil type is consistent with the rest of the subject site (shallow and free draining), I would conclude that the existing constraints on this small parcel impact on its ability to be used for agriculture or horticulture in any meaningful scale. Irrigation of this area (lot 4) within the LUC 3 area would almost certainly lead to harmful consequences such as accelerated erosion, down fan seepage or water logging/leaching into the nearby stream. These are genuine and very real risks to consider on this specific site and therefore I would not consider this area consistent with a number of other LUC 3 classified land assets.

Across the entire subject site including the LUC 3 land there are some other notable characteristics of the soil. The pH of the soil is extremely acidic and the low pH makes Al^{3+} more available to a point where its toxic to plant roots. This can result in the land being unsuitable for many improved pastoral species which would otherwise be utilized in other areas of higher utility for farming. The shallow fine sandy loam soils are very prone to drying out and hold low biological or agricultural value. These soils don't hold moisture well (approx. 20mm) and this results in them warming up in the summer and cooking most agronomically valuable plants.

On completion of two visual soil assessments I was personally able to determine that the soil on the LUC 3 area of the subject site lacks any primary production potential, furthermore on the rest of the 32ha site there are also constraints on soil types for agricultural or horticultural production systems.

To improve the soil across the entire site a significant investment in nitrogenous fertiliser, sulphur and phosphate would be required to alter the soils natural state to generate a suitable medium for more productive species to be persistent. However referencing S Maps, this soil has a high risk of leaching due to its free draining characteristics, therefore any fertiliser usage would antagonize with environmental objectives. The other major investment requirement would be lime to correct soil pH.

While some hay or grain could be grown on this land, the yields would be low and uneconomic for any such activity.



Photo 2. A representative soil assay illustrating shallow rooting depth and Aluminum toxicity at depth.



Photo 3. A representative part of proposed lot 4 within LUC 3 land showing a lot of surface runoff and a natural wetland area.

National policy statement for highly productive land considerations

A small part the proposed plan is considered to be 'highly productive' in the NPS on lot 4. I believe that its physical impediments (ponds, wetlands), its true soil type and the size of the LUC 3 area means that in fact its a "non productive" land from a farming perspective (livestock and horticultural).

The overall site I do not consider productive because of a range of constraints on it.

The risk profile regarding nitrate leaching associated with intensification of this land is also extremely high due the close proximity of neighboring bores and the small creek running through the proposed lot 4 make it an environmental risk as far as intensification is concerned. The soil types are shallow and very porous this means they have a low ability to bind onto nutrients resulting in a high leaching potential.

Access to water underpins any primary production potential in the area. This land asset cannot really be irrigated economically due to the aspect and the constraints of the current layout and topography. While the top terrace could be irrigated in the future the economic size of the command area would mean that it is a more recreational use of water rather than a standalone economically viable exercise.

Profitability

This land parcel in its entirety (32ha) is incapable of generating any profitable return from agricultural practices. It has very shallow and poor soil types and is prone to extreme dry down in summer months. Even with the addition of irrigation this size would be challenging to cover fixed costs associated with running an agricultural business and nowadays you need at least 60+ ha to be economically viable. Under a horticultural model this could would but you would need to have flat land and not steep hill sides (which are south facing) for planting into any higher value crops.

Conclusions

Looking at the entire parcel of land on 172 Burn Cottage road I would conclude the following;

- The soils hold low agricultural value and there are significant impediments to agricultural or horticultural production on the LUC 3 land within the proposed lot 4 area.
- Part of the proposed land is considered highly productive in the NPS, however due to the geographical constraints I would consider it to be a non productive land.
- The parcel is incapable of agricultural production due a low organic matter status in the soils and the shallow soils prone to both erosion and leaching.
- The return from farming this asset would be negative by a considerable margin
- The application of this land parcel for horticulture is limited in my opinion, largely due to its topography, soils and altitude, a large part of the entire lot faces towards the south which also decreases its appeal from a degree C growing day perspective. Given the soil type and altitude

there are far more appropriate places for horticulture on high class soils around other areas of the general Cromwell area.

- It is my opinion that the cost associated with a small loss of LUC 3 land will be non significant because this land is not able to be utilised for agricultural or horticultural production due to the constraints mentioned above.
- It is my opinion that this land should be able to be developed into smaller sites to allow for a more rural lifestyle land use.

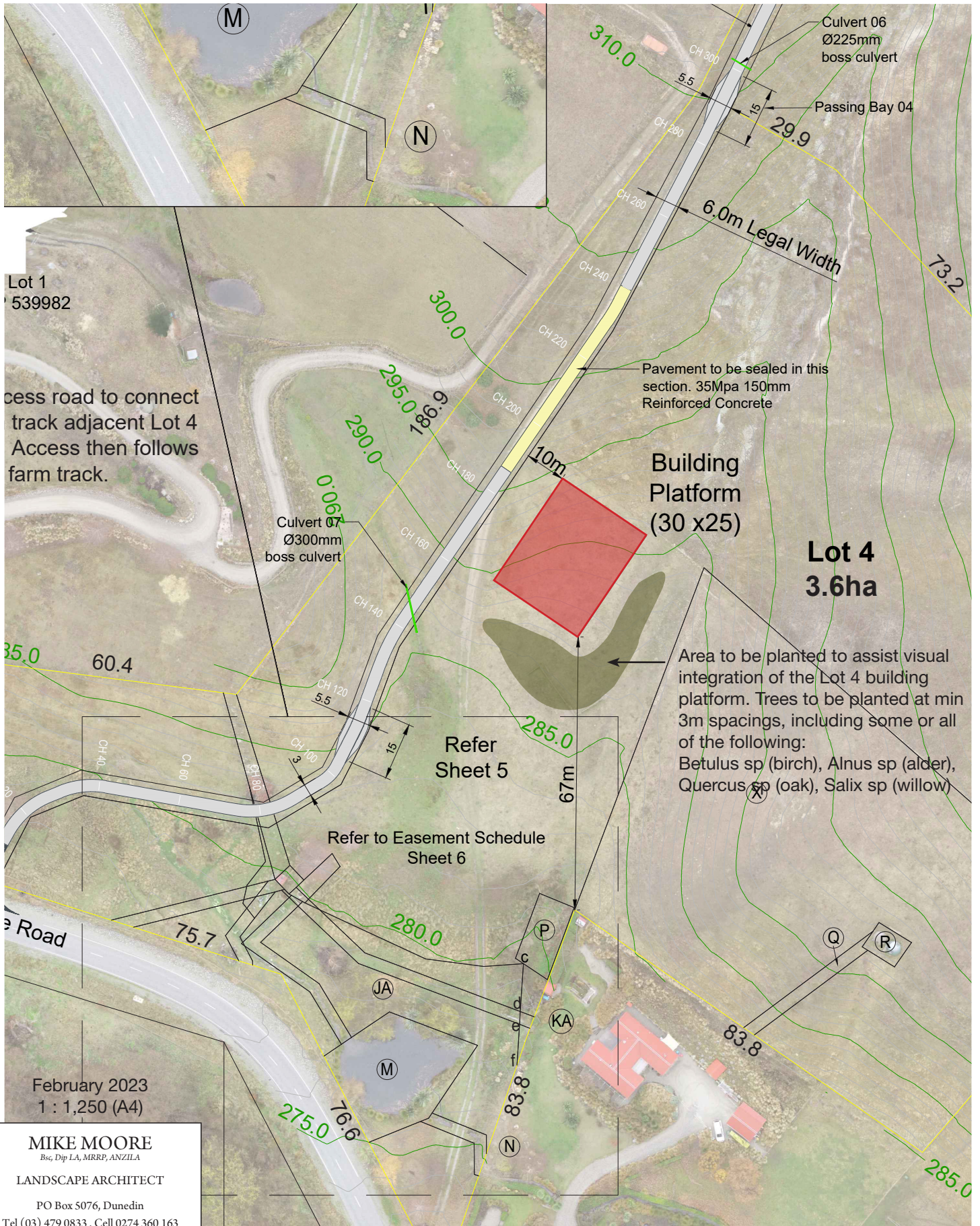
My qualifications

I hold a Bachelor of Agricultural Science degree from Lincoln University. I have worked in the seed industry as a pastoral agronomist for over a decade. I work closely with a number of large scale landowners in the Upper Clutha to drive profitable and environmentally sustainable crop and pasture rotations.

Ben Trotter
Agronomist

Figure A

Proposed mitigation planting concept – Lot 4 building platform, 172 Burn Cottage Road, Cromwell



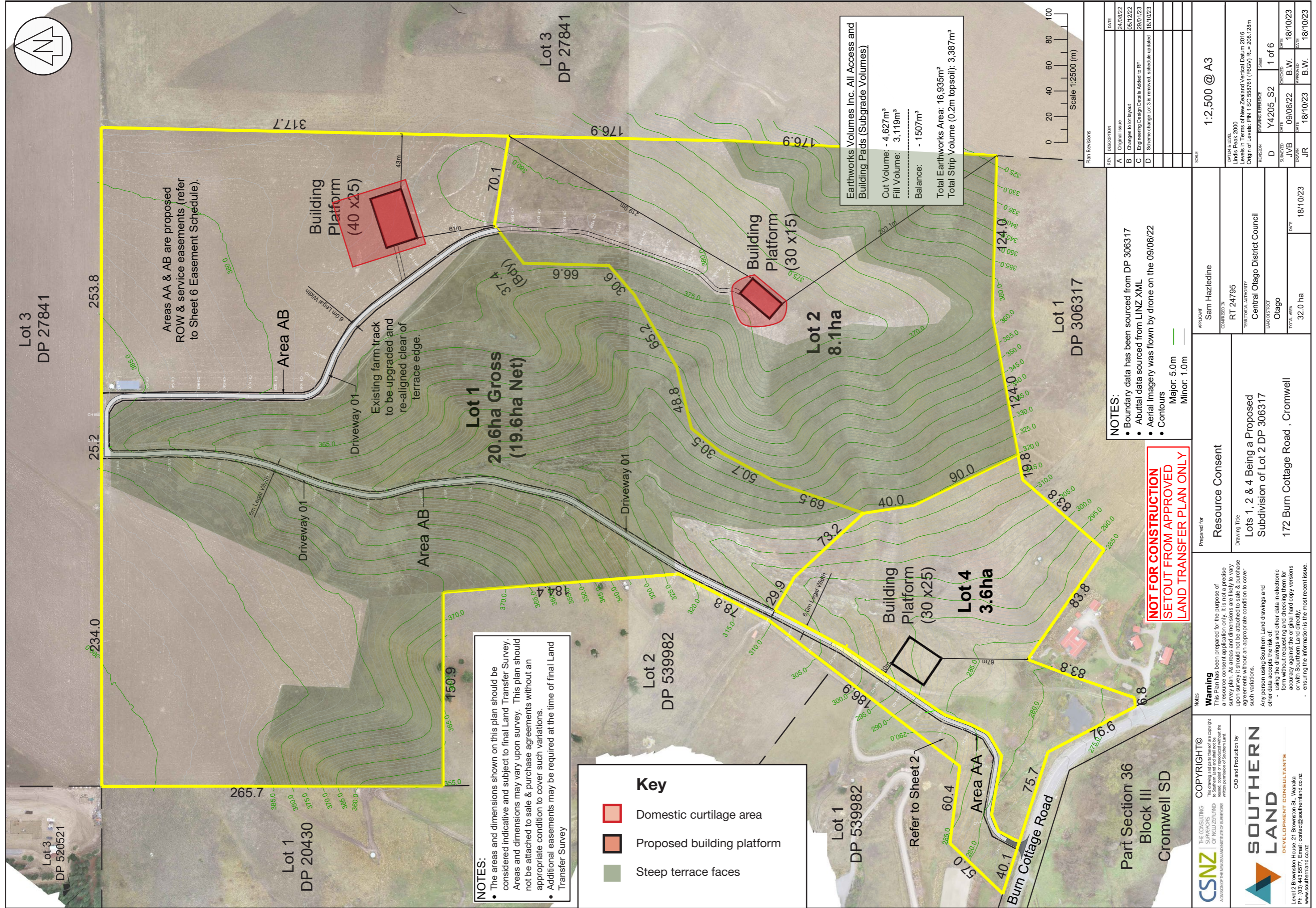


Figure 13: Proposed subdivision concept (Updated October 2023)

NOTES:

- The areas and dimensions shown on this plan should be considered indicative and subject to final Land Transfer Survey. Areas and dimensions may vary upon survey. This plan should not be attached to sale & purchase agreements without an appropriate condition to cover such variations.
- Additional easements may be required at the time of final Land Transfer Survey

Key

- Domestic curtilage area
- Proposed building platform
- Steep terrace faces

Earthworks Volumes Inc. All Access and Building Pads (Subgrade Volumes)

Cut Volume: - 4,627m³
 Fill Volume: 3,119m³
 Balance: - 1507m³

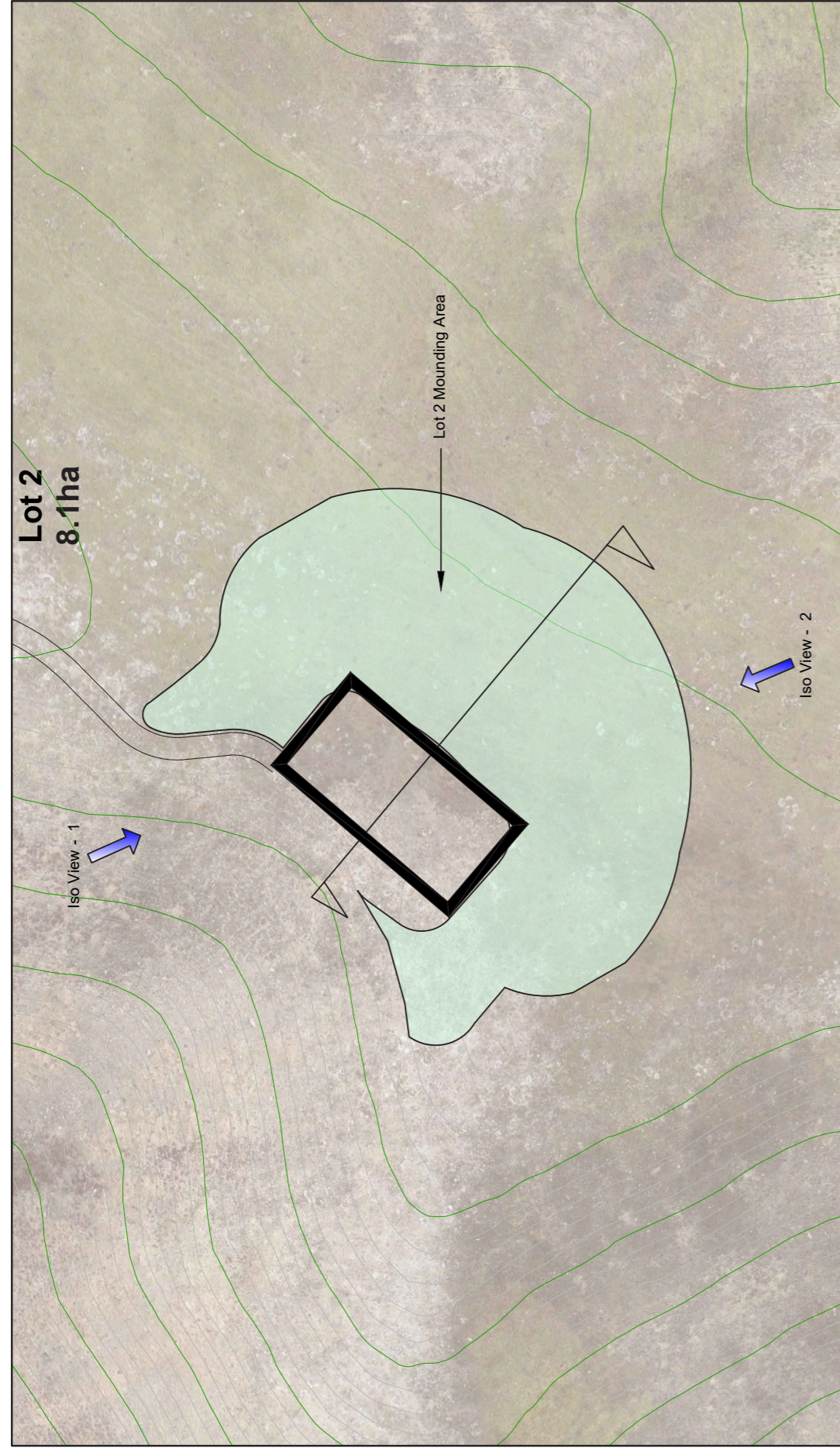
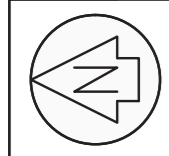
Total Earthworks Area: 16,935m²
 Total Strip Volume (0.2m topsoil): 3,387m³

NOTES:

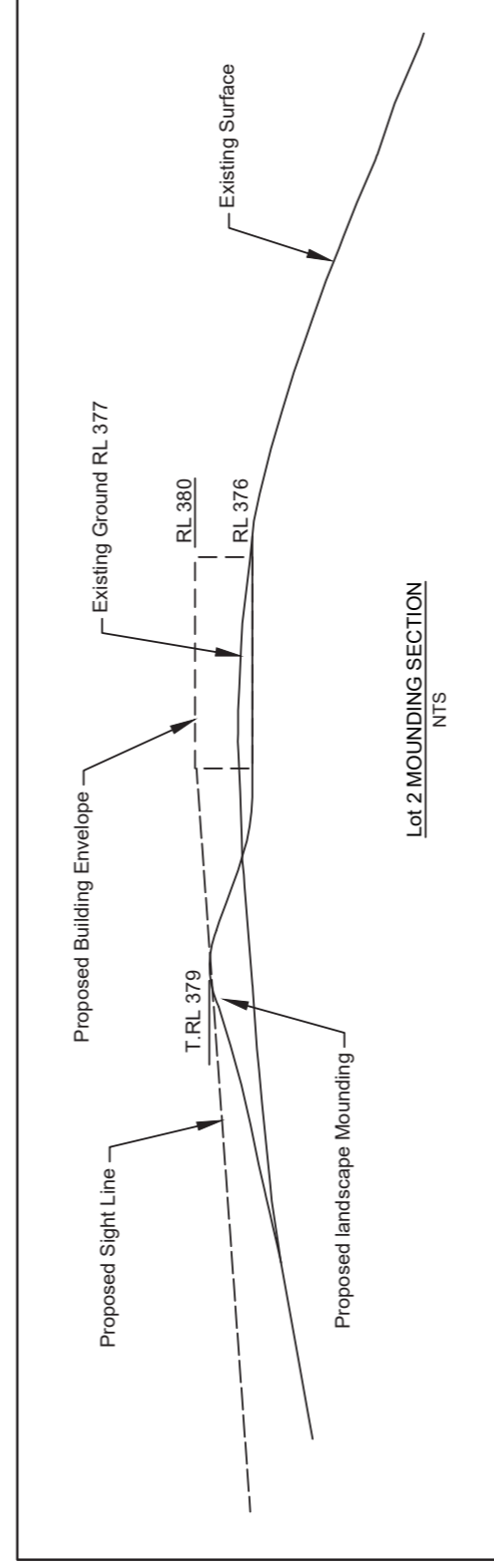
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 LAND TRANSFER PLAN ONLY**

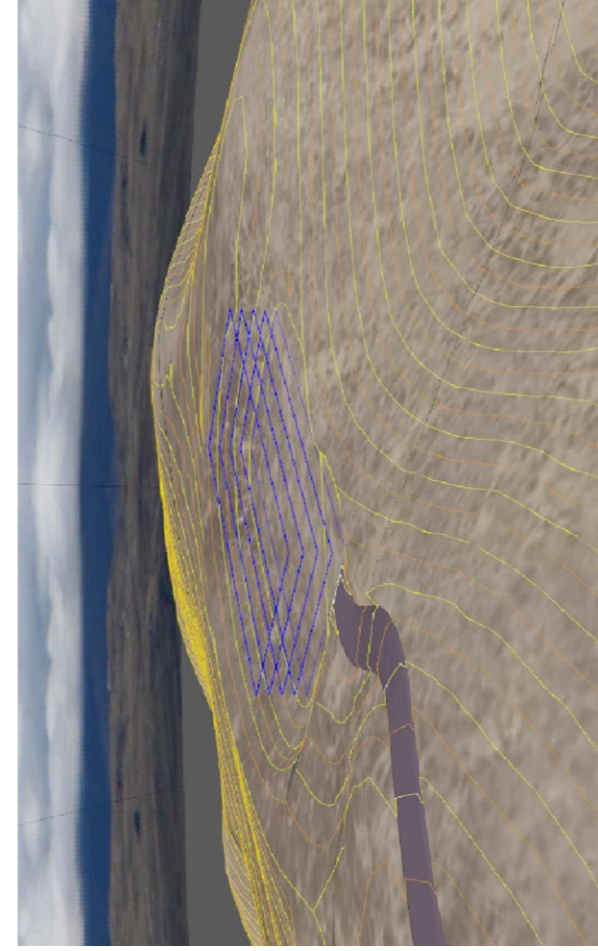
<p>Plan Revisions</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV.</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Original Issue</td> <td>24/09/22</td> </tr> <tr> <td>B</td> <td>Changes to sit layout</td> <td>05/12/22</td> </tr> <tr> <td>C</td> <td>Engineering Design Details Added to RFI</td> <td>29/01/23</td> </tr> <tr> <td>D</td> <td>Scheme change Lot 3 to be removed, schedule updated</td> <td>18/10/23</td> </tr> </tbody> </table>	REV.	DESCRIPTION	DATE	A	Original Issue	24/09/22	B	Changes to sit layout	05/12/22	C	Engineering Design Details Added to RFI	29/01/23	D	Scheme change Lot 3 to be removed, schedule updated	18/10/23	<p>APPLICANT Sam Hazledine</p> <p>CONVEYED IN RT 24795</p> <p>TERRITORIAL AUTHORITY Central Otago District Council</p> <p>LAND DISTRICT Otago</p> <p>TOTAL AREA 32.0 ha</p> <p>DATE 18/10/23</p>	<p>Prepared for Resource Consent</p> <p>Drawing Title Lots 1, 2 & 4 Being a Proposed Subdivision of Lot 2 DP 306317</p> <p>172 Burn Cottage Road, Cromwell</p>	<p>Scale 1:2,500 @ A3</p> <p>DATE 18/10/23</p> <p>REVISION D Y4205_S2 1 of 6</p> <p>SUBMITTED DATE 09/06/22</p> <p>APPROVED DATE 18/10/23</p> <p>DATE 18/10/23</p>
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D	Scheme change Lot 3 to be removed, schedule updated	18/10/23																
<p>Notes</p> <p>Warning This Plan has been prepared for the purpose of a resource consent application only. It is not a precise survey plan. As areas and dimensions are likely to vary upon survey it should not be attached to sale & purchase agreements without an appropriate condition to cover such variations.</p> <p>Any person using Southern Land 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 or with Southern Land directly. - ensuring the information is the most recent issue.</p>		<p>CSNZ THE CONSULTING SURVEYORS OF NEW ZEALAND A DIVISION OF THE NEW ZEALAND INSTITUTE OF SURVEYORS</p> <p>SOUTHERN LAND DEVELOPMENT CONSULTANTS</p> <p>Level 2 Brownston House, 21 Brownston St., Wanaka Ph: (03) 443 5577. Email: contact@southernland.co.nz www.southernland.co.nz</p>																



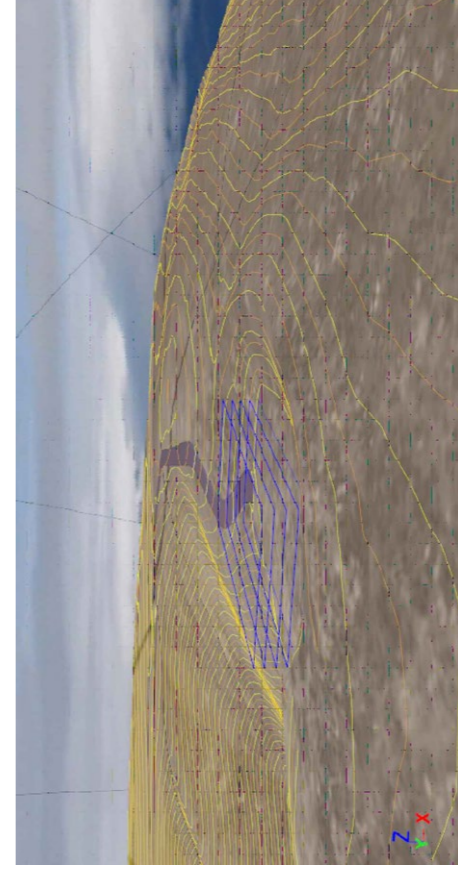
Lot 2 LANDSCAPE MOUNDING - PLAN
Scale 1:400



Lot 2 MOUNDING SECTION
NTS



Iso View - 1



Iso View - 2

NOTES:

- Boundary data has been sourced from DP 306317
- Abuttal data sourced from LINZ XML
- Aerial imagery was flown by drone on the 09/06/22
- Contours

Major: 5.0m
Minor: 1.0m

<p>CSNZ THE CONSULTING ENGINEERS OF NEW ZEALAND A MEMBER OF THE NEW ZEALAND INSTITUTE OF SURVEYORS</p> <p>SOUTHERN LAND DEVELOPMENT CONSULTANTS</p> <p>Level 2 Brownston House, 21 Brownston St., Wanaka Ph: (03) 483 5577, Email: contact@southernland.co.nz www.southernland.co.nz</p>	<p>Prepared for Resource Consent</p> <p>Drawing Title Lots 1, 2 & 4 Being a Proposed Subdivision of Lot 2 DP 306317</p> <p>172 Burn Cottage Road, Cromwell</p>	<p>Warning This Plan has been prepared for the purpose of a resource consent application only. It is not a precise survey plan. As areas and dimensions are likely to vary from those shown on the drawings, users should agree to these variations without an appropriate condition to cover such variations.</p> <p>Any person using Southern Land drawings and other data accepts the risk of: - using the drawings and other data in electronic form without checking and checking them for accuracy and integrity; - using the drawings and other data in copy versions or with Southern Land directly; - ensuring the information is the most recent issue.</p>	<p>APPLICANT Sam Hazledine</p> <p>COMPRESSOR RT 24795</p> <p>TERRITORIAL AUTHORITY Central Otago District Council</p> <p>LAND DISTRICT Otago</p> <p>TOTAL AREA 32.0 ha</p> <p>DATE 18/10/23</p>	<p>SCALE AS SHOWN</p> <p>NATURAL LEVEL Linds Peak 2000 Levels in Terms of New Zealand Vertical Datum 2016 Origin of Levels: PIN 1 SO 558761 (FEGV) RL= 208.128m</p> <p>REVISION D Y4205_E1 SHEET 10</p> <p>SUBMITTED JVB 09/06/22 DATE 18/10/23</p> <p>DRAWN JR 18/10/23 DATE 18/10/23</p>
			<p>APPROVED FOR DATE</p> <p>APPROVED FOR DATE</p> <p>APPROVED FOR DATE</p> <p>APPROVED FOR DATE</p>	

Figure 14: Lot 2 Building Platform Landscape Mitigation Concept (Updated October 2023)



Certificate of Analysis

Client:	Briar Ridge Management Co	Lab No:	2905948	DWAPV1
Contact:	Neville Low	Date Received:	05-Mar-2022	
	C/- Briar Ridge Management Co	Date Reported:	14-Mar-2022	
	34 Risinghurst Terrace	Quote No:		
	Lower Shotover	Order No:	159451	
	Queenstown 9304	Client Reference:	Water Test	
		Submitted By:	Neville Low	

Sample Type: Drinking Water for DWSNZ Compliance

Sample Name:		Briar Ridge Supply Code: BRI006 03-Mar-2022 3:47 pm	Guideline Value	Maximum Acceptable Values (MAV)
Lab Number:		2905948.1		
Routine Water + E.coli profile Kit				
Escherichia coli	MPN / 100mL	< 1 #1	-	< 1
Routine Water Profile				
Turbidity	NTU	0.08	< 2.5	-
pH	pH Units	8.0	7.0 - 8.5	-
Total Alkalinity	g/m ³ as CaCO ₃	186	-	-
Free Carbon Dioxide	g/m ³ at 25°C	3.4	-	-
Total Hardness	g/m ³ as CaCO ₃	190	< 200	-
Electrical Conductivity (EC)	mS/m	40.1	-	-
Electrical Conductivity (EC)	µS/cm	401	-	-
Approx Total Dissolved Salts	g/m ³	270	< 1000	-
Total Arsenic	g/m ³	< 0.0011	-	0.01
Total Boron	g/m ³	0.0154	-	1.4
Total Calcium	g/m ³	58	-	-
Total Copper	g/m ³	0.0082	< 1	2
Total Iron	g/m ³	< 0.021	< 0.2	-
Total Lead	g/m ³	0.00046	-	0.01
Total Magnesium	g/m ³	10.9	-	-
Total Manganese	g/m ³	< 0.00053	< 0.04 (Staining) < 0.10 (Taste)	0.4
Total Potassium	g/m ³	2.3	-	-
Total Sodium	g/m ³	10.9	< 200	-
Total Zinc	g/m ³	0.0126	< 1.5	-
Chloride	g/m ³	4.9	< 250	-
Nitrate-N	g/m ³	1.63	-	11.3
Sulphate	g/m ³	12.9	< 250	-

Note: The Guideline Values and Maximum Acceptable Values (MAV) are taken from the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2018)', Ministry of Health. Copies of this publication are available from <https://www.health.govt.nz/publication/drinking-water-standards-new-zealand-2005-revised-2018>

The Maximum Acceptable Values (MAVs) have been defined by the Ministry of Health for parameters of health significance and should not be exceeded. The Guideline Values are the limits for aesthetic determinands that, if exceeded, may render the water unattractive to consumers.

Note that the units g/m³ are the same as mg/L and ppm.



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Analyst's Comments

#1 Please interpret this microbiological result with caution as the sample was >24 hours old on receipt at the lab. The sample is required to reach the laboratory with sufficient time to allow testing to commence within 24 hours of sampling. Please interpret this result with caution as the sample was > 10 °C on receipt at the lab. The sample temperature is recommended by the laboratory's reference methods to be less than 10 °C on receipt at the laboratory (but not frozen). However, it is acknowledged that samples that are transported quickly to the laboratory after sampling, may not have been cooled to this temperature.

pH/Alkalinity and Corrosiveness Assessment

The pH of a water sample is a measure of its acidity or basicity. Waters with a low pH can be corrosive and those with a high pH can promote scale formation in pipes and hot water cylinders.

The guideline level for pH in drinking water is 7.0-8.5. Below this range the water will be corrosive and may cause problems with disinfection if such treatment is used.

The alkalinity of a water is a measure of its acid neutralising capacity and is usually related to the concentration of carbonate, bicarbonate and hydroxide. Low alkalinities (25 g/m³) promote corrosion and high alkalinities can cause problems with scale formation in metal pipes and tanks.

The pH of this water is within the NZ Drinking Water Guidelines, the ideal range being 7.0 to 8.0.

With the pH and alkalinity levels found, it is unlikely this water will be corrosive towards metal piping and fixtures.

The high alkalinity of this water may cause an increase in the pH in the root zones of plants which are irrigated using this water.

Hardness/Total Dissolved Salts Assessment

The water contains a moderate amount of dissolved solids and would be regarded as being hard.

There will be difficulty in forming a lather with soap, and a 'scum' will form in baths, showers, etc.

Nitrate Assessment

Nitrate-nitrogen at elevated levels is considered undesirable in natural waters as this element can cause a health disorder called methaemaglobinaemia. Very young infants (less than six months old) are especially vulnerable. The Drinking-water Standards for New Zealand 2005 (Revised 2018) suggests a maximum permissible level of 11.3 g/m³ as Nitrate-nitrogen (50 g/m³ as Nitrate).

Nitrate-nitrogen was detected in this water but at such a low level to not be of concern.

Boron Assessment

Boron may be present in natural waters and if present at high concentrations can be toxic to plants.

Boron was found at a low level in this water but would not give any cause for concern.

Metals Assessment

Iron and manganese are two problem elements that commonly occur in natural waters. These elements may cause unsightly stains and produce a brown/black precipitate. Iron is not toxic but manganese, at concentrations above 0.5 g/m³, may adversely affect health. At concentrations below this it may cause stains on clothing and sanitary ware.

Neither element was detected in this water, which is a pleasing feature.

Treatment to remove iron and/or manganese should not be necessary.

Bacteriological Tests

The NZ Drinking Water Standards state that there should be no Escherichia coli (E coli) in water used for human consumption. The presence of these organisms would indicate that other pathogens of faecal origin may be present. Results obtained for Total Coliforms are only significant if the sample has not also been tested for E coli.

Escherichia coli was not detected in this sample.

Final Assessment

All parameters tested for meet the guidelines laid down in the publication 'Drinking-water Standards for New Zealand 2005 (Revised 2018)' published by the Ministry of Health for water which is suitable for drinking purposes.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Drinking Water for DWSNZ Compliance			
Test	Method Description	Default Detection Limit	Sample No
Routine Water Profile		-	1
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch.	-	1
Total Digestion	Nitric acid digestion. APHA 3030 E (modified) 23 rd ed. 2017.	-	1
Turbidity	Analysis using a Hach 2100 Turbidity meter. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2130 B 23 rd ed. 2017 (modified).	0.05 NTU	1
pH	pH meter. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 4500-H ⁺ B 23 rd ed. 2017. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1
Total Alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2320 B (modified for Alkalinity <20) 23 rd ed. 2017.	1.0 g/m ³ as CaCO ₃	1
Free Carbon Dioxide	Calculation: from alkalinity and pH, valid where TDS is not >500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO ₂ D 23 rd ed. 2017.	1.0 g/m ³ at 25°C	1
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B 23 rd ed. 2017.	1.0 g/m ³ as CaCO ₃	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2510 B 23 rd ed. 2017.	0.1 mS/m	1
Electrical Conductivity (EC)	Conductivity meter, 25°C. APHA 2510 B 23 rd ed. 2017.	1 µS/cm	1
Approx Total Dissolved Salts	Calculation: from Electrical Conductivity.	2 g/m ³	1
Total Arsenic	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017 / US EPA 200.8.	0.0011 g/m ³	1
Total Boron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017.	0.0053 g/m ³	1
Total Calcium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017.	0.053 g/m ³	1
Total Copper	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017 / US EPA 200.8.	0.00053 g/m ³	1
Total Iron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017.	0.021 g/m ³	1
Total Lead	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017 / US EPA 200.8.	0.00011 g/m ³	1
Total Magnesium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017.	0.021 g/m ³	1
Total Manganese	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017 / US EPA 200.8.	0.00053 g/m ³	1
Total Potassium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017.	0.053 g/m ³	1
Total Sodium	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017.	0.021 g/m ³	1
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23 rd ed. 2017 / US EPA 200.8.	0.0011 g/m ³	1
Chloride	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 23 rd ed. 2017.	0.5 g/m ³	1
Nitrate-N	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 23 rd ed. 2017.	0.05 g/m ³	1
Sulphate	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) 23 rd ed. 2017.	0.5 g/m ³	1
Escherichia coli	MPN count using Colilert (Incubated at 35°C for 24 hours) and 97 wells. Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9223 B 23 rd ed. 2017.	1 MPN / 100mL	1

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

Testing was completed between 05-Mar-2022 and 14-Mar-2022. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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

A handwritten signature in blue ink, consisting of several overlapping, stylized strokes that form a unique, illegible mark.

Ara Heron BSc (Tech)
Client Services Manager - Environmental