APPLICATION AS NOTIFIED

McDonald's Restaurants (NZ) Limited

(RM230874)

TechnologyOne ECM Document Summary
Printed On 11-Jul-2024

Class	Description	Doc Set Id / Note Id	Version	Date
PUB_ACC	Updated Form 9	7901786	1	30-Jan-2024
PUB_ACC	Updated AEE Mt Iron Final	7901784	1	30-Jan-2024
PUB_ACC	Appendix 1 Record of Title	7829407	1	20-Nov-2023
PUB_ACC	Appendix 2 Visual Methodology Statement	7829402	1	20-Nov-2023
PUB_ACC	Appendix 5 APPENDIX 1 - PPG - Engineering Drawings	7829406	1	20-Nov-2023
PUB_ACC	Appendix 5 APPENDIX 2 - CGW - Stormwater Report	7829419	1	20-Nov-2023
PUB_ACC	Appendix 5 APPENDIX 3 - Aurora - Supply Confirmation	7829409	1	20-Nov-2023
PUB_ACC	Appendix 5 APPENDIX 4 - Chorus - Supply Contract	7829411	1	20-Nov-2023
PUB_ACC	Appendix 5 Infrastructure Report - Compiled	7829421	1	20-Nov-2023

FORM 12

File Number RM230874

QUEENSTOWN LAKES DISTRICT COUNCIL

PUBLIC NOTIFICATION

Notification of an application for a Resource Consent under Section 95A of the Resource Management Act 1991.

The Queenstown Lakes District Council has received an application for a resource consent from:

McDonald's Restaurants (NZ) Limited

What is proposed:

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The location in respect of which this application relates is situated at:

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The application includes an assessment of environmental effects. This file can also be viewed at our public computers at these Council offices:

- **Gorge Road, Queenstown;**
- **and 47 Ardmore Street, Wanaka during normal office hours (8.30am to 5.00pm).**

Alternatively, you can view them on our website when the submission period commences:

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If you wish to make a submission on this application, you may do so by sending a written submission to the consent authority no later than:

Friday 9th August 2024

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QUEENSTOWN LAKES DISTRICT COUNCIL

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(signed by Fiona Blight pursuant to a delegation given under Section 34A of the Resource Management Act 1991)

Date of Notification: 12th July 2024

Address for Service for Consent Authority:

Queenstown Lakes District Council
Private Bag 50072, Queenstown 9348
Gorge Road, Queenstown 9300

Phone **03 441 0499**
Email **rcsubmission@qldc.govt.nz**
Website **www.qldc.govt.nz**

APPLICATION FOR RESOURCE CONSENT OR
FAST TRACK RESOURCE CONSENT

FORM 9: GENERAL APPLICATION

QUEENSTOWN LAKES DISTRICT COUNCIL

Under Section 87AAC, 88 & 145 of the Resource Management Act 1991 (Form 9)

PLEASE COMPLETE ALL MANDATORY FIELDS* OF THIS FORM.

This form provides contact information and details of your application. If your form does not provide the required information it will be returned to you to complete. Until we receive a completed form and payment of the initial fee, your application may not be accepted for processing.

APPLICANT //

- Must be a person or legal entity (limited liability company or trust).
- Full names of all trustees required.
- The applicant name(s) will be the consent holder(s) responsible for the consent and any associated costs.

*Applicant's Full Name / Company / Trust: (Name Decision is to be issued in) McDonald's Restaurants (NZ) Ltd

All trustee names (if applicable):

*Contact name for company or trust: Nick Kirton

*Postal Address: PO Box 6644, Victoria Street West, Auckland

*Post code: 1142

*Contact details supplied must be for the applicant and not for an agent acting on their behalf and must include a valid postal address

*Email Address: nick.kirton@nz.mcd.com

*Phone Numbers: Day 0275908669

Mobile:

*The Applicant is:

- [x] Owner
- [ ] Prospective Purchaser (of the site to which the application relates)
- [ ] Occupier
- [ ] Lessee
- Other - Please Specify:

[x] Our preferred methods of corresponding with you are by email and phone.
The decision will be sent to the Correspondence Details by email unless requested otherwise.

CORRESPONDENCE DETAILS // If you are acting on behalf of the applicant e.g. agent, consultant or architect please fill in your details in this section.

*Name & Company: Hannah Hoogeveen, Barker & Associates

*Phone Numbers: Day 027 556 6991

Mobile:

*Email Address: hannahh@barker.co.nz

*Postal Address: PO Box 1986
Shortland Street, Auckland

*Postcode: 1140

INVOICING DETAILS //

Invoices will be made out to the applicant but can be sent to another party if paying on the applicant's behalf.
For more information regarding payment please refer to the Fees Information section of this form.

*Please select a preference for who should receive any invoices and how they would like to receive them.

- Applicant: [x]
- Agent: [ ]
- Other - Please specify:
- Email: [ ]
- Post: [ ]

*Attention: Nick Kirton

*Postal Address: PO Box 6644, Victoria Street West
Auckland

*Please provide an email AND full postal address.

*Post code: 1142

*Email: nick.kirton@nz.mcd.com

OWNER DETAILS // Please supply owner details for the subject site/property if not already indicated above

Owner Name: Mt Iron Junction Limited

Owner Address: PO Box 6644, Victoria Street West, Auckland

Owner Email: nick.kirton@nz.mcd.com

If the property has recently changed ownership please indicate on what date (approximately) AND the names of the previous owners:

Date:

Names:

DEVELOPMENT CONTRIBUTIONS INVOICING DETAILS //

If it is assessed that your consent requires development contributions any invoices and correspondence relating to these will be sent via email. Invoices will be sent to the email address provided above unless an alternative address is provided below. Invoices will be made out to the applicant/owner but can be sent to another party if paying on the applicant's behalf.

*Please select a preference for who should receive any invoices.

Details are the same as for invoicing ☑

Applicant: ☑ Landowner: ☐ Other, please specify:

*Attention: Nick Kirton

*Email: nick.kirton@nz.mcd.com

Click here for further information and our estimate request form

DETAILS OF SITE // Legal description field must list legal descriptions for all sites pertaining to the application. Any fields stating 'refer AEE' will result in return of the form to be fully completed.

*Address / Location to which this application relates:

237 Wānaka-Luggate Highway, Wānaka

*Legal Description: Can be found on the Computer Freehold Register or Rates Notice – e.g Lot x DPxxx (or valuation number)

Lot 5 DP 15016

District Plan Zone(s): Queenstown Lakes Proposed District Plan

SITE VISIT REQUIREMENTS // Should a Council officer need to undertake a site visit please answer the questions below

Is there a gate or security system restricting access by council?	YES ☑	NO ☐
Is there a dog on the property?	YES ☐	NO ☑
Are there any other hazards or entry restrictions that council staff need to be aware of? If 'yes' please provide information below	YES ☐	NO ☑

Please contact the Planner, Hannah Hoogeveen, to arrange a site visit.

PRE-APPLICATION MEETING OR URBAN DESIGN PANEL

Have you had a pre-application meeting with QLDC or attended the urban design panel regarding this proposal?

☑ Yes ☐ No ☑ Copy of minutes attached

If 'yes', provide the reference number and/or name of staff member involved: Tim Anderson, Fiona Bright, Kayla Vincent

CONSENT(S) APPLIED FOR // * Identify all consents sought // ALSO FILL IN OTHER CONSENTS SECTION BELOW

☑ Land use consent

☑ Change/cancellation of consent or consent notice conditions

☐ Extension of lapse period of consent (time extension) s125

☐ Land use consent includes Earthworks

☐ Subdivision consent

☐ Certificate of compliance

☐ Existing use certificate

QUALIFIED FAST-TRACK APPLICATION UNDER SECTION 87AAC

☐ Controlled Activity

☐ Deemed Permitted Boundary Activity

If your consent qualifies as a fast-track application under section 87AAC, tick here to opt out of the fast track process ☐

BRIEF DESCRIPTION OF THE PROPOSAL //

*Please complete this section, any form stating 'refer AEE' will be returned to be completed with a description of the proposal

*Consent is sought to:

Land use consent to establish a 445m2 McDonald's restaurant and drive-through with associated signage, landscaping, carparking, and access.

APPLICATION NOTIFICATION

Are you requesting public notification for the application?

☑ Yes ☐ No

Please note there is an additional fee payable for notification. Please refer to Fees schedule

OTHER CONSENTS

Is consent required under a National Environmental Standard (NES)?

- NES for Assessing and Managing Contaminants in Soil to Protect Human Health 2012

An applicant is required to address the NES in regard to past use of the land which could contaminate soil to a level that poses a risk to human health. Information regarding the NES is available on the website https://environment.govt.nz/publications/national-environmental-standard-for-assessing-and-managing-contaminants-in-soil-to-protect-human-health-information-for-landowners-and-developers/

You can address the NES in your application AEE OR by selecting ONE of the following:

☐ This application does not involve subdivision (excluding production land), change of use or removal of (part of) a fuel storage system. Any earthworks will meet section 8(3) of the NES (including volume not exceeding 25m^3 per 500m^2). Therefore the NES does not apply.

☑ I have undertaken a comprehensive review of District and Regional Council records and I have found no record suggesting an activity on the HAIL has taken place on the piece of land which is subject to this application.
NOTE: depending on the scale and nature of your proposal you may be required to provide details of the records reviewed and the details found.

OTHER CONSENTS // CONTINUED

☐ I have included a Preliminary Site Investigation undertaken by a suitably qualified person.

☑ An activity listed on the HAIL has more likely than not taken place on the piece of land which is subject to this application. I have addressed the NES requirements in the Assessment of Environmental Effects.

Any other National Environmental Standard

☐ Yes ☑ N/A

Do you need any consent(s) from Otago Regional Council?

☑ Yes ☐ N/A

If Yes have you applied for it?

☐ Yes ☑ No

If Yes supply ORC Consent Reference(s)

If ORC Earthworks Consent is required would you like a joint site visit ?

☐ Yes ☐ No

INFORMATION REQUIRED TO BE SUBMITTED //

Attach to this form any information required (see below & appendices 1-2).

To be accepted for processing, your application should include the following:

☑ Computer Freehold Register for the property (no more than 3 months old) and copies of any consent notices and covenants
(Can be obtained from Land Information NZ at https://www.linz.govt.nz/).

☑ A plan or map showing the locality of the site, topographical features, buildings etc.

☑ A site plan at a convenient scale.

☑ Written approval of every person who may be adversely affected by the granting of consent (s95E).

☑ An Assessment of Effects (AEE).
An AEE is a written document outlining how the potential effects of the activity have been considered along with any other relevant matters, for example if a consent notice is proposed to be changed. Address the relevant provisions of the District Plan and affected parties including who has or has not provided written approval. See Appendix 1 for more detail.

☑ We prefer to receive applications electronically – please see Appendix 5 – Naming of Documents Guide for how documents should be named. Please ensure documents are scanned at a minimum resolution of 300 dpi. Each document should be no greater than 10mb

PRIVACY INFORMATION

The information you have provided on this form is required so that your application can be processed under the Resource Management Act 1991 and may also be used in statistics collected and provided to the Ministry for the Environment and Queenstown Lakes District Council. The information will be stored on a public register and may be made available to the public on request or on the company's or the Council's websites.

FEES INFORMATION

Section 36 of the Resource Management Act 1991 deals with administrative charges and allows a local authority to levy charges that relate to, but are not limited to, carrying out its functions in relation to receiving, processing and granting of resource consents (including certificates of compliance and existing use certificates).

Invoiced sums are payable by the 20th of the month after the work was undertaken. If unpaid, the processing of an application, provision of a service, or performance of a function will be suspended until the sum is paid. You may also be required to make an additional payment, or bring the account up to date, prior to milestones such as notification, setting a hearing date or releasing the decision. In particular, all charges related to processing of a resource consent application are payable prior to issuing of the decision. Payment is due on the 20th of the month or prior to the issue date – whichever is earlier.

FEES INFORMATION // CONTINUED

If your application is notified or requires a hearing you will be requested to pay a notification deposit and/or a hearing deposit. An applicant may not offset any invoiced processing charges against such payments.

Section 357B of the Resource Management Act provides a right of objection in respect of additional charges. An objection must be in writing and must be lodged within 15 working days of notification of the decision.

LIABILITY FOR PAYMENT – Please note that by signing and lodging this application form you are acknowledging that the details in the invoicing section are responsible for payment of invoices and in addition will be liable to pay all costs and expenses of debt recovery and/or legal costs incurred by QLDC related to the enforcement of any debt.

MONITORING FEES – Please also note that the fee paid at lodgement includes an initial monitoring fee of $273 for land use resource consent applications and designation related applications, as once Resource Consent is approved you will be required to meet the costs of monitoring any conditions applying to the consent, pursuant to Section 35 of the Resource Management Act 1991.

DEVELOPMENT CONTRIBUTIONS – Your development, if granted, may also incur development contributions under the Local Government Act 2002. You will be liable for payment of any such contributions.

A list of Consent Charges is available on the on the Resource Consent Application Forms section of the QLDC website. If you are unsure of the amount to pay, please call 03 441 0499 and ask to speak to our duty planner.

Please ensure to reference any banking payments correctly. Incorrectly referenced payments may cause delays to the processing of your application whilst payment is identified.

If the initial fee charged is insufficient to cover the actual and reasonable costs of work undertaken on the application you will be required to pay any additional amounts and will be invoiced monthly as work on the application continues. Please note that if the Applicant has outstanding fees owing to Council in respect of other applications, Council may choose to apply the initial fee to any outstanding balances in which case the initial fee for processing this application may be deemed not to have been paid.

PAYMENT // An initial fee must be paid prior to or at the time of the application and proof of payment submitted.

Please reference your payments as follows:

Applications yet to be submitted: RM followed by first 5 letters of applicant name e.g RMJONES

Applications already submitted: Please use the RM# reference that has been assigned to your application, this will have been emailed to yourself or your agent.

Please note processing will not begin until payment is received (or identified if incorrectly referenced).

I confirm payment by:

- ☐ Bank transfer to account 02 0948 0002000 00 (If paying from overseas swiftcode is – BKNZNZ22)
- ☑ Invoice for initial fee requested and payment to follow
- ☐ Manual Payment (can only be accepted once application has been lodged and acknowledgement email received with your unique RM reference number)

*Reference JN 19826

*Amount Paid: Landuse and Subdivision Resource Consent fees - please select from drop down list below

$3465 - Non-complying Activities (overall consent status)

(For required initial fees refer to website for Resource Consent Charges or spoke to the Duty Planner by phoning 03 441 0499)

*Date of Payment

Invoices are available on request

APPLICATION & DECLARATION

The Council relies on the information contained in this application being complete and accurate. The Applicant must take all reasonable steps to ensure that it is complete and accurate and accepts responsibility for information in this application being so.

If lodging this application as the Applicant:

I/we hereby represent and warrant that I am/we are aware of all of my/our obligations arising under this application including, in particular but without limitation, my/our obligation to pay all fees and administrative charges (including debt recovery and legal expenses) payable under this application as referred to within the Fees Information section.

OR:

If lodging this application as agent of the Applicant:

I/we hereby represent and warrant that I am/we are authorised to act as agent of the Applicant in respect of the completion and lodging of this application and that the Applicant / Agent whose details are in the invoicing section is aware of all of his/her/its obligations arising under this application including, in particular but without limitation, his/her/its obligation to pay all fees and administrative charges (including debt recovery and legal expenses) payable under this application as referred to within the Fees Information section.

☑ PLEASE TICK

I hereby apply for the resource consent(s) for the Proposal described above and I certify that, to the best of my knowledge and belief, the information given in this application is complete and accurate.

Signed (by or as authorised agent of the Applicant) **	
Full name of person lodging this form	Hannah Hoogeveen
Firm/Company Barker & Associates	Dated 17/11/2023

**If this form is being completed on-line you will not be able, or required, to sign this form and the on-line lodgement will be treated as confirmation of your acknowledgement and acceptance of the above responsibilities and liabilities and that you have made the above representations, warranties and certification.

Section 2 of the District Plan provides additional information on the information that should be submitted with a land use or subdivision consent.

The RMA (Fourth Schedule to the Act) requires the following:

1 INFORMATION MUST BE SPECIFIED IN SUFFICIENT DETAIL

- Any information required by this schedule, including an assessment under clause 2(1)(f) or (g), must be specified in sufficient detail to satisfy the purpose for which it is required.

2 INFORMATION REQUIRED IN ALL APPLICATIONS

- (1) An application for a resource consent for an activity (the activity) must include the following:
    - (a) a description of the activity:
    - (b) a description of the site at which the activity is to occur:
    - (c) the full name and address of each owner or occupier of the site:
    - (d) a description of any other activities that are part of the proposal to which the application relates:
    - (e) a description of any other resource consents required for the proposal to which the application relates:

Information provided within the Form above

    - (f) an assessment of the activity against the matters set out in Part 2:
    - (g) an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b).

(2) The assessment under subclause (1)(g) must include an assessment of the activity against—

    - (a) any relevant objectives, policies, or rules in a document; and
    - (b) any relevant requirements, conditions, or permissions in any rules in a document; and
    - (c) any other relevant requirements in a document (for example, in a national environmental standard or other regulations).

(3) An application must also include an assessment of the activity's effects on the environment that—

    - (a) includes the information required by clause 6; and
    - (b) addresses the matters specified in clause 7; and
    - (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

Include in an attached Assessment of Effects (see Clauses 6 & 7 below)

ADDITIONAL INFORMATION REQUIRED IN SOME APPLICATIONS

- An application must also include any of the following that apply:
    - (a) if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1)):
    - (b) if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A)):

ASSESSMENT OF ENVIRONMENTAL EFFECTS

Clause 6: Information required in assessment of environmental effects

- (1) An assessment of the activity's effects on the environment must include the following information:
    - (a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:
    - (b) an assessment of the actual or potential effect on the environment of the activity:
    - (c) if the activity includes the use of hazardous substances and installations, an assessment of any risks to the environment that are likely to arise from such use:
    - (d) if the activity includes the discharge of any contaminant, a description of—
        - (i) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
        - (ii) any possible alternative methods of discharge, including discharge into any other receiving environment:
    - (e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:
    - (f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted:
    - (g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:
    - (h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).

(2) A requirement to include information in the assessment of environmental effects is subject to the provisions of any policy statement or plan.

(3) To avoid doubt, subclause (1)(f) obliges an applicant to report as to the persons identified as being affected by the proposal, but does not—

- (a) oblige the applicant to consult any person; or
- (b) create any ground for expecting that the applicant will consult any person.

CLAUSE 7: MATTERS THAT MUST BE ADDRESSED BY ASSESSMENT OF ENVIRONMENTAL EFFECTS

- (1) An assessment of the activity's effects on the environment must address the following matters:
    - (a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:
    - (b) any physical effect on the locality, including any landscape and visual effects:
    - (c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:
    - (d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:
    - (e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:
    - (f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations.

(2) The requirement to address a matter in the assessment of environmental effects is subject to the provisions of any policy statement or plan.

A2 APPENDIX 2 // Information requirements for subdivision

UNDER THE FOURTH SCHEDULE TO THE ACT:

- An application for a subdivision consent must also include information that adequately defines the following:
    - (a) the position of all new boundaries:
    - (b) the areas of all new allotments, unless the subdivision involves a cross lease, company lease, or unit plan:
    - (c) the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips:
    - (d) the locations and areas of any existing esplanade reserves, esplanade strips, and access strips:
    - (e) the locations and areas of any part of the bed of a river or lake to be vested in a territorial authority under section 237A:
    - (f) the locations and areas of any land within the coastal marine area (which is to become part of the common marine and coastal area under section 237A):
    - (g) the locations and areas of land to be set aside as new roads.

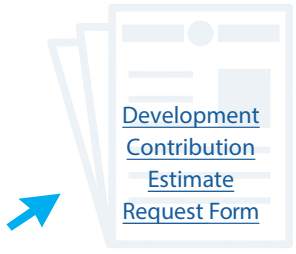
A3 APPENDIX 3 // Development Contributions

Will your resource consent result in a Development Contribution and what is it?

- A Development Contribution can be triggered by the granting of a resource consent and is a financial charge levied on new developments. It is assessed and collected under the Local Government Act 2002. It is intended to ensure that any party, who creates additional demand on Council infrastructure, contributes to the extra cost that they impose on the community. These contributions are related to the provision of the following council services:
    - Water supply
    - Wastewater supply
    - Stormwater supply
    - Reserves, Reserve Improvements and Community Facilities
    - Transportation (also known as Roading)

Click here for more information on development contributions and their charges

OR Submit an Estimate request *please note administration charges will apply



A4 APPENDIX 4 // Fast - Track Application

Please note that some land use consents can be dealt with as fast track land use consent. This term applies to resource consents where they require a controlled activity and no other activity. A 10 day processing time applies to a fast track consent.

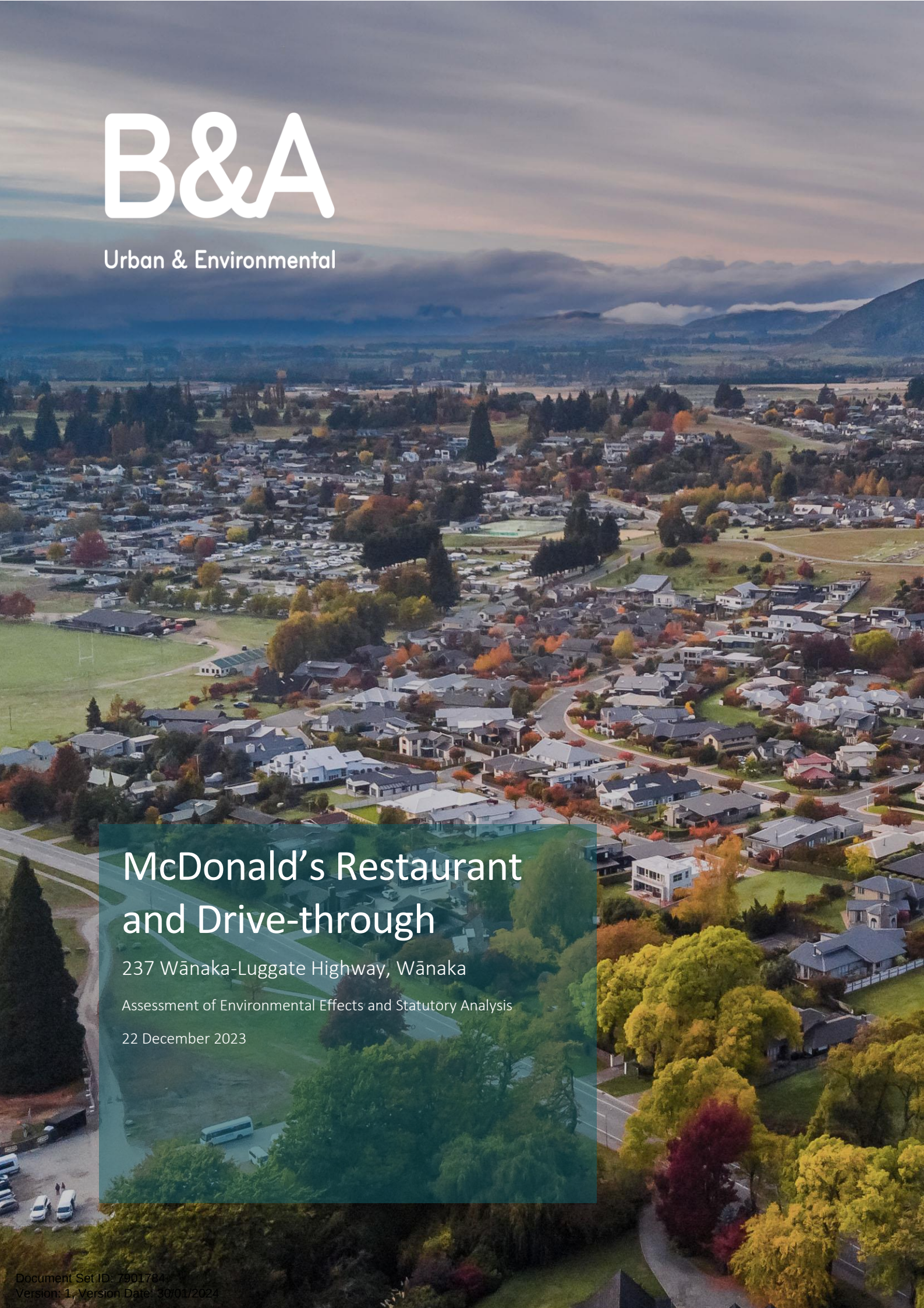
If the consent authority determines that the activity is a deemed permitted boundary activity under section 87BA of the Act, written approval cannot be withdrawn if this process is followed instead.

A fast-track application may cease to be a fast-track application under section 87AAC(2) of the Act.

A5 APPENDIX 5 // Naming of documents guide

While it is not essential that your documents are named the following, it would be helpful if you could title your documents for us. You may have documents that do not fit these names; therefore below is a guide of some of the documents we receive for resource consents. Please use a generic name indicating the type of document.

- Application Form 9
- Assessment of Environmental Effects (AEE)
- Computer Register (CFR)
- Covenants & Consent Notice
- Affected Party Approval/s
- Landscape Report
- Ecological Report
- Engineering Report
- Geotechnical Report
- Wastewater Assessment
- Traffic Report
- Waste Event Form
- Urban Design Report



B&A

Urban & Environmental

McDonald's Restaurant and Drive-through

237 Wānaka-Luggate Highway, Wānaka

Assessment of Environmental Effects and Statutory Analysis

22 December 2023

B&A Reference:

19826

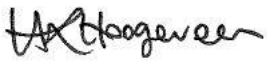
Status:

Final

Date:

22 December 2023

Prepared by:



Hannah Hoogeveen

Associate, Barker & Associates Limited

Reviewed by:

Matt Norwell

Director, Barker & Associates Limited

Contents

Appendices

1.0 Applicant and Property Details

To:	Queenstown Lakes District Council
Site Address:	237 Wānaka-Luggate Highway
Applicant Name:	McDonald's Restaurants (NZ) Limited
Address for Service:	Barker & Associates Ltd PO Box 158, Queenstown 9348 Attention: Matt Norwell/Hannah Hoogeveen
Legal Description:	Lot 5 DP 15016 (refer to Record of Title OT5B/1115 attached as **Appendix 1**)
Site Area:	5.834Ha[1]
Site Owner:	Mt Iron Junction Limited
District Plan:	Queenstown Lakes Proposed District Plan
QLDC PDP Zoning:	Rural Zone
QLDC ODP Zoning:	Rural General Zone
Designations:	None
Additional Limitations:	H1 Flood Hazard; State Highway (Wānaka-Luggate Highway); LUC4 soil classification
Locality Diagram:	Refer to **Figure 1** and **Figure 4** below
Brief Description of Proposal:	Land use consent to establish a 445m^2 McDonald's restaurant and drive-through with associated signage, landscaping, carparking, and access.
Summary of Reasons for Consent:	QLDC – PDP : A discretionary activity for a restaurant in the Rural Zone, a non-complying activity to undertake a drive-through activity, a breach to the earthworks volume, and transport standards, and signs (refer Section 5).

[1] The site area at the time of lodging the application. However, it is noted that a subdivision consent has been lodged for the site and is currently processing. More detail on this is included in this report. The site is located within Proposed Lot 2 (2.724Ha).

2.0 Background

2.1 Introduction

This report has been prepared in support of a resource consent application by McDonald's Restaurant (NZ) Limited ('**McDonald's**') for a land use consent to establish an 445m^2 restaurant and drive-through at 237 Wānaka-Luggate Highway, Wānaka. At the time of making this application, the proposed development is proposed to be undertaken on a site legally described as Lot 5 DP 15016 as contained within Record of Title OT5B/1115.

This Assessment of Environmental Effects ('**AEE**') has been prepared in accordance with the requirements of section 88 of and Schedule 4 to the Resource Management Act 1991 ('**the Act**') and is intended to provide the information necessary for a full understanding of the activity for which consent is sought and any actual or potential effects the proposal may have on the environment. It is noted that a regional earthworks consent is required from ORC, and will be prepared and submitted in due course.

2.2 Consent History

The owner of the site is Mt Iron Junction Limited who currently have a subdivision consent processing with Council for this site (QLDC Reference: RM230506). Another application by Davison Wanaka Family Trust is currently being processed by Council with regards to the signage and layout for the service station (QLDC reference: RM230478). At the time of writing, both of these applications are on hold.

Various resource consents have been approved on the subject site however the most relevant resource consent is summarised as follows:

RM181471 was granted on 19 April 2021 by way of consent order by the Environment Court for the establishment of the Mt Iron Junction development on Lot 5 DP 15016 which included the following:

i. A new road ('Link Road') from the northern side of the new Waka Kotahi roundabout at the junction of State Highway 84 and State Highway 6;

ii. The development of a service station relatively centrally to the site;

iii. The development of 13 two-storey residential units in duplex and stand-alone typologies in 10 buildings in the northeast part of the site;

iv. The development of single-level workers accommodation units comprising 54 bedrooms in nine buildings plus a utility building (drying room, laundry, rubbish room, and manager's unit) in a separate building, all located to the west of the residential units on the site;

v. Associated access and parking areas, pedestrian footpaths, and landscaping for the above activities; and

vi. A protected landscape area in the southwest part of the site, with the balance of the site left undeveloped, as shown in the approved Masterplan below:

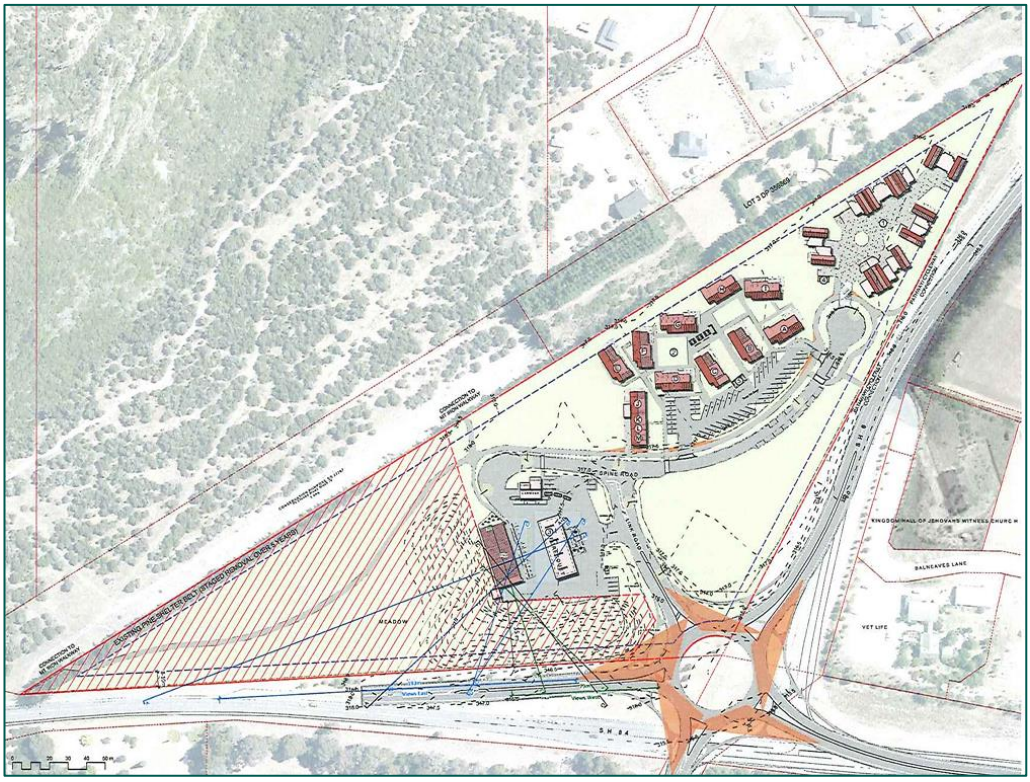


Figure 1: Approved Masterplan (Source: E-Docs RM181471)

RM230478 is currently processing for changes to the layout and design of the service station and signage.

RM230506 is currently processing to subdivide the parent site (Lot 5 DP15016) into three fee simple allotments and road to be vested in Council. Proposed Lot 1 is for the service station and the McDonald's would be situated on Proposed Lot 2.

2.3 Pre-application Meeting

A pre-application meeting was held on 19 July 2023 with QLDC planning staff. A copy of the meeting minutes is included at Appendix 13. The purpose for the meeting was primarily to introduce the project and to broadly discuss process for an application, given the due diligence status of the land acquisition. It was agreed at the meeting that the application would be lodged on a publicly notified basis.

3.0 Site Context

3.1 Site Description

The site sits within the Mt Iron Junction site, and is currently comprised of one parcel of land being Lot 5 DP 15016. The Mt Iron Junction development was originally approved by way of Environment Court Consent Order, Decision No. [2021] NZEnvC 53. The site is currently vacant.

The Mt Iron Junction site is triangular in shape and is wholly located within the Rural Zone of the PDP. It is bound to the south by State Highway 84 and to the east by State Highway 6. The Mount Iron reserve borders the northern boundary of the Mt Iron Junction site.

A new roundabout at the intersection of State Highways 84 and 6, Riverbank Road, and the Mount Iron Junction site is currently being constructed at the south eastern corner of the site. This context for the Mount Iron Junction site is shown below in Figure 2.

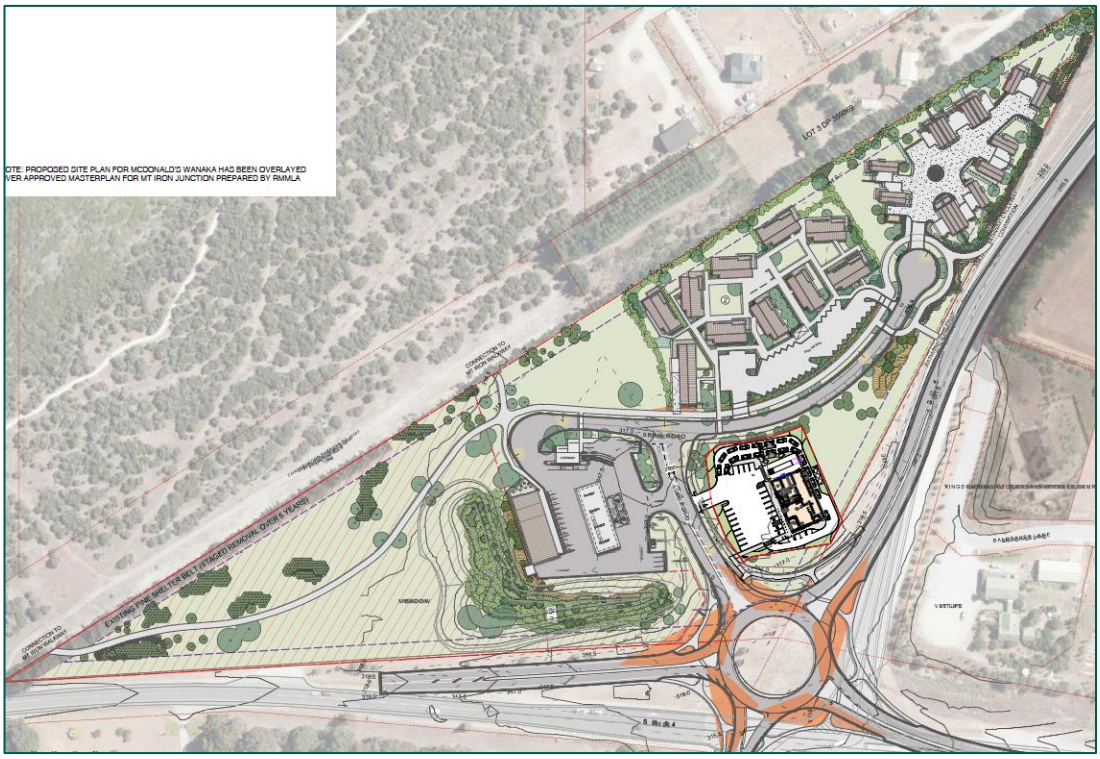


Figure 2: Mount Iron Junction Masterplan including McDonald's (Source: ASC Architects and RMMLA).

The Mount Iron Junction site is subject to an approved but unimplemented resource consent (RM181471) comprising a petrol station, nine workers accommodation units with 54 bedrooms, and 13 two-storey residential units on the site as shown in Figure 2 above. This consent also included a protected landscape area on the western portion of the site, shown hatched in Figure 2 above. This protected landscape area was formalised by way of covenant, and shall remain in place until such time that the land no longer has a rural zoning. The part of the site subject to this application is not subject to such a covenant.

The topography of the site is predominantly flat with a gentle slope toward the northern boundary. In terms of landscape, the site is located in the Rural Zone and Rural Character Landscape, and adjoins the Mount Iron Outstanding Natural Feature ('ONF'). The landscape character of the site is described in the Landscape Assessment appended to this report as Appendix 4.

3.2 Surrounding Locality

The surrounding environment contains a mix of recreational, commercial, rural lifestyle and residential activities.

The land to the northwest is comprised of the Mount Iron natural feature. This part of the Mount Iron reserve is currently administered by the Department of Conservation ('DoC'). However, it will be subject to a QLDC Reserve Management Plan process which has commenced and feedback is due on 20 November 2023 following the Council's acquisition of the northern and eastern parts of Mount Iron and Little Mount Iron.

The land to the northeast is comprised of large lot residential development at the southern end of Albert Town.

The land across State Highway 6 to the east include more large lot residential development, a church and a large vet clinic. The land across State Highway 84 to the south appears to be predominantly developed into rural lifestyle properties.

A new roundabout is currently being constructed by Waka Kotahi at the intersection of State Highway 6, State Highway 84, Riverbank Road, and the Mount Iron Junction site.

Figure 3: Locality Plan (Source: QLDC Spatial Data Hub)

3.3 Planning Context

3.3.1 District Plan

The site is subject to the provisions of the QLDC Proposed District Plan ('PDP'). The surrounding environment contains a mix of zones under the PDP as shown below in Figure 4. We set out the surrounding zones and overlays with correlating numbers to Figure 4.

1. 237 Wānaka-Luggate Highway is within the Rural Zone and is on the southern side of the Urban Growth Boundary as it relates to Albert Town;

2. The Mount Iron Reserve is within the Rural Zone and is identified as an Outstanding Natural Feature ('ONF') Landscape Priority Area;
3. The residential properties accessed by Aubrey Road and Old Racecourse Road are within the Large Lot Residential A Zone and the Urban Growth Boundary;
4. The land east of State Highway 6 from the site is within the Rural Residential Zone;
5. The land south of State Highway 84 from the site is within the Rural Lifestyle Zone. The Urban Growth Boundary as it relates to Wānaka adjoins this land (western boundary).

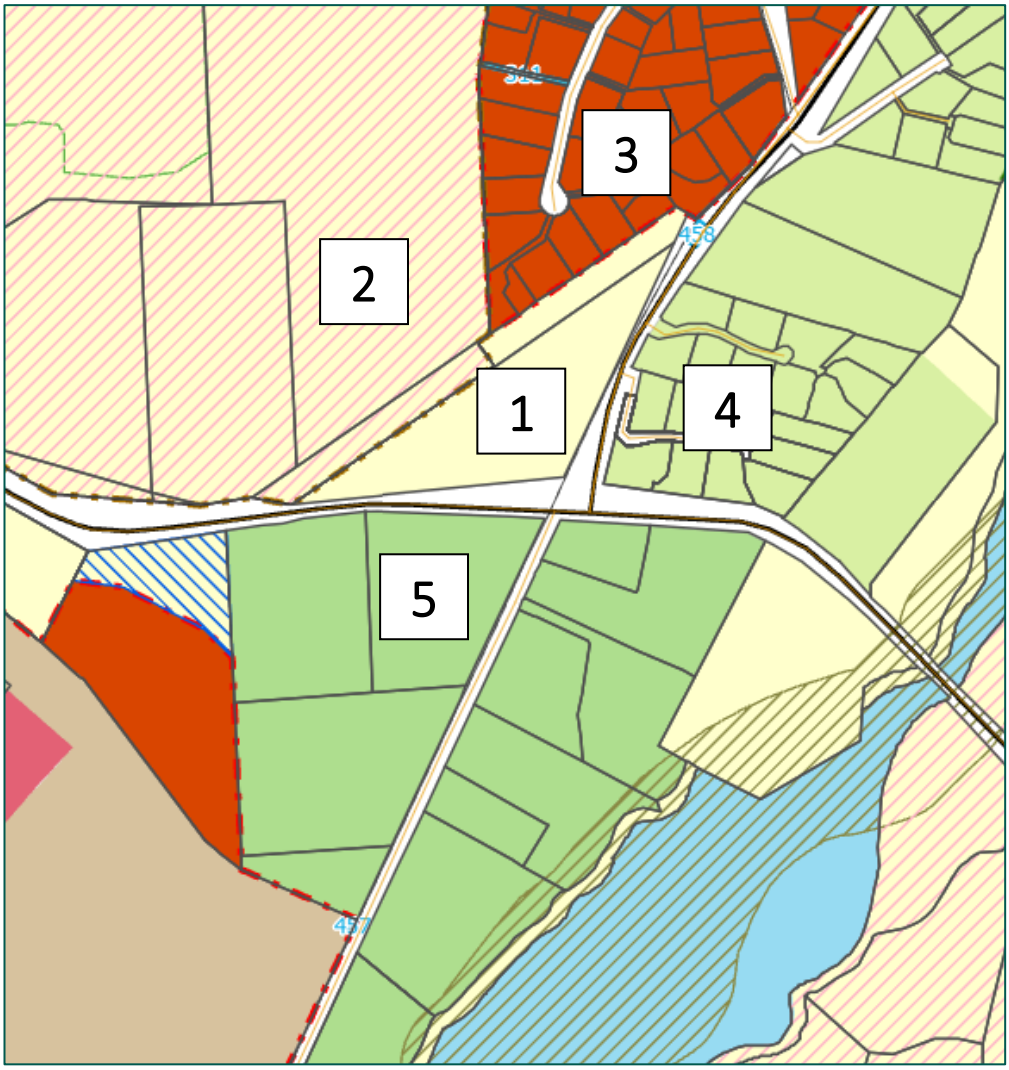


Figure 4: PDP Zoning Map showing site and surrounding zoning (Source: qldc.maps.arcgis.com)

4.0 Proposal

It is proposed to establish a McDonald's restaurant and drive-through on the site at 237 Wānaka-Luggate Highway, Wānaka. The site comprises 5.834Ha of land across one existing record of title. A summary of the key elements of the proposal is set out below. More detailed descriptions on particular aspects of the proposal are set out in the specialist reports and plans accompanying the application.

- Site clearing and earthworks: Removal of any remaining fencing and vegetation from the site. Undertake earthworks across the area of the McDonalds 'sub-site', being removal of topsoil and other unsuitable material of 1400m³, plus 375m³ cut to fill (275m³ fill) over an area of 2,840m², to establish a flat platform for the building and parking and access. Some further earthworks for footings and slab construction and topsoiling of landscaped areas will also be required. Silt and sediment control measures and an earthworks management plan ('EMP') are proposed in accordance with the civil engineering report and plans at Appendix 4.

- Building: Construct a 445m² single-level McDonald's restaurant building located to the north of the new roundabout, being in the southern part of the Mount Iron Junction site. The building is located in the eastern half of the McDonald's sub-site. The drive-through service windows are located on the eastern side of the building, with the drive-through wrapping around the north, east and southern edges of the building, before discharging back into the carpark which is located in the western part of the McDonald's 'sub-site'.

  The kitchen and back-of-house area are located in the rear of the building. Seating for 75 diners is provided. The building is approximately 6m high to the parapet. It is clad with a combination of horizontal 'Innowood' shiplap cladding in American Oak, vertical 'Dimond' steel tray profile cladding, and 80mm thick schist stone. The facias are paint finished-James Hardie 'Easylap' cladding, with the glazing framed by powder-coated aluminium joinery. The building offers glazing to the dining areas and 'PlayPlace', as shown on the architectural plans and elevations at Appendix 2.

- Operation: The restaurant and drive-through are proposed to operate on a 24 hour per day, seven day per week basis.

- Access and Parking: The McDonald's site is accessed by the Link Road, approximately opposite the ingress for the service station. The access is two-way. Vehicles can enter the site and turn left to enter the drive-through lane, or right to the main carparking area. 24 car parks are provided on the site including two accessible carparks, an Uber carpark, and two grill-order carparks within the drive-through lane.

  The drive-through lane starts at the northern boundary of the 'sub-site', turns clockwise along the eastern boundary, and then along part of the southern boundary, around the building. The drive-through lane is double-width and has dual ordering points. After ordering the drive-through lane becomes single in width as it approaches the service windows.

  The drive-through operates by customers placing their order at the Customer Order Display (C.O.D) unit. A photograph is then taken of the driver and attached to their order so they are easily identified by staff. The design of this drive-through lane has been carefully considered by the application and traffic engineer to avoid queuing outside the site, and to avoid onsite and offsite traffic conflicts, as well as to ensure an efficient service. Two "grill order" carparks are provided at the end of the drive-through lane to allow customers to move clear of the drive-through lane on occasions when there is a delay in filling a particular order.

  The loading area is situated in the northern part of the site, at the rear of the building and adjacent to the back-of-house area.

  A pedestrian access from the footpath adjacent to the roundabout will be provided by way of a footpath within the site and a pedestrian crossing across the drive-through egress. Two

secure bicycle parking places are located on a concrete area adjacent to the western elevation of the restaurant building.

- Landscaping: The balance of the site will be landscaped in accordance with the plans at Appendix 3. This includes planting around all boundaries of the sub-site, as well as strategic planting of specimen trees in the Mount Iron Junction site to the west of the building. An acoustic fence will be constructed around the northern and eastern boundaries of the McDonald's development site to avoid adverse acoustic effects on the approved workers accommodation. Further detail on landscaping and the acoustic fence is set out in the landscape plans at Appendix 3 and the landscape visual assessment at Appendix 4.
- Signage: Signage is set out in the architectural plans RC50 (site signs) and RC51 (building signs) and the site plan at Appendix 2, but by way of summary the site signs include a 4.5m-high blade sign with an illuminated 'M', way finding and traffic control signs, and digital menu boards. Some freestanding directional signs are internally illuminated, as detailed on the drawings.

  The wall-mounted/building signs are predominantly naming and branding signs and are detailed on the elevations and signage plans at Appendix 2.
- Servicing: It is noted that the infrastructure servicing report has been prepared on the basis that the subdivision activity described by RM230506 is consented and implemented. That consent is nearly at the state of completion and issue[2]. Stormwater, electricity and telecommunications can be independent of RM230506.

  Stormwater from the roof and hardstand areas is proposed to be discharged to ground via soak pits as there is no public stormwater network servicing the site. Geotechnical investigations have confirmed the soil is suitable for soakage. Treatment will be provided from the carparking and vehicle manoeuvring areas.

  A new gravity wastewater main along the boundary with State Highway 6 is proposed. The wastewater main would require a pump station within the Mount Iron Junction site, and it is proposed to vest all new wastewater assets in Council.

  A new DN250 watermain to the future Lot 2 (RM230506) is proposed, which is fed by the newly constructed QLDC-owned DN450 trunk main. From this, a DN125 connection will be provided to the McDonald's 'sub-site' to provide water servicing.

  Electricity and telecommunication providers have confirmed the site can be serviced. Further detail of the servicing proposal is included in the infrastructure report and plans at Appendix 5.
- Lighting: External lighting will include six pole downlights for way finding purposes within the carpark as well as internally illuminated signs per RC50 and RC51 of the architectural plans. All lighting specified is in accordance with the QLDC Southern Light Strategy.

Full details of each element described above is provided in the relevant reports or plans appended to this application.

[2] We have been advised that this consent is likely to be given effect to, similar to the land use consent for the Mount Iron Junction Development.

5.0 Reasons for Consent

5.1 Queenstown Lakes District Council – Proposed District Plan

The site is zoned Rural Zone under the QLDC Proposed District Plan ('PDP'). Whilst the PDP is not fully operative, this is now considered to be the dominant planning document in terms of this application. It is not considered that any other regard needs to be had to the Operative Plan provisions as part of this application as there are no applicable matters subject to appeal. That being the case, the consents sought are:

Rural Zone – Chapter 21

- A **discretionary activity** pursuant to Rule 21.4.11 in regard to construction of a new building in the Rural zone that is not provided for by any other rule.
- A **discretionary activity** pursuant to Rule 21.4.24 in regard to a restaurant in the Rural zone.
- A **non-complying activity** pursuant to Rule 21.4.37 in regard to a commercial activity not otherwise provided for in Table 21.4. The application proposes the restaurant has a drive-through component to its activity.
- A **restricted discretionary activity** pursuant to Rule 21.5.2 in regard to the building encroaching the 20m building setback by up to 2m.

Earthworks – Chapter 25

- A **restricted discretionary activity** pursuant to Rule 25.4.2 for earthworks exceeding the maximum volume of 1,000m^3 in the Rural Zone, as set out in Rule 25.5.4. A total of 2,050m^3 is proposed.

Transport – Chapter 29

- A **restricted discretionary activity** pursuant to Rule 29.4.11 for an activity that will generate greater than 400 additional vehicle trips per day or 50 additional trips during the commuter peak hour.
- A **restricted discretionary activity** pursuant to Rule 29.5.17 for a proposal that does not provide the required sight distances to the north.

Signs – Chapter 31

- A **discretionary activity** pursuant to Rule 31.5.1 for a freestanding blade sign with a height of 4.5m where 3.5m is permitted.
- A **discretionary activity** pursuant to Rule 31.5.1 for a word sign with an area of 3.05m² where 2m² is permitted.
- A **restricted discretionary activity** pursuant to Rule 31.5.12 for signs on land adjoining a state highway.

S127 Resource Management Act 1991

- A **discretionary activity** consent pursuant to s127 of the RMA is sought to amend the consented planting plans of Condition 1 of RM181471 to relocate 25 consented (but as yet planted) trees

within the Mount Iron Junction site and to amend the site fencing plan, as well as amendments to any other conditions that include plan references, to include the proposed plans[3].

Any other consents

- Any other consents required for the proposal which are not detailed above.

5.2 National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011 (NESCS)

A desktop assessment of the former land use activities on the site was undertaken as part of RM181471 and no consents under the NES:CS were required. Since the time of that resource consent, no new HAIL activities have been undertaken on site and it is considered that the findings of that review remain relevant.

The proposal therefore doesn't require any consents under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

5.3 Operative District Plan

As discussed in 5.1 above, it is considered that the Proposed District Plan is now the dominant plan in respect of this application, and that all of the relevant ODP rules have been overtaken by operative PDP rules.

5.4 Activity Status

Overall, this application is for a **non-complying** activity.

6.0 Public Notification Assessment (Sections 95A, 95C and 95D)

6.1 Assessment of Steps 1 to 4 (Sections 95A)

Section 95A specifies the steps the council is to follow to determine whether an application is to be publicly notified. These are addressed in statutory order below.

6.1.1 Step 1: Mandatory public notification is required in certain circumstances

Step 1 requires public notification where this is requested by the applicant; or the application is made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977.

The applicant requests notification for this proposal, pursuant to Step 1.

6.2 Permitted Baseline and Receiving Environment

The consent authority may disregard an adverse effect of the activity if a rule or national environmental standard permits an activity with that effect. In this case there is no useful permitted baseline as there are no permitted commercial activities in the Rural Zone.

[3] For example, conditions 44 and 48.

The "environment" embraces the existing environment, and the future state of the environment as it might be modified by permitted activities and by resource consents which have been granted where it appears likely[4] that those consents will be implemented.[5]

The resource consents granted for the site are an important consideration in assessing effects on this site. We consider that these consented activities (the consent is likely to be given effect to) shape the environment in which we can assess the proposal. In this regard, the site is no longer a vacant greenfield site, but is comprised of the activities and development set out in Section 2.2 of this report. We have been advised by the developer for Mt Iron Junction that it is more likely than not that the consent will be given effect to. This is further supported by the lodgement and ongoing and active processing of the subdivision consent (RM230506), and variations to the approved land use consent for the service station regarding signage and layout (RM230478).

Waka Kotahi / NZTA are currently constructing a large roundabout to the south of the site, which further modifies the receiving environment. The site is located between the Urban Growth Boundaries of both Wānaka and Albert Town, which are set within 1km of each other. The consented and existing environment surrounding the subject site are relevant considerations for the application.

6.3 Public Notification Conclusion

Having undertaken the section 95A public notification tests, under step 1 public notification is required as it has been requested by the applicant. The application can therefore proceed on a publicly notified basis.

7.0 Consideration of Applications (Section 104)

7.1 Statutory Matters

Subject to Part 2 of the Act, when considering an application for resource consent and any submissions received, a council must, in accordance with section 104(1) of the Act have regard to:

- Any actual and potential effects on the environment of allowing the activity;
- Any relevant provisions of a national environmental standard, other regulations, national policy statement, a New Zealand coastal policy statement, a regional policy statement or proposed regional policy statement; a plan or proposed plan; and
- Any other matter a council considers relevant and reasonably necessary to determine the application.

As a non-complying activity, section 104D of the Act states that a council may only grant the application if:

(a) adverse effects will be no more than minor; or

(b) the activity is not contrary to the objectives and policies of the relevant plans.

[4] Likely means "more likely than not".
[5] *Queenstown Lakes District Council v Hawthorn Ltd* [2006] NZRMA 424 at [79].

7.2 Weighting of Proposed Plan: QLDC Operative District Plan

As noted above, given the progression of the relevant sections of the Proposed District Plan through the process, it is considered with respect to all matters that the proposal can be assessed against the Proposed District Plan provisions only.

8.0 Effects on the Environment (Section 104(1)(A))

The following sections set out an assessment of the wider effects of the proposal having regard to the following matters:

- Earthworks;
- Geotechnical stability and natural hazards;
- Landscape and visual effects;
- Character effects;
- Servicing and access;
- Traffic generation;
- Acoustic effects;
- Cumulative effects; and
- Positive effects

These matters are set out and discussed below.

8.1.1 Earthworks

It is proposed to prepare an Environmental Management Plan (EMP) prior to undertaking any earthworks on the site. That plan will include appropriate silt and sediment controls to be established around all areas of earthworks to mitigate any adverse effects on nearby waterway areas. It is confirmed that the recommendations detailed in the infrastructure report and in an EMP form part of the proposal and it is envisaged that these will form conditions of consent. A final EMP will have to be approved by the council.

The site is also relatively flat and the earthworks will not generate significant changes to landscape or topography, nor undermine any surrounding land.

For these reasons, it is considered that any adverse effects in regard to silt and sediment runoff effects will be less than minor, and that landform effects will be negligible.

8.1.2 Geotechnical Stability & Natural Hazards

A Geotechnical Memo prepared by Geosolve (attached as Appendix 6) provides recommendations in relation to geotechnical stability. The report indicates that so long as the recommendations of the report are followed for the foundation design and the carpark area, no adverse geotechnical effects are expected. Geosolve have also confirmed that the soil is suitable for soakage of stormwater. Based on the advice from Geosolve, and subject to their recommendations being followed, it is considered that any adverse effects in relation to geotechnical stability will be less than minor.

In terms of natural hazards, a flood hazard assessment has been undertaken by PatersonPittsGroup ('PPG') and is included as **Appendix 5**. The assessment considered the flood hazards for the site. The report concludes that the building will be outside any flood hazards and that overall they do not consider there to be any flood hazard risks associated with the proposed development. Based on PPG's advice, it is not considered that there will be any adverse effects from flooding with respect to this development.

8.1.3 Servicing

The provision of infrastructure to service the development has been assessed by PPG in the infrastructure report attached as **Appendix 5.** Stormwater disposal has been assessed by CGW in the Stormwater Attenuation Design letter attached to the PPG report, and Geosolve have assessed ground conditions to receive stormwater**.** The assessments confirm that the proposed McDonald's restaurant and drive-through site can be adequately serviced in respect of stormwater, wastewater, and water supply. Electricity and telecommunications can also be supplied.

Accordingly, it is considered that no adverse effects will result in terms of site servicing.

8.1.4 Transportation

Trip generation, parking, loading, and access have been considered in the assessment provided by Traffic Planning Consultants ('TPC'), included as **Appendix 7**. Their assessment has considered the transportation effects of the proposal as well as those of the consented environment, as well as the modelling undertaken through the RM181471 process. The following key conclusions are noted:

- *"The site is suitable for a McDonald's restaurant from an overall transportation point of view, forming (in conjunction with the already consented service station) part of a vehicle oriented "service" area that is remote from the main Wanaka township and is able to directly serve the travelling public on the major State Highway network.*
- *With a new roundabout currently being constructed by Waka Kotahi at the SH6/SH84 intersection, the site will enjoy safe and convenient access from the State Highway network whilst having less than a minor effect on the transport environment.*
- *The on-site layout of circulation and parking will comply with all of the standards in the Queenstown Lakes Proposed District Plan, and will enable the site to function with minimal impact on the surrounding area and road network.*
- *It is considered that the proposed McDonald's restaurant will have less than a minor impact on the existing and future transport environments in this general location, and will have positive benefits in terms of serving the travelling public along these key transport corridors. It is concluded that the proposal is acceptable from an overall transportation point of view."*

Overall, having regard to the Integrate Transport Assessment ('ITA'), it is considered that any adverse effects associated with transportation matters will be less than minor.

8.1.5 Character Effects

Landscape character effects have been assessed by RMMLA in their report at Appendix 4. Overall it was considered by RMMLA that the landscape character effects will be less than minor on the wider environment regarding visual values.

The activity itself also has the potential to generate character effects, particularly as it is a restaurant and drive-through activity in a Rural Zone. Notwithstanding the built form that has been assessed by RMMLA, the remaining character effects of the activity largely comprise traffic and noise.

The environment on the site contains a service station across Link Road to the west, as well as workers accommodation and townhouses to the north and northeast. Waka Kotahi / NZTA is currently constructing a 5-arm roundabout immediately to the south of the site. RMMLA provide a description of the surrounding character at section 4.3 of their report (Appendix 4) which we concur with. We consider that the description of the surrounding area as 'peri-urban' is an appropriate description, particularly when having regard to the close proximity of the Urban Growth Boundaries of Wānaka and Albert Town to the northeast and southwest of the site, and the construction of the large new roundabout to the south of the site. Whilst the site is zoned Rural, the site is relatively small (5.834Ha) and is disconnected from other rurally-zoned land that is used for such purposes[6].

With regard to traffic effects on character, the site is located on the northern side of an intersection of two major State Highways for the District. TPC conclude that:

- *"The site is suitable for a McDonald's restaurant from an overall transportation point of view, forming (in conjunction with the already consented service station) part of a vehicle oriented "service" area that is remote from the main Wanaka township and is able to directly serve the travelling public on the major State Highway network."*

Similarly, from a landscape character perspective, RMMLA undertake the following assessment:

- *"The proposed McDonald's has been located to sit between and alongside the Caltex Service Station and 22 residential town houses at the entry into Wānaka. This additional commercial activity differs from the predominantly residential and rural residential living activities within the receiving environment. However, a commercial activity like this is well situated / clustered alongside the service station (a commercial activity) as they both generate relatively high traffic volumes, which in this instance aligns well with the adjoining a high-volume trafficked roundabout. Also, because the future adjacent residential units and service station will visually contain the development within a discreet area, so it will be well separated from the nearby residential and rural living areas.*

  At a wider scale, the proposal will reflect a typical mix of activities that commonly occurs along a main state highway on the outskirts of a town or city in Aotearoa New Zealand.

  Further, the size and scale of the proposed building will be relatively consistent with the size and scale of the consented development, being 6.1m tall with a site coverage of 445.8m2 in comparison to the 5.9m height of the Caltex Service Station buildings which have a combined floor area of approximately 800m2. Along with the proposed landscaping, the proposal will form part of the cohesive node and pattern of mostly residential and commercial development that is situated on the terrace at the intersection of two main state highways."

Acoustic effects have been considered by SLR in their report at Appendix 8. SLR's noise predictions show that the proposal can comply with the noise rules for the zone.

[6] We noted that Mount Iron, as is adjoins the site, is zoned Rural however it is not considered that it is used for Rural purposes and is better described as a public open space.

Overall, based on the assessments undertaken by TPC with regard to traffic effects, RMMLA with regard to landscape character effects, and SLR with regard to noise effects, as well as our own assessment of the planning environment and context of the site, we consider that the character effects will be less than minor overall.

8.1.6 Acoustic effects

A Noise Assessment has been prepared by SLR and this is attached as **Appendix 8**. SLR has considered the proposed activity and its location on the intersection of two state highways as well as the consented development on the subject site.

It is noted that in order to achieve compliance with the night-time rules at the notional boundary of the workers accommodation units, an acoustic fence is proposed along the northern and eastern boundaries of the McDonald's development site. The activity is sufficiently separated from other noise-sensitive activities to avoid adverse acoustic effects.

Overall, based on the advice received by SLR, and the adherence to relevant conditions, it is considered that any adverse effects of the proposal in regard to acoustic effects on the wider environment and neighbouring properties, including the workers accommodation and townhouses within the Mount Iron Junction site, will be less than minor.

8.1.7 Landscape and Visual Effects

A Landscape Assessment prepared by Rough Milne Mitchell Landscape Architects Limited ('RMMLA') is attached as **Appendix 4**. This report identifies that the site is located in the Rural Zone of the Proposed District Plan (PDP), is classified as a Rural Character Landscape, and that the Mount Iron Outstanding Natural Feature is located adjacent to the north of the site.

The Landscape Assessment sets out the context of the site and provides an assessment of the landscape and visual effects. The Landscape Assessment identifies that the potential landscape and visual effects arising from the proposal include:

- *"Effects on visual amenity values, in particular effects on Mt Iron's high degree of aesthetic qualities that contribute to road users visual amenity when they enter and exit Wānaka;*
- *Cumulative effects, in particular built form and signage when seen in the foreground of Mt Iron; and*
- *Effects on the rural and peri-urban landscape character of the receiving environment."*

At section 5.2 and 5.3 of that report, the Landscape Assessment goes on to undertake a landscape and visual assessment of the proposal from public and private viewpoints in the receiving environment of the site (as defined on Sheet 004 of the appendix to the RMMLA report). No viewpoints experience adverse landscape or visual effects to a more than minor degree, with two viewpoints, being located on Riverbank Road and State Highway 6 receiving adverse visual effects that could be considered minor (but no more than minor). All other viewpoint assessed by RMMLA experience less than minor or no adverse landscape or visual effects.

The Landscape Assessment also undertakes an assessment of the proposal's landscape and visual considerations against the relevant sections of the Proposed District Plan. This includes the relevant assessment matters contained within Chapter 3 (Strategic Direction), Chapter 6 (Landscapes and Rural Character), and Chapter 21 (Rural Zone).

Regarding perceptual values of visibility and effects on visual amenity, the Landscape Assessment concluded that:

- *"The visual catchment of the proposal is limited to the short stretches of road entering the roundabout, all of which is within 100 – 200m of the site, and a 200m stretch of SH6 prior to descending to the Cardrona River.*
- *In most instances, the proposed building will be seen to one side of Mt Iron and will not appear to intrude into skyline views of Mt Iron, which may otherwise reduce the prominence of the ONF.*
- *The proposed landscaping will visually break up the bulk of built form and / or screen large parts of the building from view, which along with its dark recessive cladding will reduce its potential prominence.*
- *The proposed landscaping will provide visual separation between the development and the adjoining state highways and integrate it into the well treed setting of the Mt Iron Junction development.*
- *The proposed vegetation will be compatible with and contribute to the visual amenity provided by the green / vegetated corridor experienced along these roads.*

Overall, the proposal development will have a very low degree of effect on the receiving environment's peri-urban landscape character. Also, the proposal will have a very low degree of adverse effects on Mt Iron's perceptual values, as it will remain the prominent feature when entering Wānaka."

Overall, when taking into account the conclusions of the report completed by Rough Milne Mitchell Landscape Architects Limited, as well as the proposed tree planting, it is considered that any adverse effects of the proposal with respect to landscape and visual effects on the wider environment will be less than minor.

8.1.8 Cumulative Effects

The McDonald's restaurant and drive through is proposed to be located on a site that is in the Rural Zone of the PDP and is subject to an approved resource consent as detailed in Section 2.2 of this report. The proposal therefore has the potential to generate cumulative effects when having regard to the consented development on the Mount Iron Junction site. All of the specialist reports that accompany this application have considered the consented environment.

As discussed above in Section 8.1.7 and on the basis of RMMLA's report at Appendix 4, the adverse landscape and visual amenity effects overall will be less than minor.

As discussed above in Section 8.1.5, the adverse character effects of the activity in the context of the site surrounds and consented development will be less than minor.

As discussed above in Section 8.1.4 and on the basis of TPC's report at Appendix 7, the adverse effects on the transportation environment will be less than minor.

As discussed in Section 8.1.3 and on the basis of PPG's report at Appendix 5, the adverse effects on services and infrastructure are negligible.

Overall, it is considered that the cumulative effects of the proposal, principally landscape and visual effects, character effects of the activity, effects on the transportation environment, and servicing

effects will be less than minor, and the cumulative effect is not considered to breach such a threshold that it could be considered significant.

8.1.9 Positive Effects

It is considered that the proposal will give rise to significant positive effects. These include:

- The development of a high-quality, architecturally-designed commercial building, which will be visually integrated within the environment; and
- Support for the local economy by enabling employment and increased spending in the area.

8.1.10 Summary of Effects

Overall, it is considered that any adverse effects on the environment as a result of this proposal will be less than minor. Further, it is considered that the proposal will also result in positive effects.

9.0 District Plan and Statutory Documents (Section 104(1)(B))

An assessment of the relevant Rural provisions of the Proposed District Plan has been undertaken as attached as **Appendix 12**. The assessment of the PDP is summarised as follows:

9.1 Objectives and Policies of the QLDC Proposed District Plan

9.1.1 Strategic Direction – Chapter 3

The particularly relevant strategic objectives (SO) and the associated relevant policies that relate to this proposal are detailed as follows with the key parts underlined:

- **SO 3.2.1:** The development of a prosperous, resilient and equitable economy in the District.
- **SO 3.2.1.1:** The significant socioeconomic benefits of well and appropriately located visitor industry places, facilities and services are realised across the District.
- **SO 3.2.1.6:** Diversification of the District's economic base and creation of employment opportunities through the development of innovative and sustainable enterprises.
- **Policy 3.3.2** In rural areas, provide for commercial recreation and tourism related activities that enable people to access and appreciate the District's landscapes provided that those activities are located and are of a nature that:

  a. protects the landscape values of Outstanding Natural Features and Outstanding Natural Landscapes; and

  b. maintains the landscape character and maintains or enhances the visual amenity values of Rural Character Landscapes.

The proposal provides for an activity that increases the economic base within the Wānaka area and the wider District, through enabling a place for employment for 40-50 people. McDonald's restaurants are typically franchised to people who live locally.

In terms of Objective 3.2.1.8, it is considered that the building is appropriately designed and located to ensure that the landscape values of the adjoining Outstanding Natural Feature (Mount Iron) is protected.

This proposal will result in a high-quality, architecturally-designed commercial building, which will be visually integrated within the environment as described in the Landscape Assessment provided in Appendix 4.

The accessibility of the proposed McDonald's restaurant and drive-through to the surrounding urban areas of Wānaka and Albert Town will enable spending in the local economy. The site is located on the intersection of two state highways, which is an appropriate location for a drive-through restaurant when considering where such activities (including petrol stations) are often located in New Zealand.

- SO 3.2.3: *A quality built environment taking into account the character of individual communities.*

This proposal is considered to be consistent with Objectives 3.2.3 as the proposal has taken into account the existing built environment character in Central Otago and ensures the values are taken into account in the design. In this regard the architect has used materials and colour schemes commonly found in buildings in Central Otago, including schist stone and dark, recessive colours.

- *SO 3.2.4: The distinctive natural environments and ecosystems of the District are protected.*

The proposal has been positioned away from streams and therefore the natural character of these areas will be retained. The building is positioned as far into the site as possible to retain the predominant view to Mount Iron from public and private viewpoints.

For the above reasons, the proposal is considered to be generally consistent with the objectives and policies located in Chapter 3 of the PDP.

9.1.2 Landscape – Chapter 6

The site is classified as being within a Rural Character Landscape and it adjoins the Mount Iron Outstanding Natural Feature (however is not within an ONF overlay). The particularly relevant landscape policies are set out as follows, with the key parts underlined. These policies are addressed in the Landscape Assessment attached as Appendix 4 and are further discussed below:

- Policy 6.3.4.1 - Recognise that subdivision and development is unsuitable in many locations in Rural Character Landscapes and successful applications will need to be, on balance, consistent with the objectives and policies of the Plan.
- Policy 6.3.4.4 - Have particular regard to the potential adverse effects on landscape character and visual amenity values where further subdivision and development would constitute sprawl along roads.
- Policy 6.3.4.5 - Ensure incremental changes from subdivision and development do not degrade landscape character, or important views as a result of activities associated with mitigation of the visual effects of proposed development such as screen planting, mounding and earthworks.
- Policy 6.3.4.8 - Avoid adverse effects on visual amenity from subdivision, use and development that:

  a. is highly visible from public places and other places which are frequented by members of the public generally (except any trail as defined in this Plan); or

  b. forms the foreground for an Outstanding Natural Feature or Outstanding Natural Landscape when viewed from public roads.

The proposal is considered to be consistent with Policy 6.3.4.8 which seeks to avoid adverse effects from development that is highly visible from public places. As outlined in the Landscape Assessment, the proposal will only have limited visibility from public places and other places which are frequented by members of the public, due to the recessed position of the building on the site, proposed tree planting, and the development being obscured by existing intervening vegetation, and the required earth-mounding to screen the service station.

The proposed McDonald's building and associated development will not degrade the landscape character of the surrounding environment as detailed in the Landscape Assessment attached as **Appendix 4.** This proposed design is generally consistent with the character of the built form that was granted by RM181471. The changes to the visual appearance of the site as a result of the proposed development, will be mitigated through the appropriately located landscaping, and the location of the building which is positioned in a way that is largely screened from views from outside of the site.

For the above reasons, and the assessment of the Landscape Assessment at **Appendix 4**, it is considered that the proposal will be consistent with the objectives and policies in Chapter 6 of the PDP.

9.1.3 Rural Zone – Chapter 21

The subject site is located in the Rural Zone. The purpose of the Rural Zone is to *"enable farming activities and provide for appropriate other activities that rely on rural resources while protecting, maintaining, and enhancing landscape values, …and rural amenity."*

Whilst the proposal is consistent with some of the objectives and policies for the zone, such as:

- those relating to protecting landscape values of ONF's (Objective 21.2.1(a));
- building setbacks to mitigate adverse effects on landscape character and visual amenity (Policy 21.2.1.3);
- lighting that does not cause glare to other properties, roads, public places or views of the night sky (Policy 21.2.1.5);
- provide adequate firefighting infrastructure (Policy 21.2.1.9);
- ensures traffic maintains safe and efficient operation of the road network (Policy 21.2.1.15);
- and the land does not have identified constraints that would require avoidance of use or development (Objective 12.2.8).

The proposal cannot meet the general gist of the objectives and policies which seek to provide for farm activities and farm buildings, or rurally-adjacent or dependant activities, while protecting rural landscape character and amenity. In this case the site, and the proposed activity and development, cannot be described has having rural landscape character or amenity, therefore it automatically falls short of those objectives and policies which effectively list these "and" not "or". Objective 21.2.9 is an example of this (emphasis added):

"21.2.9 Objective – Provision for diversification of farming and other rural activities that protect landscape and natural resource values and maintains the character of rural landscapes."

For the above reasons, the proposal is not considered to be consistent with the relevant objectives and policies for the Rural Zone in Chapter 21 of the PDP.

9.1.4 Earthworks – Chapter 25

The objectives and policies relating to earthworks are set out in Chapter 25 of the PDP, and the key relevant objective (Objective 25.2.1) requires that earthworks are undertaken in a manner that protects the safety of people and avoids, remedies and mitigates adverse effects on the environment.

The proposed earthworks have been assessed in section 8.2 above and it was concluded that any adverse effects will be less than minor, as appropriate erosion and sediment controls will be in place to minimise sediment run-off, and dust suppressants will be in place to minimise nuisance effects.

An Environmental Management Plan as proposed by the civil engineer will ensure that earthworks are undertaken in a manner that avoids adverse effects on the environment, and that inappropriate effects are avoided within the landscape. Māori cultural values, including wāhi tūpuna will be protected through the implementation of the management plan and Accidental Discovery Protocol.

9.1.5 Natural Hazards – Chapter 28

The key provisions in the natural hazards section of the PDP are as follows:

- Objective 28.3.1A The risk to people and the built environment posed by natural hazards is managed to a level tolerable to the community.
- Objective 28.3.1 B - Development on land subject to natural hazards only occurs where the risks to the community and the built environment are appropriately managed.

The site is not located in an identified natural hazards area and the flood hazard report attached as Appendix 5 confirms that there is no flood hazard risk associated with the proposed development. Standard building code provisions and specific stormwater design and overland flow management will mitigate the flooding risk to the future building. As such, the risk of damage to human life, property and the environment from natural hazards can be adequately avoided or mitigated. In overall terms, the proposal is considered to be consistent with the proposed objectives and associated policies in Chapter 28 which seek to manage, determine and understand hazard risk.

9.1.6 Transport– Chapter 29

The transport related objectives and policies are set out in Chapter 29 of the Proposed District Plan.

- Objective 29.2.1 seeks to achieve an integrated, safe and efficient approach to land use and transportation, that will support alternative transport modes, reduce traffic generation and manage the effects of land uses on the transport network.
- Objective 29.2.2 ensures that parking, loading, access, and onsite manoeuvring are consistent with the character, scale, intensity, and location of the zone and contribute toward providing a safe and efficient transport network and economic development.
- Policy 29.2.1.6 facilitates private coach transport as a form of largescale shared transport, through providing for off-site or non-accessory coach parking outside of specified zones where

the site location and design measures mitigate adverse effects on the transport network, amenity of neighbouring sites, and the quality of the streetscape and pedestrian environment.

Based on TPC's parking and access assessment attached as **Appendix 7**, it is considered that the proposed car parking will be adequate to meet the likely demand associated with the development and that the anticipated vehicle movements will be able to be accommodated within the capacity of the surrounding road network. Further, the proposed access arrangements will ensure the safety of pedestrians and other vehicle users is maintained, and will avoid adverse effects on the State Highways.

Overall, based on TPC's advice, it is considered that the proposal will accord with Objectives 29.2.1, and 29.2.2 and Policy 29.2.1.6.

9.1.7 Signs – Chapter 31

The signage related objectives and policies are set out in Chapter 31 of the Proposed District Plan.

- **Objective 31.2.1** seeks to ensure that signage is of a scale and extent that maintains the character of amenity values of the District and enhances access.
- **Policies 31.2.1.1-31.2.1.3** seeks to ensure that the number, size, location, design and appearance of signs maintain the character and amenity values of the site and surrounding environment, and be located within the site to which they relate.
- **Policy 31.2.1.7** seeks to ensure that illuminated signage does not lead to adverse effects on the receiving environment;
- **Objective 31.2.2** seeks to maintain public safety for pedestrian and users of the transport network;
- **Objective 31.2.3** seeks to ensure that signs are complementary to or do not detract from the design values of the building to which they relate and are sympathetic to the design values of nearby developments and public places.

The proposed signs are building signs, a free-standing branding sign, and way-finding signs all within the subject site. A reduced level of branding and signage has been proposed for this site to ensure that character and amenity effects are minimal, whilst still providing some advertising of the activity. Internally illuminated signage will comply with the District Plan lighting controls. The signs are not located within an ONF, are not flashing or moving, are not roof signs or contain offensive material. The signs are appropriate to the activity to which they relate and do not detract from the design values of the building. The signs are considered to be consistent with those of the approved activity and development on the site, particularly the service station.

Waka Kotahi have confirmed that the signs are acceptable from a safety perspective from the two state highways and roundabout.

Based on the location of the site at the intersection of two state highways, the consented development on the site, Waka Kotahi's feedback, and RMMLA's landscape visual assessment attached as **Appendix 3**, the proposal is considered to be generally consistent with the objectives and policies as they relate to signs.

9.1.8 Noise – Chapter 36

The noise related objectives and policies are set out in Chapter 36 of the Proposed District Plan.

- **Objective 36.2.1** seeks to control the adverse effects of noise toa reasonable level to manage the potential for conflict arising from adverse noise effects between land use activities.
- **Policy 36.2.1.1** seeks to ensure that unreasonable noise from land use and development is avoided, remedied or mitigated.

Based on the location of the site at the intersection of two state highways and SLR's noise assessment attached as **Appendix 8**, it is considered that the noise generated by the activity will be acceptable in the surrounding aural environment and will ensure the aural amenity of nearby residential properties is maintained.

Overall, based on SLR's advice, it is considered that the proposal will accord with Objective 36.2.1, Policy 36.2.1.1.

9.1.9 PDP Objective and Policy Conclusion

The proposal is considered to accord with most of the relevant objectives and policies of the Plan that relate to the activity and development, being objectives and policies in the transport, earthworks, noise, natural hazards, landscape character and the strategic directions chapters of the Plan.

However as the site is zoned Rural, we conclude that the proposal is contrary to those objectives and policies, being those which principally direct land use activities in a zone. Therefore overall we consider that, as the proposal is contrary to the Rural Zone objectives and policies, we cannot confidently say that the proposal is wholly consistent with the objectives and policies of the PDP.

9.2 Operative & Proposed Regional Policy Statement

9.2.1 Partially Operative Regional Policy Statement

The Regional Policy Statement for Otago (RPS) 1998 is now revoked and the new Regional Policy Statement for Otago (PORPS) was made partially operative on 15 March 2021. Objectives and policies relevant to this application include:

- **Objective 1.1** Otago's resources are used sustainably to promote economic, social, and cultural wellbeing for its people and communities.
- **Policy 1.1.1** Provide for the economic wellbeing of Otago's people and communities by enabling the use and development of natural and physical resources only if the adverse effects of those activities on the environment can be managed to give effect to the objectives and policies of the Regional Policy Statement.
- **Objective 1.2** Recognise and provide for the integrated management of natural and physical resources to support the wellbeing of people and communities in Otago.

As detailed in Sections 8 and 9 of this report, this proposal is considered to provide for the economic, social, and cultural wellbeing for communities by providing a dining facility that will contribute to the local economy. Potential adverse effects of the activity will be managed through the implementation of an EMP and through the landscaping that is proposed. Overall, it is considered that the proposal takes an integrated approach to the management of resources by utilising existing infrastructure and using land for a commercial purpose that is located in close proximity to the existing urban areas of Wānaka and Albert Town, and also providing for those utilising the state highway network in the District.

9.2.2 Proposed Regional Policy Statement

The Proposed Regional Policy Statement (PRPS) has been notified and the submissions period closed on 3 September 2021 (and further submissions closed on 12 November 2021). When Otago Regional Council notified the PRPS, it was considered to be a freshwater document by the Council. The High Court in Dunedin subsequently determined that the PRPS is not a freshwater planning document in accordance with section 80A of the RMA and the document has to be amended to exclude parts of the document in relation to freshwater and hearings have not yet been held. Due to the stage that the PRPS is currently at, it is considered that limited weighting should be given to this document.

9.3 National Policy Statements

9.3.1 National Policy Statement for Highly Productive Soils

The National Policy Statement for Highly Productive soils (NPSHPL) came into effect on 17 October 2022. All land which is categorised as Land Use Capability (LUC) 1, 2 or 3 falls under the NPSHPL. The land subject to the proposed McDonald's restaurant and drive-through is located in an area where the soil is classed as LUC 4 as mapped by the New Zealand Land Resource Inventory.[7] The application therefore does not engage the NPSHPL.

9.3.2 National Policy Statement for Urban Development

The National Policy Statement for Urban Development (NPS-UD) came into effect on 20 August 2020. QLDC have recently notified their intensification plan change to give effect to the NPS-UD however the application site remains in the Rural Zone under this plan change. We are aware that the landowner has made a submission seeking that the zoning of the site is changed to an urban zone given the surrounding context of the site and the approved resource consent. The Intensification Plan change is currently in the submission phase and little weight is afforded at this time. Further as the site is zoned Rural, the NPS-UD has little relevance. We do note however, that the zoning of the site is inconsistent with the approved use of the site, and the surrounding landuse and zoning context of the site, and that an urban zoning would be more appropriate.

9.4 Summary

It is considered that the proposed development is consistent with the general objectives and policies of the Proposed District Plan as they relate to earthworks, noise, transportation, however is not consistent with the objectives and policies of the Rural Zone.

The proposal is also generally consistent with the relevant higher order planning documents, including the Partially Operative Regional Policy Statement 2019 and the NPS-HPL.

10.0 Relevant Rules and Assessment Criteria

The QLDC PDP specifies the relevant assessment criteria to be considered in assessing this application for each of the consent matters in the following sections:

[7] https://ourenvironment.scinfo.org.nz/maps-and-tools/app/Land%20Capability/lri_luc_main

- Buildings within 20m of the road boundary (Rule 21.5.2):
  (a) rural Amenity and landscape character;
  (b) open space;
  (c) the adverse effects on the proposed activity from noise, glare and vibration from the established road.
  (d) Where Electricity Sub Transmission Infrastructure or Significant Electricity Distribution Infrastructure as shown on the District Plan web mapping application is located within the adjacent road, any adverse effects on that infrastructure.
- Earthworks that exceed the permitted volume (Rule 25.4.2):

  25.7.1.1 Soil erosion, generation and run-off of sediment.

  25.7.1.2Landscape and visual amenity values.

  25.7.1.3 Effects on infrastructure, adjacent sites and public roads.

  25.7.1.4 Land stability.

  25.7.1.5 Effects on water bodies, ecosystem services and biodiversity.

  25.7.1.6 Cultural, heritage and archaeological sites.

  25.7.1.7 Nuisance effects.

  25.7.1.8 Natural Hazards.

  25.7.1.9 Functional aspects and positive effects.

  Plus the assessment criteria at 25.8.1 – 25.8.11.
- An activity that exceeds the vehicle trip limits (Rule 29.4.11)
  (a) Integration with the existing transport network;
  (b) Measures to reduce traffic generation;
  (c) Measures to facilitate modal shift;
  (d) functional and operational needs of the activity to locate in that environment;
  (e) Any positive effects on the efficient use or amenity of the site or overall subdivision layout;
  (f) Any positive effects on the urban design quality of the land use or subdivision activity; and
  (g) Any recommendations from an Integrated Transport Assessment.
- A vehicle access that does not meet the required sight distances (Rule 29.5.17).
  (a) Effects on safety, efficiency, and amenity of the site and of the transport network, including the pedestrian and cycling environment.
  (b) Any positive effects on achieving planned intensification and compact urban form. Any positive effects on the efficient use of the site or efficiency of the overall subdivision layout.

These criteria largely cover the same matters that have been discussed and assessed in the above report and in the specialist assessments forming part of this application. In particular:

- The assessment matters being relating landscape character and amenity values have been addressed in the landscape report attached as **Appendix 4;**
- The assessment matters relating to earthworks and natural hazards have been addressed in the geotechnical report attached as **Appendix 6,** and the civil engineering attached as **Appendix 5**; and
- The assessment matters relating to transport have been addressed in the ITA attached as **Appendix 7**.

Overall, for these reasons and those described in sections 8 and 9 above, it is considered that the proposal accords with the relevant District Plan assessment criteria.

11.0 Part 2 Matters

Section 5 of Part 2 identifies the purpose of the RMA as being the sustainable management of natural and physical resources. This means managing the use, development and protection of natural and physical resources in a way that enables people and communities to provide for their social, cultural and economic well-being and health and safety while sustaining those resources for future generations, protecting the life supporting capacity of ecosystems, and avoiding, remedying or mitigating adverse effects on the environment.

Section 6 of the Act sets out a number of matters of national importance including (but not limited to) the protection of outstanding natural features and landscapes and historic heritage from inappropriate subdivision, use and development. As detailed in Section 8 of this report, this proposal will not result in more than minor adverse landscape effects. In overall terms it is considered that proposal is appropriate in this location.

Section 7 identifies a number of "other matters" to be given particular regard by Council and includes (but is not limited to) Kaitiakitanga, the efficient use of natural and physical resources, the maintenance and enhancement of amenity values, and maintenance and enhancement of the quality of the environment.

Section 8 requires Council to take into account the principles of the Treaty of Waitangi.

Overall, as the effects of the proposal are considered to be no more than minor, and the proposal accords with the relevant QLDC PDP objectives, policies and assessment criteria, it is considered that the proposal will be in accord with the general resource management principles set out in Part 2 of the Act.

12.0 Other Matters (Section 104(1)(C))

12.1 Record of Title Interests

The Records of Title for the site are subject to a number of interests (refer **Appendix 1**). All of the interests have been reviewed and none of these are anticipated to affect the resource consent application.

13.0 Section 104D(1) 'Gateway Test'

To be able to grant consent to a non-complying activity, a council must be satisfied that either the adverse effects of the activity on the environment will be minor (s104D(1)(a)), or the proposed activity will not be contrary to the objectives and policies of a proposed plan or plan (s104D(1)(b)). This consideration is commonly known as the 'threshold test' or the 'gateway test'. If either of the limbs of the test can be passed, then the application is eligible for approval, but the proposed activity must still be considered under section 104. There is no primacy given to either of the two limbs, so if one limb can be passed then the 'test' can be considered to be passed.

As identified in the assessment above, the adverse effects of the activity on the environment are considered to be less than minor although the proposed activity is contrary to the Rural Zone objectives and policies of the Proposed Plan. As one of the limbs can be passed, the application can be considered under section 104 and a determination made on the application as provided by section 104B.

14.0 Conclusion

The proposal involves the establishment of land use consent to establish an 445m^2 McDonald's restaurant and drive-through at 237 Wānaka-Luggate Highway. Based on the above report it is considered that:

- Public notification is required as it is requested by the Applicant.
- The adverse effects of the activity on the environment will be less than minor. Whilst the proposed activity is contrary to the objectives and policies of the Rural Zone of the PDP, the activity is consistent with the other relevant objectives and policies of the PDP. The activity is considered to be appropriate in this location when having regard to the consented activity on the site, the wider context of the nearby UGB of Wānaka and Albert Town, the typicality of these types of activities being located on state highways, and adverse effects being able to be avoided, remedied or mitigated such that they can be considered as less than minor;
- There are positive effects including the creation of a locally-franchised restaurant that will support the local economy by enabling employment and increase in spending in the area;
- The proposal does not engage the NPS-HPL;
- The proposal is considered to be consistent with Part 2 of the Act.

It is therefore concluded that the proposal is an appropriate activity on the site and that it satisfies all matters the consent authority is required to assess, and that consent can be granted under s104B subject to conditions of consent. We would welcome the opportunity to review and contribute to conditions of consent at the appropriate time.

RPNZ document ordering service

Certificate of Title with diagram: OT5B/1115

Property: 237 Wanaka-Luggate Highway, Wanaka, Queenstown-Lakes District

Legal Description: Lot 5 Deposited Plan 15016

CoreLogic Reference: 3151448/1

Processed: 04 September 2023

Sourced from RPNZ, a CoreLogic solution. For any queries about this document or this service please call 0800 82 55 78 or email documentordering@corelogic.co.nz.

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **OT5B/1115**

Land Registration District **Otago**

Date Issued 03 July 1973

Prior References
OT5B/475

Estate Fee Simple

Area 5.8340 hectares more or less

Legal Description Lot 5 Deposited Plan 15016

Registered Owners
Mt Iron Junction Limited

Interests

501771 Gazette Notice declaring that State Highway No: 89 (Queenstown - Wanaka) fronting the within land to be a limited access road - 17.8.1978 at 1.41 pm

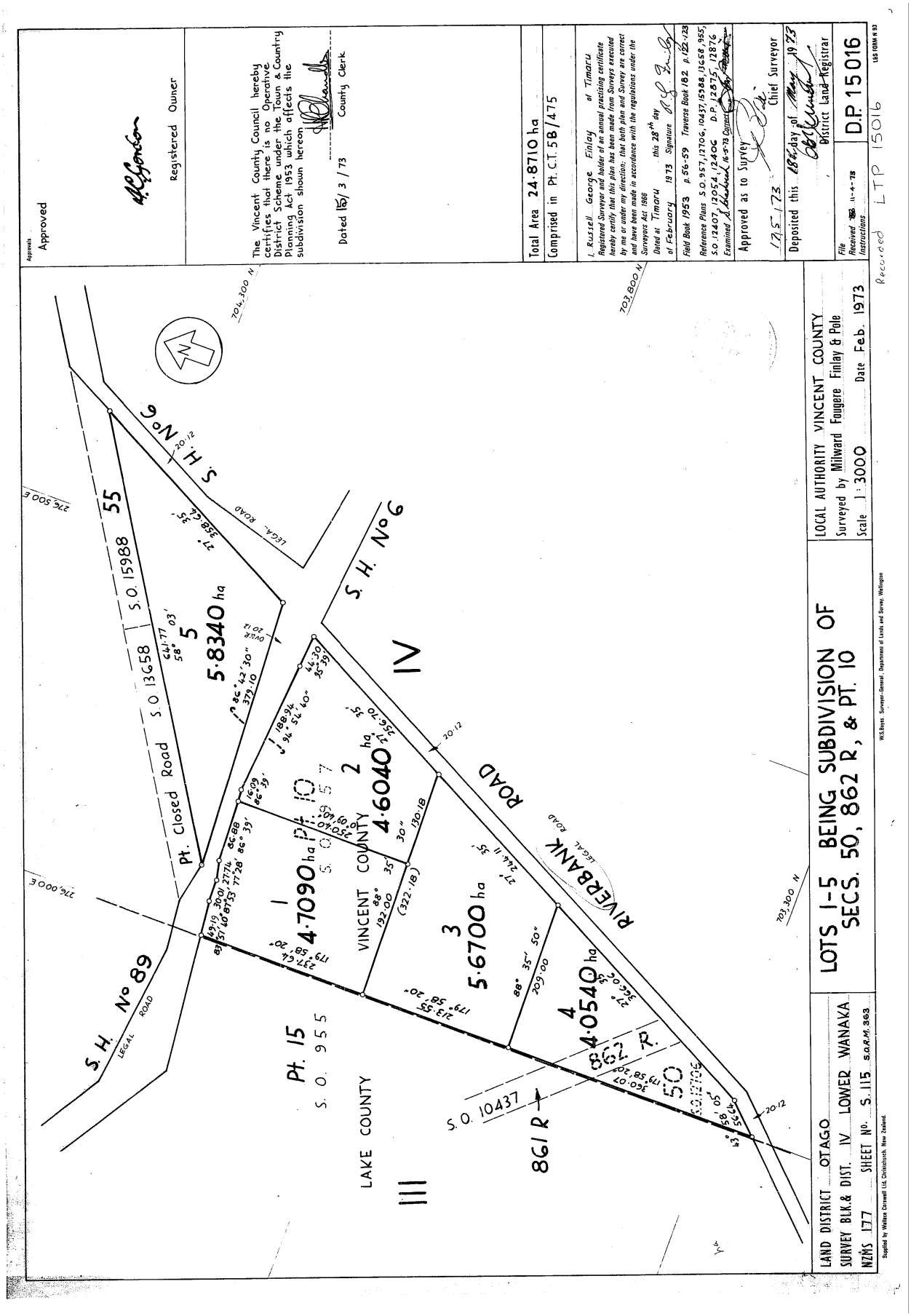
843805.2 Transfer creating the following easements - 2.12.1993 at 9.05 am

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Convey water	Section 61 Block IV Lower Wanaka Survey District - CT OT12D/1639	A-B-C Transfer 843805.2	Lot 5 Deposited Plan 15016 - herein	
Install pumps	Section 61 Block IV Lower Wanaka Survey District - CT OT12D/1639	D Transfer 843805.2	Lot 5 Deposited Plan 15016 - herein	
Convey water	Section 61 Block IV Lower Wanaka Survey District - CT OT12D/1639	D Transfer 843805.2	Lot 5 Deposited Plan 15016 - herein	
Convey electricity	Section 61 Block IV Lower Wanaka Survey District - CT OT12D/1639	D Transfer 843805.2	Lot 5 Deposited Plan 15016 - herein	

5016824.1 Gazette Notice declaring adjoining road (State Highway No.6) to be a Limited Access Road - 21.12.2000 at 9:21 am

11525203.4 Mortgage to ANZ Bank New Zealand Limited - 26.8.2019 at 4:16 pm

12356112.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 by Her Majesty the Queen - 20.1.2022 at 8:29 am



asc architects
designgroup

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new zealand
p. +64 9 377 5332
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architecture
interior design
urban design

Visual Simulation Methodology

These visual simulations prepared for McDonald's Restaurants Limited are to accompany their Resource Consent application of McD Wanaka at 237 Wanaka-Luggate Highway, Wanaka.

The main objective of a photo simulation is to provide an image that, as realistically as possible, conveys the modification or change of a proposed activity. The most appropriate technical methodology has been applied to ensure the accuracy of what is depicted, in terms of its relative position, elevation, scale, and appearance. Photo simulations can never replace the real experience of being at a location, but they are a useful tool to assist in the decision-making process.

To achieve a photo simulation, a 3D model is rendered into a series of 2-dimensional photographs.

The viewpoint locations were selected by Rough Milne Mitchell Landscape Architects Ltd (RMM). Also, the photographs were taken by RMM with a Canon EOS 7D Mark II 50mm focal length camera on 12th July 2023 between 12:15-3:45pm. RMM identified the coordinates and altitude of each photograph.

Seven individual portrait photos were captured from each viewpoint location and stitched together using the Photomerge tool on Photoshop. These panorama photographs and their coordinates were then sent onto ASC Architects to prepare the visual simulations.

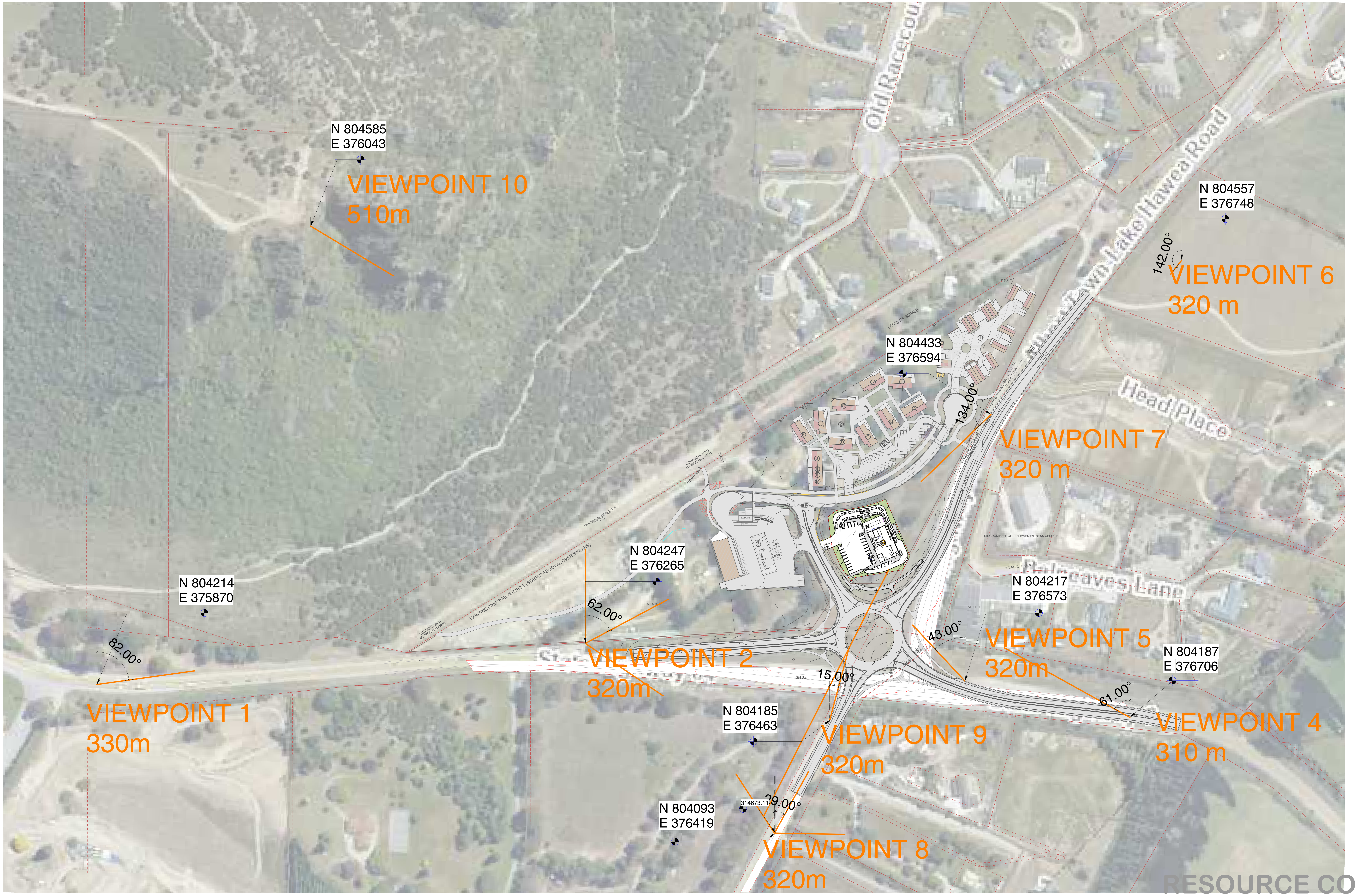
ASC Architects developed a 3D building and site model on Revit utilising survey information both co-ordinates and datum provided by Patterson Pitts Group who carried out the earthworks and surveying for Mt Iron Junction. The survey had been completed in co-ordinate system Lindis Peak Circuit 2000, and co-ordinates captured by RMM were converted on LINZ via the converter tool and were located in our model as identified on A1040. The surrounding context was developed with the information received from Mt Iron Junction and the Mt Iron Junction roundabout as well as ArchGIS for areas beyond the site and new roundabout.

See below conversion from New Zealand Geodetic Datum 2000 to Lindis Peak circuit 2000. Vertical datum is New Zealand Vertical Datum 2016.

	NZGD 2000		Lindis Peak Circuit 2000	
Viewpoints	Latitude	Longitude	East	North
1	44°41'48"	169°9'47"	375870	804214
2	44°41'47"	169°10'5"	376265	804247
4	44°41'49"	169°10'25"	376706	804187
5	44°41'48"	169°10'19"	376573	804217
6	44°41'37"	169°10'27"	376748	804557
7	44°41'41"	169°10'20"	376594	804433
8	44°41'52"	169°10'12"	376419	804093
9	44°41'49"	169°10'14"	376463	804185
10	44°41'36"	169°9'55"	376043	804585

Viewpoints in Revit were set up based on the co-ordinates, bearings and height, refer to attached plan RC1040. The photographs were also superimposed on the viewpoints to confirm camera angle positioning and height. Given the immediate surrounding context

for the new Mt Iron Roundabout is not in the existing photographs captured The views were then rendered in the plugin of Enscape with the output including the rendered image and alpha channel layers. The alpha channels assisted with removal of background from the rendered image to be overlayed in Photoshop over the photographs captured by RMM.



RESOURCE CONSENT

asc architects design group

LEGAL DESCRIPTION

ADDRESS
237 Wanaka Luggate Highway

McDONALD'S RESTAURANTS (NEW ZEALAND) LIMITED
302 Great South Road : Greenlane : Auckland
PO Box 6644 : Wellesley St : Auckland 1141
Telephone : 09 539-4300 Fax : 09 539-4310
(c) 1984 McDonald's Corporation

SHEET TITLE
Visual Simulation Viewpoints

PROJECT
McDonald's Wanaka

SCALE @ A1 : 1 : 1500
SCALE @ A3 :
DATE : July 2023

DATE	DESIGN	DRAWN	APPROVED
07/21/23	Designer	Author	Approver

REVISIONS

MRL PROJECT
JOB No: 22326
DRAWING No: RC1040
ORIGINAL A1 SIZE

i'm lovin' it®

237 WANAKA - LUGGATE HIGHWAY, WANAKA - ENGINEERING DRAWINGS

CLIENT:	MCDONALD'S RESTAURANTS NZ LTD	**PPG JOB NUMBER:**	W7173							
PROJECT NAME:	237 WANAKA - LUGGATE HIGHWAY, WANAKA	**DAY**	22							
		MONTH	08							
		YEAR	2023							
SHEET NO.	**SHEET TITLE**	**DRAWING REVISIONS**								
100	INDEX SHEET	0								
101	OVERVIEW SERVICING PLAN	0								
200	EXISTING CONTOURS	0								
201	PROPOSED CONTOURS	0								
202	CUT/FILL CONTOURS	0								
203	EARTHWORKS CROSS SECTIONS	0								
DISTRIBUTION:										
MCDONALD'S RESTAURANTS NZ LIMITED		1								
CONSULTANTS TEAM										
QUEENSTOWN LAKES DISTRICT COUNCIL										
CONTRACTOR										
REASONS FOR ISSUE:		Y								
DRAWING SIZE:		A3								
MEDIA:		PDF								

A = APPROVAL D = DESIGN X = PRICING I = INFORMATION P = PRELIMINARY
C = CONSTRUCTION T = TENDER Y = CONSENT R = REQUESTED E = DXF OR DWG

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E wanaka@ppgroup.co.nz

Client & Location:

MCDONALD'S RESTAURANTS NZ LTD

237 WANAKA-LUGGATE HIGHWAY
WANAKA

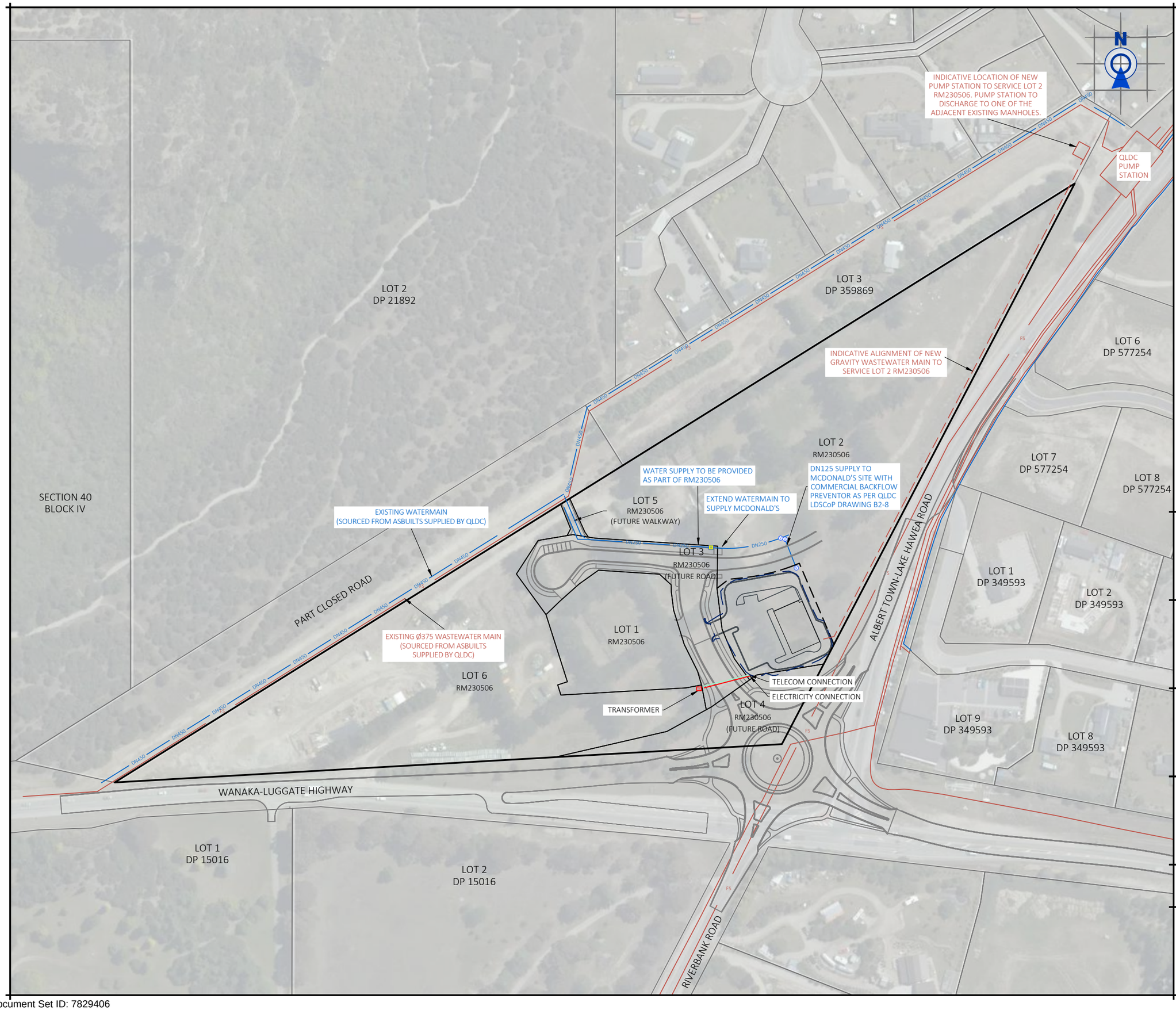
Purpose & Drawing Title:

ENGINEERING DRAWINGS

INDEX SHEET

PRELIMINARY

Surveyed by:	-	Original Size:	Scale:		
Designed by:	PPG	A3	NTS		
Drawn by:	LJB				
Checked by:	AGT				
Approved by:	AGT		DO NOT SCALE		
Job No:	Drawing No:	Sheet No:	Revision No:	Date:	
W7173	001	100	0	22/08/2023	



NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.

LEGEND

- KERBS
- PROPOSED BUILDING FOOTPRINT
- EXISTING BOUNDARY
- PROPOSED BOUNDARIES RM230506
- NOTIONAL FUTURE SITE BOUNDARY
- EXISTING FOULSEWER MAIN
- EXISTING WATER SUPPLY MAIN
- WATER HYDRANT
- WATER VALVE
- POWER
- TRANSFORMER
- TELECOM

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Purpose & Drawing Title:

ENGINEERING DRAWINGS

OVERVIEW SERVICING PLAN

PRELIMINARY

Surveyed by:	-	Original Size:	Scale:	
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Drawn by:	LJB			
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Approved by:	AGT			
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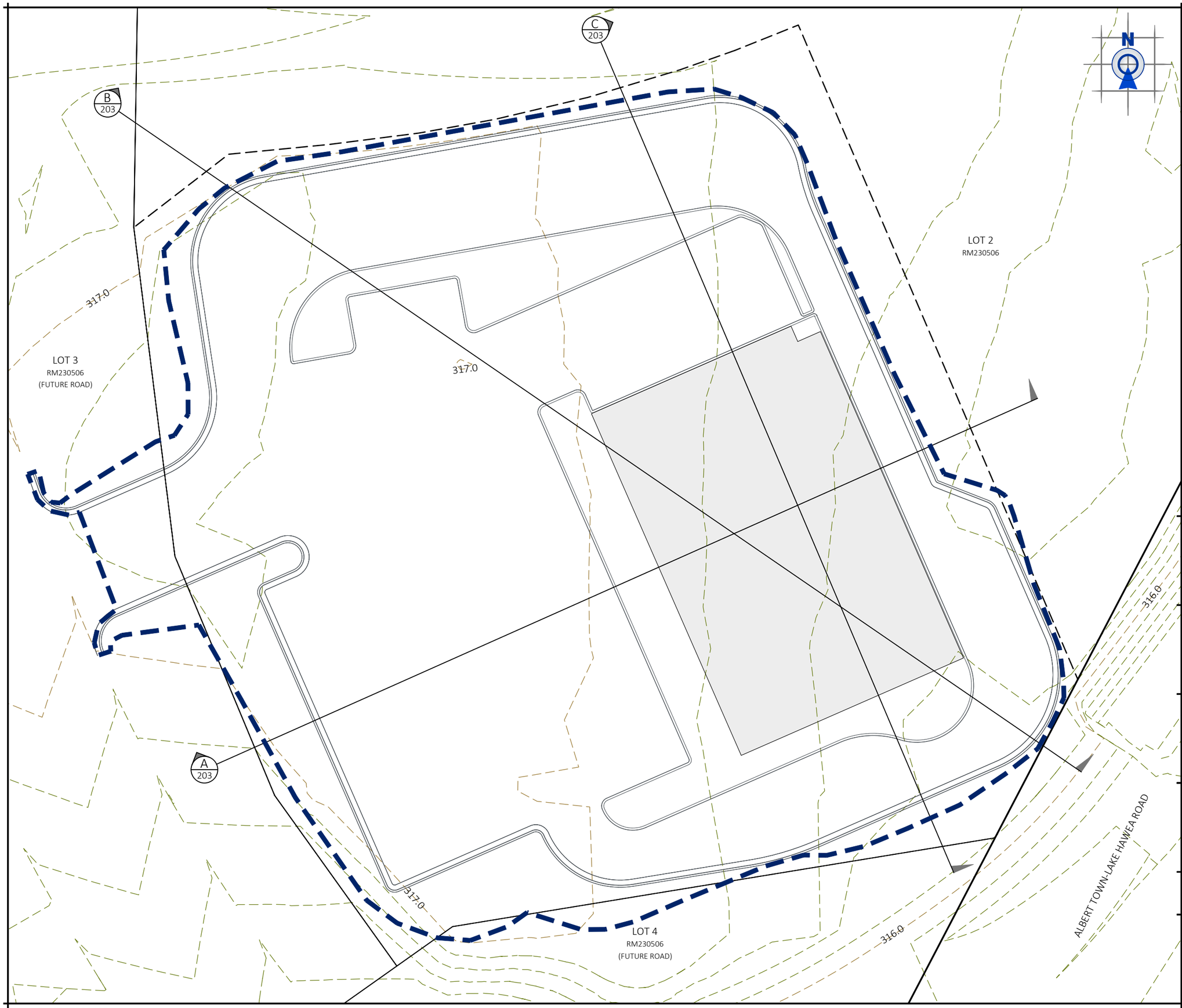

NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.

2. EXISTING CONTOURS SHOWN ARE A COMBINED DESIGN SURFACE FROM THE UNDERLYING DEVELOPMENT RM230506 AND NZTA ROUNDABOUT WORKS

LEGEND

- EXISTING CONTOURS MINOR (0.2m INTERVAL)
- EXISITING CONTOURS MAJOR (1.0m INTERVAL)
- EXTENTS OF EARTHWORKS
- KERBS
- PROPOSED BUILDING FOOTPRINT
- EXISTING BOUNDARY
- PROPOSED BOUNDARIES RM230506
- NOTIONAL FUTURE SITE BOUNDARY

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ENGINEERING DRAWINGS

EXISTING CONTOURS

PRELIMINARY

Surveyed by:	-	Original Size:	Scale:	
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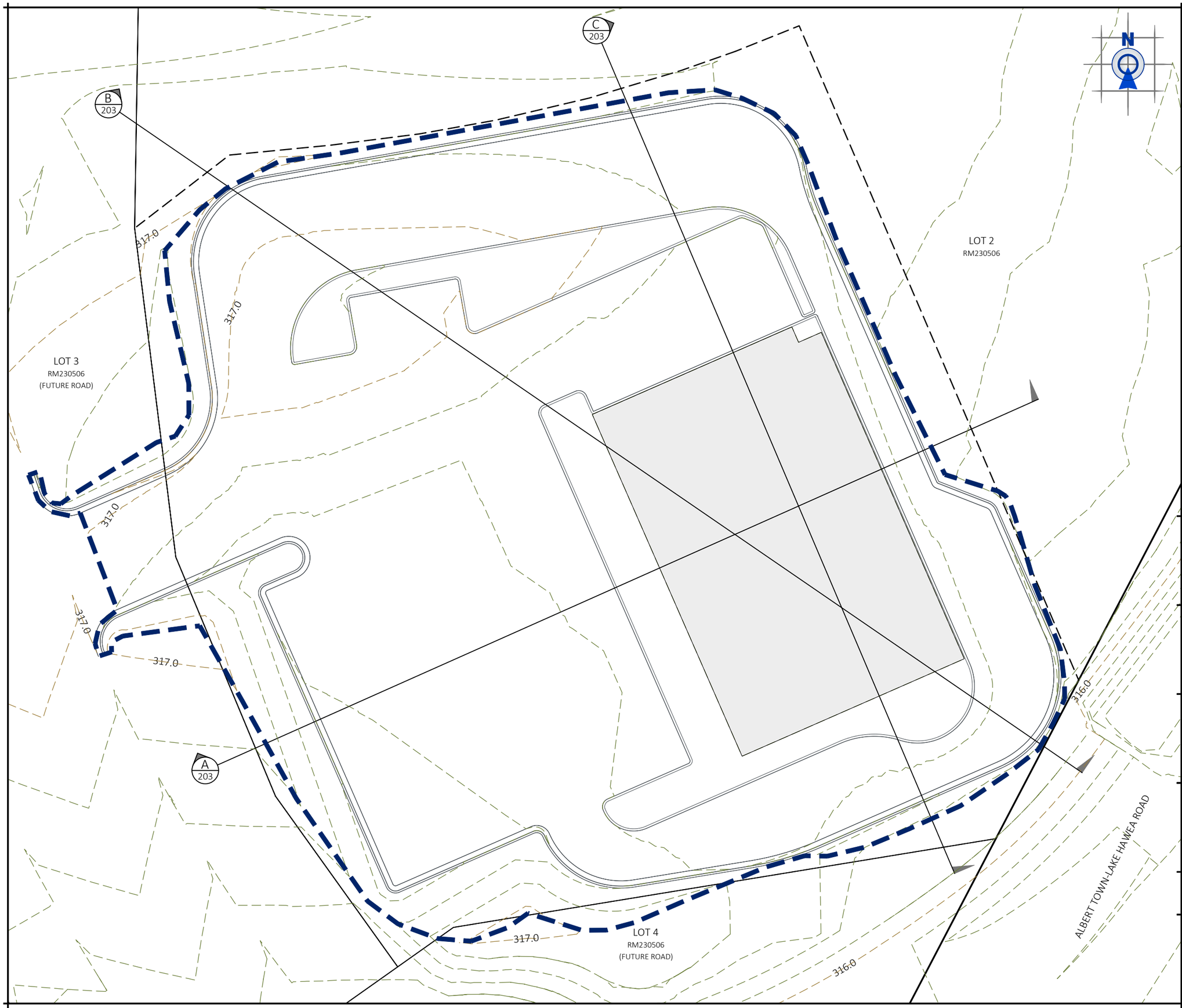

NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.

LEGEND

- PROPOSED CONTOURS MINOR (0.2m INTERVAL)
- PROPOSED CONTOURS MAJOR (1.0m INTERVAL)
- EXTENTS OF EARTHWORKS
- KERBS
- PROPOSED BUILDING FOOTPRINT
- EXISTING BOUNDARY
- PROPOSED BOUNDARIES RM230506
- NOTIONAL FUTURE SITE BOUNDARY

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PROPOSED CONTOURS

PRELIMINARY

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Approved by:	AGT			
Job No:	Drawing No:	Sheet No:	Revision No:	Date:
W7173	001	201	0	22/08/2023

EARTHWORKS QUANTITIES

AREA OF EARTHWORKS	2,840m²
STRIP TOPSOIL TO WASTE OFFSITE (ALLOWED AVERAGE DEPTH OF 200mm)	560m³
STRIP INSUITABLE MATERIAL AND LOESS TO WASTE OFFSITE (ALLOWED AVERAGE DEPTH OF 300mm)	840m³
CUT TO FILL FROM UNDERSIDE OF LOESS TO SUBGRADE (NOMINALLY 350mm BELOW DESIGN RL)	CUT : 375m³ FILL : 275m³
TOTAL EARTHWORKS (EXCLUDNG BUILDING FOOTINGS/SLAB, CARPARK AND FOOTPATH PAVEMENTS AND MINOR TOP SOILING OF GARDEN AREAS)	2050m³

NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.
2. MAXIMUM CUT DEPTH 0.9m
   MAXIMUM FILL DEPTH 0.4m
3. CUT-FILL DEPTHS ARE FROM PRE MOUNT IRON JUNCTION ROUNDABOUT SURFACE TO DESIGN SURFACE

LEGEND

CUT
- 3.0m +
- 2.5m to 3.0m
- 2.0m to 2.5m
- 1.5m to 2.0m
- 1.0m to 1.5m
- 0.5m to 1.0m
- 0.25m to 0.5m
- 0.0m to 0.25m

FILL
- 0.0m to 0.25m
- 0.25m to 0.5m
- 0.5m to 1.0m
- 1.0m to 1.5m
- 1.5m to 2.0m
- 2.0m to 2.5m
- 2.5m to 3.0m
- 3.0m +

- KERBS
- EXISTING BOUNDARY
- PROPOSED BOUNDARIES RM230506
- NOTIONAL FUTURE SITE BOUNDARY
- DEPTH CONTOURS (AT 0.5m INTERVALS)
- EXTENTS OF POSSIBLE UNDERCUT

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Purpose & Drawing Title:

ENGINEERING DRAWINGS

CUT/FILL CONTOURS

PRELIMINARY

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Designed by:	PPG	A3	1:250	
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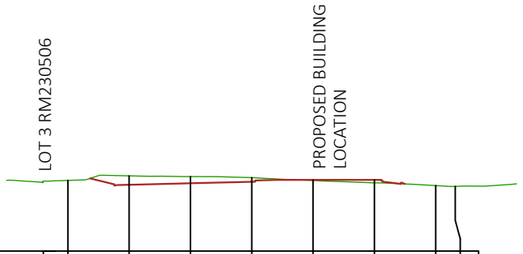
Approved by:	AGT		DO NOT SCALE	
Job No:	Drawing No:	Sheet No:	Revision No:	Date:
W7173	001	202	0	22/08/2023

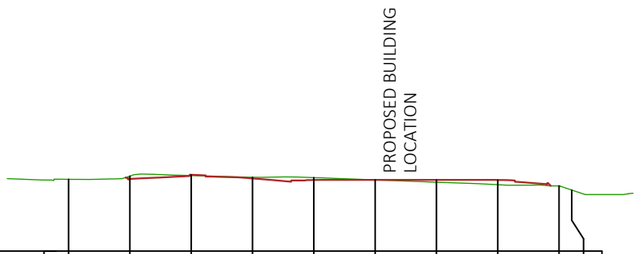


DATUM RL 311.0									
DESIGN SURFACE		316.40	316.52	316.64	316.80	316.80			
-CUT / +FILL TO DESIGN		-0.7	-0.5	-0.3	0.1	0.2			
NATURAL SURFACE	316.75	317.13	317.07	316.98	316.75	316.56	316.33	316.27	
CHAINAGE	0	10	20	30	40	50	60	63	

EARTHWORKS CROSS SECTION A

A3 HORZ SCALE 1:1000

A3 VERT SCALE 1:500

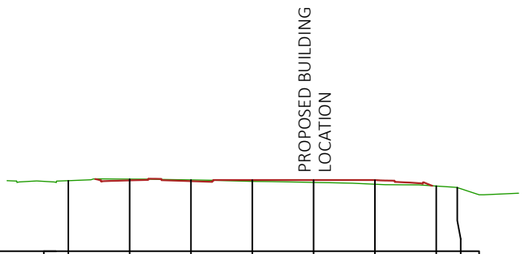


DATUM RL 311.0										
DESIGN SURFACE		316.87	317.21	316.92	316.79	316.80	316.80	316.79		
-CUT / +FILL TO DESIGN		-0.2	0.1	-0.1	-0.2	0	0.2	0.4		
NATURAL SURFACE	316.84	317.10	317.15	317.01	316.98	316.80	316.60	316.40	316.31	315.97
CHAINAGE	0	10	20	30	40	50	60	70	80	82

EARTHWORKS CROSS SECTION B

A3 HORZ SCALE 1:1000

A3 VERT SCALE 1:500



DATUM RL 311.0									
DESIGN SURFACE		316.77	316.71	316.80	316.80	316.80			
-CUT / +FILL TO DESIGN		-0.1	-0.1	0.1	0.2	0.3			
NATURAL SURFACE	316.75	316.87	316.81	316.69	316.61	316.46	316.31	316.18	
CHAINAGE	0	10	20	30	40	50	60	63	

EARTHWORKS CROSS SECTION C

A3 HORZ SCALE 1:1000

A3 VERT SCALE 1:500

NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.

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Client & Location:

MCDONALD'S RESTAURANTS NZ LTD

237 WANAKA-LUGGATE HIGHWAY
WANAKA

Purpose & Drawing Title:

ENGINEERING DRAWINGS

EARTHWORKS CROSS SECTIONS

PRELIMINARY

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Drawn by:	LJB			
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Approved by:	AGT			
Job No:	Drawing No:	Sheet No:	Revision No:	Date:
W7173	001	203	0	22/08/2023

CGW Ref: 230374-LET-C-001-A
Date: 2 August 2023

Paterson Pitts Limited Partnership
19 Reece Crescent

Wanaka
Attention: Alex Todd

Dear Alex,

RE: 230374 – McDonalds Wanaka – Mt Iron Junction

1. Introduction

CGW Consulting Engineers have been engaged by the client (Paterson Pitts Group) to provide a stormwater attenuation design for the proposed McDonalds development located at the new Mt Iron Junction development.

The purpose of this design is to support a resource consent application to Queenstown Lakes District Council (QLDC) and show that the development can meet the stormwater requirements of the QLDC Land Development and Subdivision Code of Practice (LDSCoP).

We have referred to the resource consent plans provided by the client, and proposed layout and site levels from Paterson Pitts Group (PPG) for this design assessment.

Our limitations are attached in Appendix A.

1.1 Background

The development consists of the construction of a new restaurant building, parking areas, drive through lanes, footpaths, and a loading bay to support the new proposed restaurant building.

There is no existing QLDC stormwater network available in this area. Therefore, stormwater runoff from new hardstanding areas will be required to discharge to ground via soak pits.

Previous geotechnical testing has been carried out by Geosolve, detailed in their report dated March 2018. This report includes the results of soakage testing carried out within the proposed restaurant location. The results show that soakage conditions are favourable, with a recommended unfactored rate of 720 mm/hr.

The development will have greater than 10 carparks, so as per section 4.2.8 of the LDSCoP a stormwater treatment device is required to provide treatment for the water quality flow from all hardstanding pavement areas.

2. Design

2.1 Design Parameters

Table 1 below provides the design parameters used for the design of the soak pits.

Table 1 - Design Inputs

Input	Note	Source
Catchments	Roof: 445 m^2 (C: 0.90) Hardstand: 1876 m^2 (C: 0.85) Landscaping: 697 m^2 (C: 0.30)	Supplied Plans from Client C values from NZBC E1
Infiltration Rate	720 mm/hr reduced to 360 mm/hr to allow for loss of performance over time.	Soakage testing carried out by Geosolve near the proposed building location
1% AEP 2-hour design intensity used in calculations	23.0 mm/hr (2-hour)	NIWA HIRDS V4 RCP8.5 2081 - 2100

No slope correction factors have been applied to the C-values shown above. A time of concentration of 10 minutes has been used for peak runoff dues to the compact nature of the site. Soakpits have been assessed across a range of durations to identify the critical duration of the soakpits.

2.2 Pre and Post Development Stormwater Runoff

The proposed development includes a significant increase in hardstanding area, as there is no QLDC stormwater network in the vicinity of the site, and the high permeability of the underlying gravels, we have designed the soak pits to cater for the 100-year rainfall event.

Tertiary flow paths have been provided in the event that the system becomes blocked or its capacity is exceeded. Tertiary flow paths discharge from site at the two low points located at the south-eastern and south-western corners of the site.

2.3 Stormwater Layout

Two separate networks have been proposed for the site.

The first network is located to the North East for clean runoff from new restaurant roof areas only. Runoff from new building downpipes will be directed to a soakpit along the North East boundary.

The second stormwater network is proposed for runoff from the remainder of the site, including trafficable hardstanding areas. This system will comprise of stormwater sumps located in the low points of the kerb and channels, a stormwater treatment device, and soakpit located under the proposed new carpark.

2.4 Pipework Design

An indicative stormwater pipe network has been shown in drawing 230374-DWG-C-01-01-A. Detailed design of the stormwater pipework will be required in the future detailed design phase. Detailed pipework design will be undertaken in accordance with NZBC E1 and the QLDC LDSCoP.

Stormwater pipework will be designed for a 1% AEP event to match the soakpit design event.

From our concept design, the peak flow rate to soakpit 1 is approx. 32.9 L/s and the peak runoff to soakpit 2 is approx. 7.3 L/s.

2.5 Stormwater Treatment

As per local best practice a water quality flow (WQF) of 10mm/hr has been adopted.

In a WQF event, the peak flow rate from impervious hardstanding areas is approx. 5.0 L/s.

The proposed SPEL Vortceptor treatment device can treat a maximum water quality flow rate of 26 Litres/second. The bypass flow capacity of this device is 280 L/s therefore the treatment device has sufficient capacity both for the treatment flows and peak flows.

Alternative treatment options include Hynds UpFlo modules (4 cartridges) and a Stormwater360 Jellyfish device (2 cartridges).

The final selection of the treatment device and specification will be confirmed during the detailed design phase.

2.6 Soakage Design

Two separate soakage devices have been designed to cater to all rainfall events up to and including the 100-year ARI. The larger soakage device will receive the surface runoff from all of the pavement, landscaping and footpath areas with a total area of 2,573 m^2 and a C-value of 0.7. This soakage device will include a SPEL Vortceptor treatment device (or similar) to treat the water quality flow including oil and grease treatment. The larger soak pit will be placed centrally within the main car park at a

depth allowing trafficable loads above. Due to space constraints, it is proposed that the soak pit will be constructed utilizing proprietary devices with a void ratio of 95% such as Rain Smart modules or Flo-Vault systems. The soak pit must be trafficable and will therefore require increased cover as well as geogrid reinforcement of backfill layers above the device in accordance with the suppliers' requirements.

The second soak pit will service the roof area with an area of 445 m^2 and a C-value of 0.9 and is proposed to be placed along the north-eastern boundary of the site within the proposed landscaping area. This soakage device will treat the runoff from the prosed building roof and therefore will not need to pass through a treatment device first. This second soak pit will also utilize proprietary devices with 95% void ratio due to site size constraints. However, this soak pit does not need to be trafficable as it's in the landscaped berm, however consideration will need to be made to potential side loading from the drive through lane.

3. Conclusion

Our concept stormwater design assessment indicates that the stormwater from the proposed development can comply with the QLDC LDSCoP requirements.
Previous testing by others indicates that the underlying soils at the site are suitable for stormwater discharge to ground via soakpits.
It is proposed to discharge stormwater for all events up to and including the 1% AEP event to ground utilizing two separate soak pits constructed using proprietary chambers to achieve high void ratios. Indicative catch pits locations and a water quality treatment device sizing has been assessed as part of this preliminary concept design. The findings of this preliminary concept design will need to be confirmed and detailed further during future detailed design phases.

Yours faithfully,

Prepared by

Cameron Tulett

Civil Engineer

BE (Civil), MEngNZ

Reviewed

P.P.

Nathan Borger

Senior Civil Engineer

BEngTech, MEngNZ

Appendix A. Limitations

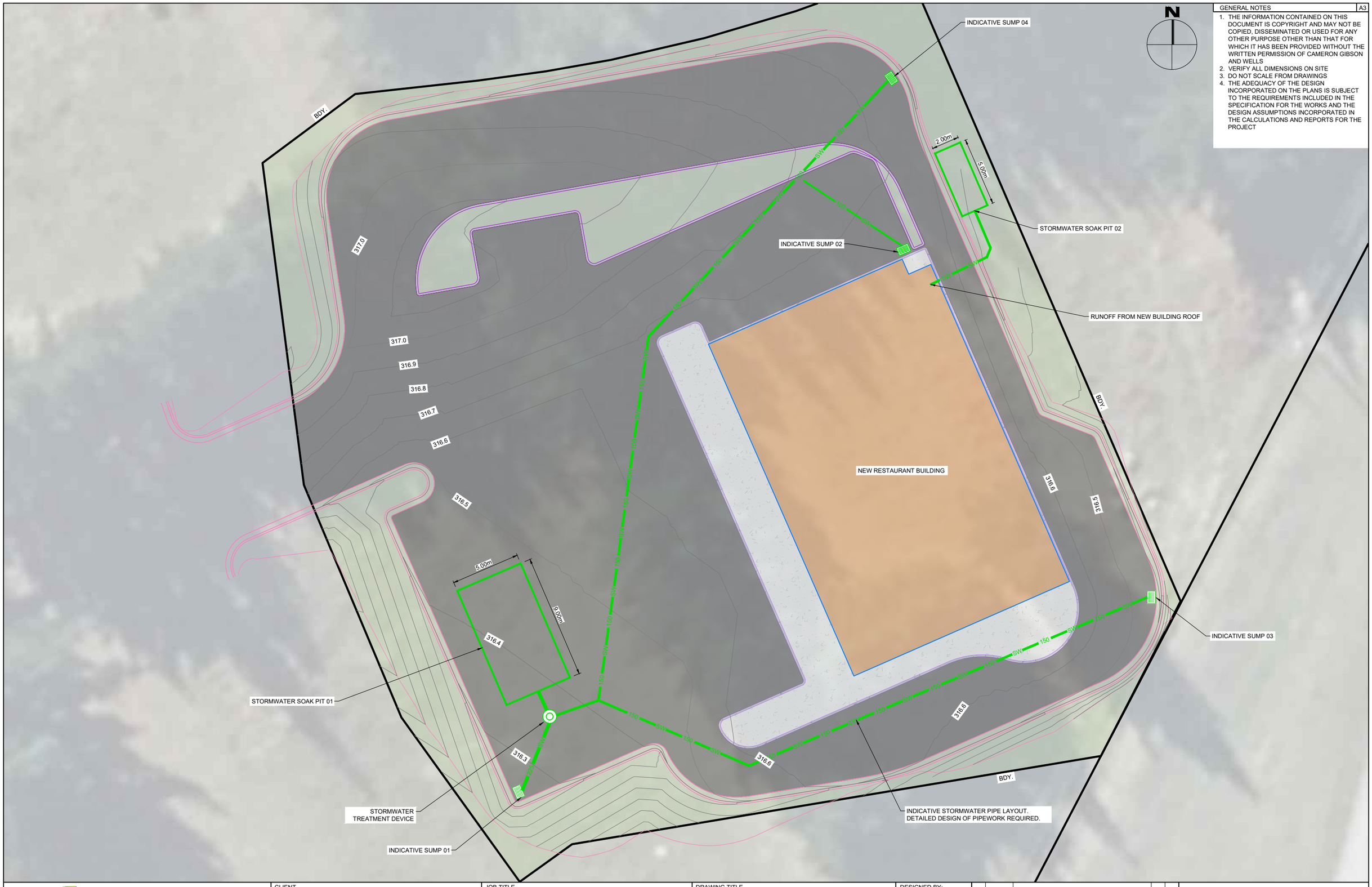
This report has been prepared solely for the benefit of our client, Paterson Pitts Group, as per our brief and an agreed consultancy agreement. The reliance by any other parties on the information or opinions contained in this report shall, without our prior agreement in writing, be at such parties' sole risk.

The conclusions and recommendations contained within this report are based on the investigations as described in detail above. Defects and unforeseen ground conditions may remain undetected which might adversely affect the stability of the site and the recommendation made herein.

This report has been prepared solely to address the issues raised in our brief and shall not be relied on for any other purpose.

In the event the third-party investigation data has been provided to us, the client acknowledges that we have placed reliance on this information to produce our report and CGW will accept no liability resulting from any errors or defects in the third-party data provided to us.

Appendix B. Concept Stormwater Layout



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2. VERIFY ALL DIMENSIONS ON SITE
3. DO NOT SCALE FROM DRAWINGS
4. THE ADEQUACY OF THE DESIGN INCORPORATED ON THE PLANS IS SUBJECT TO THE REQUIREMENTS INCLUDED IN THE SPECIFICATION FOR THE WORKS AND THE DESIGN ASSUMPTIONS INCORPORATED IN THE CALCULATIONS AND REPORTS FOR THE PROJECT

CGW CONSULTING ENGINEERS
AUCKLAND • WELLINGTON • NELSON • WESTPORT • CHRISTCHURCH • WANAKA
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CLIENT: PATERSON PITTS LIMITED PARTNERSHIP

JOB TITLE: NEW RESTAURANT IN WANAKA

DRAWING TITLE: STORMWATER DISCHARGE LAYOUT

DESIGNED BY: CAMERON TULETT

DRAFTED BY: CAMERON TULETT

REV	DATE	REVISION	CHD	APD
A	01.08.23	FIRST ISSUE		

RESOURCE CONSENT

SCALE	SIZE
1:250 A3	A3

PROJECT NO	TYPE	SHEET	REV
230374	DWG	C-01-01	A

Original Sheet Size A3 (420x297) File Path: C:\12dS\data\APP-SERVER\230374 - New Restaurant in Wanaka_139415 - Drawings\CAD\230374-DWG-C-01-01-A - Overall Plan.dwg - CGW A3

N

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CLIENT: PATERSON PITTS LIMITED PARTNERSHIP

JOB TITLE: NEW RESTAURANT IN WANAKA

DRAWING TITLE: CONCEPT CATCHMENT PLAN

DESIGNED BY: CAMERON TULETT

DRAFTED BY: CAMERON TULETT

REV	DATE	REVISION	CHD	APD
A	01.08.23	FIRST ISSUE		

RESOURCE CONSENT

SCALE	SIZE
1:250 A3	A3

PROJECT NO	TYPE	SHEET	REV
230374	DWG	C-01-01	A

Original Sheet Size A3 (420x297) File Path: C:\12dS\data\APP-SERVER\230374 - New Restaurant in Wanaka_139415 - Drawings\CAD\230374-DWG-C-05-01-A - Catchment Plan.dwg - CGW A3

Appendix C. Concept Stormwater Calculations

Job Number	230374	**Prepared by**	CT
Job Name	New Restaurant	**Reviewed by**	NB
Calc Purpose	BC	**Date**	2/08/2023

Soakage Device Calculator

Key: Input | Design Variable | Calculation | Output | Check Cell

Good | Neutral | Bad | Warning | *Explanatory*

Results

Sufficient storage for primary flow? **Yes** *for a 100 year, 120-minute duration storm event*

Design Variables

Device Type	Proprietary	
Void Ratio	0.95	*per product literature*
Reduction for loss of performance	0.5	
Soakage Device Length	9.00m	
Soakage Device Width	5.00m	
Soakage Device Depth	1.32m	

Inputs

Table 1 - Catchment Areas and Parameters

Sub-Catchment Description	Abbrev	Runoff Coeff (C)	Area (A)	CA	Primary CIA	Secondary CIA	Predeveloped C
Roof	**Aroof**	0.90	0.0m²	**0.0**	**0.0m³**	**0.0m³**	0.30
Hardstand	**Ahard**	0.85	1876.0m²	**1594.6**	**73.4m³**	**42.4m³**	0.30
Permeable	**Aperm**	0.50	0.0m²	**0.0**	**0.0m³**	**0.0m³**	0.00
Grassed	**Agrass**	0.30	697.0m²	**209.1**	**9.6m³**	**5.6m³**	0.30
Total	**Atotal**	**0.70**	**2573.0m²**	**1803.7**	**83.0m³**	**48.0m³**	**0.30**

Rainfall data inputs located at the end of the spreadsheet

Tested Soakage Rate Sr: 720mm/hr *From previous infiltration testing on the site*

Calculations for Primary Flow Assessment - NZBC E1/VM1 Soakage Device Design

Annual Recurrence Interval	ARI	100 years	
Duration (mins)		**120 mins**	*60min max for NZBC, Critical Storm of 120 min is from table 3 below*
Design intensity	I	**23.0mm/hr**	*NIWA HIRDSv4 - RCP8.5 2081-2100*
Runoff to soak pit	Rc	**82.97m³**	
Area of soak pit	Asp	**45m²**	
Design soakage rate	Srd	**360mm/hr**	
Volume disposed by soak pit by duration	Vsoak	**32.40m³**	*Asp x Srd / 1000 x duration*
Volume of storage required in soak pit	Vstor Req	**50.57m³**	*Rc - Vsoak*
Volume of storage provided in soak pit	Vstor Pro	**56.43m³**	*Length x Width x Depth x Void Ratio. Must be greater than Vstor Req*

Primary Flow - Soakage Sizing for all Storm Events

v4. Volumes greater than the soakpit volume will be highlighted in red. Green box shows NZBC requirement of 10 year ARI up to 60 minutes.

Table 4 - Data Table Assessment of Volume Required in Soakpit

Pre Development Runoff	50.6m³	Duration 10	20	30	60	120	360	720	1440	2880	4320	5760	7200
ARI	**1.58**	2.771	3.07739	2.903	1.18767	-5.49	-46.3	-122	-291	-654	-1029	-1409	-1792
	2	3.463	4.09949	4.255	3.27996	-2.31	-40.8	-115	-281	-642	-1016	-1396	-1779
	5	6.018	7.88726	9.035	10.4948	8.364	-21.7	-88.6	-248	-602	-972	-1351	-1733
	10	8.122	10.9535	12.91	16.2666	17.02	-7.05	-69.1	-223	-572	-940	-1318	-1699
	20	10.44	14.3205	17.15	22.5796	26.04	8.641	-48.3	-198	-541	-908	-1285	-1667
	30	11.94	16.4849	19.86	26.5477	31.81	18.6	-35.7	-182	-523	-888	-1264	-1647
	40	13.05	18.1082	21.84	29.4336	35.78	25.09	-26.2	-171	-510	-874	-1250	-1632
	50	13.98	19.4309	23.46	31.7784	39.39	31.58	-19.1	-162	-499	-864	-1238	-1621
	60	14.74	20.5132	24.82	33.7625	42.27	35.91	-12.8	-154	-491	-853	-1230	-1613
	80	16.03	22.3169	27.07	37.0092	46.96	43.49	-3.06	-142	-476	-840	-1216	-1598
	100	17.02	23.7598	28.88	39.5343	50.57	49.98	4.945	-133	-466	-829	-1204	-1587
	250	21.53	30.1329	36.72	50.7173	66.08	74.87	37.2	-93.6	-422	-783	-1157	-1539

Source Rainfall Data

HIRDS V4 Intensity-Duration-Frequency Results

Site name:	Custom Location
Coordinate system:	WGS84
Longitude:	169.1705
Latitude:	-44.6959

DDF Model

Parameters:	c	d	e	f	g	h	i
Values:	-0.01402	0.657	-0.00475	-0.01	0.286	-0.01	1.999

Table 5 - Rainfall Intensities (mm/hr) from HIRDSv4 :: RCP8.5 for the period 2081-2100

ARI	AEP	10	20	30	60	120	360	720	1440	2880	4320	5760	7200
1.58	**0.633**	18.2	14.1	12.2	9.64	7.46	4.7	3.33	2.26	1.43	1.06	0.843	0.7
2	**0.5**	20.5	15.8	13.7	10.8	8.34	5.21	3.69	2.48	1.57	1.16	0.922	0.763
5	**0.2**	29	22.1	19	14.8	11.3	6.98	4.89	3.25	2.03	1.5	1.18	0.973
10	**0.1**	36	27.2	23.3	18	13.7	8.33	5.79	3.82	2.38	1.74	1.37	1.13
20	**0.05**	43.7	32.8	28	21.5	16.2	9.78	6.75	4.41	2.73	1.99	1.56	1.28
30	**0.033**	48.7	36.4	31	23.7	17.8	10.7	7.33	4.77	2.94	2.14	1.68	1.37
40	**0.025**	52.4	39.1	33.2	25.3	18.9	11.3	7.77	5.04	3.09	2.25	1.76	1.44
50	**0.02**	55.5	41.3	35	26.6	19.9	11.9	8.1	5.24	3.22	2.33	1.83	1.49
60	**0.017**	58	43.1	36.5	27.7	20.7	12.3	8.39	5.42	3.31	2.41	1.88	1.53
80	**0.012**	62.3	46.1	39	29.5	22	13	8.84	5.7	3.48	2.51	1.96	1.6
100	**0.01**	65.6	48.5	41	30.9	23	13.6	9.21	5.92	3.6	2.6	2.03	1.65
250	**0.004**	80.6	59.1	49.7	37.1	27.3	15.9	10.7	6.82	4.11	2.95	2.3	1.87

Job Number	230324	**Prepared by**	CT
Job Name	12 Tomtit Crescent, Hawea	**Reviewed by**	NB
Calc Purpose	BC	**Date**	2/08/2023

Soakage Device Calculator

Key: Input | Design Variable | Calculation | Output | Check Cell
Good | Neutral | Bad | Warning | *Explanatory*

Results

Sufficient storage for primary flow? **Yes** *for a 100 year, 360-minute duration storm event*

Design Variables

Device Type	Proprietary	
Void Ratio	0.95	*per product literature*
Reduction for loss of performance	0.5	
Soakage Device Length	5.00m	
Soakage Device Width	2.00m	
Soakage Device Depth	1.32m	

Inputs

Table 1 - Catchment Areas and Parameters

Sub-Catchment Description	Abbrev	Runoff Coeff (C)	Area (A)	CA	Primary CIA	Secondary CIA	Predeveloped C
Roof	**Aroof**	0.90	445.0m²	400.5	32.7m³	10.7m³	0.30
Hardstand	**Ahard**	0.85	0.0m²	0.0	0.0m³	0.0m³	0.30
Permeable	**Aperm**	0.50	0.0m²	0.0	0.0m³	0.0m³	0.00
Grassed	**Agrass**	0.30	0.0m²	0.0	0.0m³	0.0m³	0.30
Total	**Atotal**	0.90	445.0m²	400.5	32.7m³	10.7m³	0.30

Rainfall data inputs located at the end of the spreadsheet

Tested Soakage Rate Sr: 720mm/hr *From previous infiltration testing on the site*

Calculations for Primary Flow Assessment - NZBC E1/VM1 Soakage Device Design

Annual Recurrence Interval	ARI	100 years	
Duration (mins)		360 mins	*60min max for NZBC, Critical Storm of 120 min is from table 3 below*
Design intensity	I	13.6mm/hr	*NIWA HIRDSv4 - RCP8.5 2081-2100*
Runoff to soak pit	Rc	32.68m³	
Area of soak pit	Asp	10m²	
Design soakage rate	Srd	360mm/hr	
Volume disposed by soak pit by duration	Vsoak	21.60m³	*Asp x Srd / 1000 x duration*
Volume of storage required in soak pit	Vstor Req	11.08m³	*Rc - Vsoak*
Volume of storage provided in soak pit	Vstor Pro	12.54m³	*Length x Width x Depth x Void Ratio. Must be greater than Vstor Req*

Primary Flow - Soakage Sizing for all Storm Events

v4. Volumes greater than the soakpit volume will be highlighted in red. Green box shows NZBC requirement of 10 year ARI up to 60 minutes.

Table 4 - Data Table Assessment of Volume Required in Soakpit

Pre Development Runoff	11.1m³	Duration 10	20	30	60	120	360	720	1440	2880	4320	5760	7200
ARI	1.58	0.615	0.68235	0.643	0.26082	-1.22	-10.3	-27.2	-64.7	-145	-229	-313	-398
	2	0.768	0.9093	0.943	0.7254	-0.52	-9.08	-25.5	-62.6	-143	-226	-310	-395
	5	1.336	1.75035	2.005	2.3274	1.851	-4.83	-19.7	-55.2	-134	-216	-300	-385
	10	1.803	2.4312	2.866	3.609	3.774	-1.58	-15.4	-49.7	-127	-209	-293	-378
	20	2.317	3.1788	3.807	5.01075	5.776	1.901	-10.8	-44	-120	-202	-286	-370
	30	2.651	3.6594	4.408	5.89185	7.058	4.112	-7.97	-40.6	-116	-197	-281	-366
	40	2.898	4.01985	4.848	6.53265	7.939	5.554	-5.86	-38	-113	-194	-278	-363
	50	3.105	4.31355	5.209	7.0533	8.74	6.996	-4.27	-36	-111	-192	-275	-360
	60	3.272	4.55385	5.509	7.49385	9.381	7.957	-2.88	-34.3	-109	-190	-273	-358
	80	3.559	4.95435	6.01	8.21475	10.42	9.639	-0.71	-31.6	-106	-187	-270	-355
	100	3.779	5.27475	6.41	8.77545	11.22	11.08	1.063	-29.5	-104	-184	-268	-353
	250	4.78	6.68985	8.152	11.2586	14.67	16.61	8.224	-20.8	-93.8	-174	-257	-342

Source Rainfall Data

HIRDS V4 Intensity-Duration-Frequency Results

Site name:	Custom Location							
Coordinate system:	WGS84							
Longitude:	169.1705							
Latitude:	-44.6959							
DDF Model Parameters:	c	d	e	f	g	h	i	
Values:	-0.01402	0.657	-0.00475	-0.01	0.286	-0.01	1.999	

Table 5 - Rainfall Intensities (mm/hr) from HIRDSv4 :: RCP8.5 for the period 2081-2100

ARI	AEP	10	20	30	60	120	360	720	1440	2880	4320	5760	7200
1.58	**0.633**	18.2	14.1	12.2	9.64	7.46	4.7	3.33	2.26	1.43	1.06	0.843	0.7
2	**0.5**	20.5	15.8	13.7	10.8	8.34	5.21	3.69	2.48	1.57	1.16	0.922	0.763
5	**0.2**	29	22.1	19	14.8	11.3	6.98	4.89	3.25	2.03	1.5	1.18	0.973
10	**0.1**	36	27.2	23.3	18	13.7	8.33	5.79	3.82	2.38	1.74	1.37	1.13
20	**0.05**	43.7	32.8	28	21.5	16.2	9.78	6.75	4.41	2.73	1.99	1.56	1.28
30	**0.033**	48.7	36.4	31	23.7	17.8	10.7	7.33	4.77	2.94	2.14	1.68	1.37
40	**0.025**	52.4	39.1	33.2	25.3	18.9	11.3	7.77	5.04	3.09	2.25	1.76	1.44
50	**0.02**	55.5	41.3	35	26.6	19.9	11.9	8.1	5.24	3.22	2.33	1.83	1.49
60	**0.017**	58	43.1	36.5	27.7	20.7	12.3	8.39	5.42	3.31	2.41	1.88	1.53
80	**0.012**	62.3	46.1	39	29.5	22	13	8.84	5.7	3.48	2.51	1.96	1.6
100	**0.01**	65.6	48.5	41	30.9	23	13.6	9.21	5.92	3.6	2.6	2.03	1.65
250	**0.004**	80.6	59.1	49.7	37.1	27.3	15.9	10.7	6.82	4.11	2.95	2.3	1.87

Vortex Seperator

Inflows

Table 1. Catchments

Sub-Catchment Description	Post-Dev Runoff Coeff (C)	Area (A) m^2	CA
1	0.700	2573.0	1801.1
			0.0

Water quality intensity	iwq	10.0 mm/hr
Water quality flow	wqf	**0.005 m^3/s**
	wqf	**5.0 L/s**

Time of concentration of primary network:	ToC	10.0 min
1% AEP 10 min Peak Flow Rate		**32.8 L/s**

Vortex Devices

Table 3. Comparison of Devices

Supplier/Manufacturer	Make	Model	Chamber Dia (mm)	Max. Pipe Size (mm)	Efficiency	Mean Particle Size	Head-loss at Max Flow (mm)	WQF (L/s)	Max Flow Rate (L/s)
SPEL	Vortceptor	SVI.025	1200	-	70%	-	-	26	280
SW360	Jellyfish 2 x cartridge		1050					10	
Hynds	UpFlo 4 x cartridge		1200					6.32	

Job Number	230374	**Prepared**	CT
Job Name	New Restaurant in Wanaka	**Reviewed**	NB
Calc Purpose		**Date**	2/08/2023

Stormwater - Small Development Calculator

This calculator is based on NZBC E1 VM1 inlcuding Rational Method for runoff estimation and Mannings formula for full pipe flow (non-surchaged)

Key:

Design Variable	Input	Output		Constant		linked cell
Explanatory	Calc	Note	Good	Neutral	Bad	Warning

Catchments

Table 1 - Catchments

ID		Areas					Area (m2)	Weighted C Value	ARI (Year)	T.O.C. (min.)	I (mm/hr)	Q (L/s)
		Roof	Asphalt/Pave	Gravel	Landscaping	Misc						
1	South-west sump (SUMP 01)		1102		389		1491	0.706	100	10	65.6	19.2
2	Sump northern end of building (SUMP 02)		134		100		234	0.615	100	10	65.6	2.6
3	South-east sump (SUMP 03)		302.5		208		510.5	0.626	100	10	65.6	5.8
4	North-east sump (SUMP 04)		338				338	0.850	100	10	65.6	5.2
5	Roof soak pit	445					445	0.900	100	10	65.6	7.3
6												
7	SW Treatment Device Bypass flow		1876		697		2573	0.701	100	10	65.6	32.9
8	SW Treatment Device WQF		1876		697		2573	0.701			10.0	5.0
9												
10												

Pipe Sizing

Table 2 - Pipe Sizing

ID		Catchment(s)	∑ Q (L/s)	Dia (mm)	Grade (1 in)	Material	Velocity (m/s)	Capacity (%)
A		1	19.20	225	100	UPVC	0.43	31%
B		2	2.62	100	100	UPVC	0.31	38%
C		3	5.83	150	100	UPVC	0.32	31%
D		4	5.24	150	100	UPVC	0.29	28%
E		5	7.30	150	100	UPVC	0.40	39%
F		2,4	7.86	150	100	UPVC	0.43	42%
G		2,3,4	13.69	150	100	UPVC	0.76	74%
H		1,2,3,4	32.89	225	100	UPVC	0.74	54%

Appendix D. Geosolve Geotech Report

Geotechnical Report

237 Wanaka-Luggate Highway,

Wanaka

Report prepared for:

Mt Iron Junction Limited

Report prepared by:

GeoSolve Limited

Distribution:

Mt Iron Junction Limited

Paterson Pitts Group

GeoSolve Limited (File)

March 2018

GeoSolve Ref: 170839

GEOTECHNICAL WATER RESOURCES PAVEMENTS

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1 Introduction

1.1 General

This report presents the results of a geotechnical investigation carried out by GeoSolve Ltd in order to determine subsoil conditions, stormwater soakage capability and earthworks recommendations at 237 Wanaka-Luggate Highway, Wanaka. Geotechnical design parameters and foundation bearing parameters are provided. Rockfall and seismic hazard has been assessed. The proposed development plan area has been provided by McCoy Wixon Architects via Paterson Pitts Group.

Photo 1. View of the site looking northeast from TP1.

The investigation was carried out for Mount Iron Junction Limited in accordance with GeoSolve Ltd.'s proposal dated 27 October 2017, which outlines the scope of work and conditions of engagement. This report will supplement a resource and earthworks consent application.

1.2 Proposed Development

We understand it is proposed to develop the above property into a commercial area and this requires geotechnical assessment of the site to assess suitability for development and to identify any geotechnical issues.

Figure 1, Appendix A shows a concept plan for the proposed development.

2 Site Description

2.1 General

The subject property, legally described as Lot 5 DP 15016, is located approximately 2.5 km east of central Wanaka, as shown in Figure 1 below.

Figure 1: Site location (blue symbol) in relation to Wanaka township (Source: http://maps.qldc.govt.nz/qldcviewer/)

The property is accessed off Wanaka-Luggate Highway and is situated to the southeast of Mt Iron.

Two dwellings, a large garage and a sleepout currently occupy the site. The remaining area of the site has been divided into small paddocks which are separated by fencing. Unsealed roads have been created to access the dwellings with some asphalt poured within the driveway of the northeast dwelling. Ground cover comprises grass, shrubs and pine trees.

The site is bounded by the Wanaka-Luggate Highway to the south, Albert Town-Lake Hawea Road to the east and Crown Land and 37 Albert Town-Lake Hawea Road to the northwest.

2.2 Topography and Surface Drainage

The site topography is generally sub-horizontal across the property. The site was observed to be naturally free-draining. No earthworks plans have been provided to GeoSolve at this stage although these are anticipated to be relatively minor.

No spring flows or seepages were observed during site investigations.

3 Geotechnical Investigations

GeoSolve Ltd visited the subject property on the 18th and 19th of December 2017 and the 17th of January 2018 undertaking an engineering geological site inspection with confirmatory subsurface investigations.

The investigations carried out for the purposes of this report are as follows:

- A site inspection and field mapping by an engineering geologist to assess rockfall risk for the proposed development;
- 17 Test pits (TP), extending to a maximum depth of 4.5 m below ground level (bgl) to produce geological logs of the subsoils;
- 10 Scala penetrometer tests extending to a maximum depth of 1.4 m bgl to assess relative density of the subsoils;
- 2 Heavy Dynamic Probe (DPH) tests, extending to a maximum depth of 15 m bgl to assess relative density of subsoils at depth and confirm the ground water model below the site;
- Piezometer installation;
- 4 Soakage pits and 2 HT21 standpipe permeability tests to assess permeability in the two proposed soakage areas at the development.

Test pit and Scala penetrometer locations and logs are presented in Appendices A and B respectively.

DPH locations and logs are presented in Appendices A and C.

Permeability test locations and logs are presented in Appendices A and D.

4 Subsurface Conditions

4.1 Geological Setting

The site is located in the Wanaka Basin, a feature formed predominantly by glacial advances. The schist bedrock within the basin has been extensively scoured by ice and lies at considerable depth below this site. Overburden material above the schist in this region includes glacial till, alluvial outwash sediments, lake sediment and beach deposits.

During the Mt Iron and Hawea Glacial Advances 18-23,000 years before present, the glaciers terminated upstream from Albert Town forming moraine loops and outwash terraces. Well-consolidated glacial till gravels were laid down on the flanks and beds of the glaciers. With the final retreat of the ice, about 16,000 years ago, Lake Wanaka formed and the Clutha River became entrenched in the glacial deposits.

Mt Iron lies directly to the north of the property where bedrock is exposed along the face of the southeastern bluff.

The Cardrona fault is mapped near the southeast corner of the property, this fault is considered capable of earthquakes of Magnitude 7.3 but has an average return period of

5,000-10,000 years. The Alpine Fault, located approximately 70 km away, runs along the western foothills of the Southern Alps, and is likely to present a more significant seismic risk to the site in the short term. There is a high probability that an earthquake of Magnitude 8 or more will occur along the Alpine Fault within the next 50 years and such a rupture is likely to result in strong ground shaking in the vicinity of Wanaka.

4.2 Stratigraphy

Results from the test pitting indicate the sub-surface stratigraphy comprises:

- 0.1 to 0.2 m of topsoil, overlying;
- Isolated uncontrolled fill (1.2-1.7 m in TP6, SP1 and 2 only), overlying;
- Isolated buried topsoil (0.1-0.4 m in TP6, SP1 and 2 only), overlying;
- 0.1 to 0.3 m of loess, overlying;
- 0.3 to 4.2 m+ of outwash gravel, interbedded with;
- Lenses of outwash sand, 0.3-0.9 m thick were observed within the outwash gravel.
- Lake sediment is inferred to underlie the outwash gravel at approximately 11-12 m bgl in the area of DPH 1.

Topsoil was observed at the surface of all test pits except SP1 and 2 and predominately comprises brown, organic SILT with roots and rootlets.

Uncontrolled fill was observed to underlie the topsoil in TP6, SP 1 and 2 and extends to 1.2 to 1.7 m bgl. The fill comprises light grey/grey, loose to medium dense, gravelly SAND with minor organic silt and trace sticks, rootlets and wire, SAND with some gravel and silt, and sandy GRAVEL with trace cobbles, boulders and organic silt.

Buried topsoil was observed to underlie the uncontrolled fill in TP6, SP1 and 2 and extends to 1.6 to 1.8 m bgl. Buried topsoil comprises, brown sandy organic SILT with minor rubbish and gravel.

Loess was observed to underlie the topsoil in 15 of the 17 test pits and extends to a depth of 0.2 to 0.5 m bgl. The loess predominately comprises light brown, firm silty SAND with minor rootlets.

Outwash gravel was observed to underlie the loess, topsoil or buried topsoil in all test pits. Outwash gravel typically comprises brown, grey and dark grey medium dense, sandy GRAVEL with some to trace cobbles and trace boulders. Boulders up to 0.7 m diameter were observed. Outwash gravel was observed to the termination depth of all test pits.

0.3 to 0.9 m thick outwash sand lenses were observed in TPs 3, 6 and 11 and typically comprise grey/brown, medium dense SAND with minor to some gravel and gravelly SAND.

Lake sediment is inferred to underlie the outwash gravel at 11-12 m bgl in the DPH 1 area from the relative density observed in the DPH test and knowledge of relative levels and relative density of lake sediment in the Albert Town area.

Full details of the observed subsurface stratigraphy can be found within the test pit and soakage pit logs contained in Appendix B and D respectively.

4.3 Groundwater

Groundwater was not observed during test pit investigations which extend to 4.5 m bgl.

A piezometer was installed to 6.7 m depth in close proximity to DPH2 and was dipped dry to full depth. Piezometers could not be installed any deeper to reach the water table due to coarse cobbles and boulders within the outwash gravel unit.

4.4 Slope Stability

No instability features were observed on the site during investigations.

The bluffs of Mt Iron outcrop to the north of the site and a rockroll hazard is shown on the QLDC hazard database within 70 m of the north-western boundary. Rockfall from the bluffs to the north has been assessed as part of site investigations, this is detailed in section 6.7 of this report.

5 Liquefaction Analysis

5.1 Introduction

A preliminary liquefaction assessment has been undertaken using test pit and heavy dynamic probe (DPH) data. Two Heavy Dynamic Probe (DPH) tests were undertaken within the site to assess liquefaction risk.

5.2 Earthquake Scenarios

In accordance with NZS1170 – Structural Design Actions[1], the following two earthquake scenarios were considered based on a building with Importance Level 2 with a 50 year design life.

These scenarios represent the following design performance requirements:

- Serviceability Limit State (SLS) – to avoid damage that would prevent the structure from being used as originally intended, without repair, and;
- Ultimate Limit State (ULS) – to avoid collapse of the structural system.

In terms of NZS 1170, Class D subsoil conditions (deep soils) were assumed to underlie the site.

The methods presented within the NZTA Bridge Manual (2014)[2] have been adopted for deriving the site peak ground accelerations (PGA) as they use unweighted seismic hazard factors and corresponding (effective) earthquake magnitudes that are better suited to be used in the assessment of liquefaction.

[1]NZS1170-5 (2004) Structural Design Actions, Part 5: Earthquake Actions – New Zealand.
[2] NZTA Bridge Manual, Third Addition, Amendment 2, Effective from May 2016 (Manual Number SP/M/022).

Table 1 below provides a summary of the annual exceedance probability, effective magnitude and PGA adopted for each seismic case analysed in the liquefaction assessment.

Table 1: Annual exceedance probability, effective earthquake magnitude and peak horizontal ground accelerations for each seismic case

Seismic Case	Annual Exceedance Probability (AEP)	Effective Magnitude	Peak Horizontal Ground Acceleration (g)
Serviceability Limit State (SLS) design earthquake	1/25	6.1	0.08
Ultimate Limit State (ULS) design earthquake	1/500	6.2	0.32

5.3 Liquefaction Assessment

5.3.1 General

Liquefaction occurs when susceptible, saturated soils attempt to move to a denser state under cyclic shearing. In this report, liquefaction is defined as when pore pressures rise to reach the overburden stress. When this occurs, the following effects can happen at flat sites:

- Loss of strength;
- Ejection of material under pressure to the ground surface (i.e. surface disruptions), and;
- Post-liquefaction volumetric densification as the soils reconsolidate.

In addition, sloping sites or sites with a 'free face' may experience lateral spreading or movement.

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

5.3.2 DPH Analysis

Analyses were performed to evaluate the liquefaction potential of the lake sediment unit underlying the outwash gravel and the discrete sand lenses within the outwash gravel unit utilising the methods recommended by Idriss & Boulanger (2014)[3]. These methods use information obtained from soil logging and in situ testing, such as soil type, fines content, layer thicknesses, and blow count.

[3] Boulanger R.W. and Idriss, I.M. (2014). 'CPT and SPT Based Liquefaction Triggering Procedures,' Report No. UCD/CMG–14/01, Dept. of Civil & Environmental Engineering, University of California at Davis.

A piezometer was installed to 6.7 m bgl in close proximity to DPH 1 which was dipped dry to full depth. This has been assumed as the water table depth for analysis purposes even though this is likely a conservative assumption.

The liquefaction analysis results are summarised below in Table 2.

Table 2: Summary of liquefaction results from DPH testing

Factor	Assessment		Implications
Crust thickness	The crust thickness is determined to be at least 8.7 m for the ULS design earthquake. Data from the Canterbury earthquake sequence plus other historic earthquakes[4] has been collated and observed surface damage compared with crust thickness. This data indicates that surface damage is likely for crusts of less than about 3.5 m thickness.		The crust is significantly thicker than 3.5 m and therefore should be sufficiently thick to limit surface damage in a ULS seismic event. Particularly given the minor (0-10 mm) predicted liquefaction induced settlement within the upper 10 m of the soil profile.
LSN	1/500 AEP (ULS)	LSN range = 0-7	Surface expression of liquefaction unlikely.
Free field settlement	1/500 AEP (ULS)	0-10 (80) mm	0-10 mm estimated in the upper 10 m in the areas tested. 80 mm of total settlement is predicted within testing completed to 15 m depth. Lake sediment is inferred at 11.5-14.5 m bgl in DPH 1 which is predicted to liquefy under ULS seismic loading.
Lateral spread	Lateral spreading under seismic loading is not expected to occur as the site is relatively flat without any nearby free face.		None.

[4] Bowen, H.J. and Jacka, M.E. (2013). Liquefaction induced ground damage in the Canterbury Earthquake: Predictions versus reality. Proceedings of the 19th NZGS Geotechnical Symposium. Editor CY Chin. Queenstown, New Zealand.

6 Engineering Considerations

6.1 General

The recommendations and opinions contained in this report are based upon ground investigation data obtained at discrete locations on site and historical information held on the GeoSolve database. The nature and continuity of subsoil conditions away from the investigation locations is inferred and cannot be guaranteed.

6.2 Geotechnical Parameters

Table 3 provides a summary of the recommended geotechnical design parameters for the soils expected to be encountered during construction of any future buildings and retaining walls.

Table 3: Recommended Geotechnical Design Parameters

Unit	Thickness (m)	Bulk Density γ (kN/m^3)	Effective Cohesion c' (kPa)	Effective Friction ϕ' (deg)	Elastic Modulus E (kPa)	Poissons Ratio ν
Topsoil/Buried Topsoil (organic SILT with roots and rootlets and sandy organic SILT with minor rubbish and gravel)	0.1-0.4	16	To be removed from building and engineered fill footprints			
Uncontrolled Fill (loose to medium dense, gravelly SAND with minor organic silt, SAND with some gravel an silt and sandy GRAVEL with trace organic silt, cobbles and boulders)	1.2-1.7	18	To be removed from building and engineered fill footprints			
Loess (firm, silty SAND)	0.1-0.3	18	0	31	5,000	0.3
Outwash Gravel with Outwash Sand lenses (medium dense, sandy GRAVEL with trace to some cobbles and trace boulders. Lenses of gravelly SAND to SAND with minor gravel)	0.3-4.2	18	0	36 (32 in Sand)	10,000-20,000	0.3

6.3 Site Preparation/Earthworks

During the earthworks operations all topsoil, uncontrolled fill, organic matter and other unsuitable materials should be removed from the construction areas in accordance with

the recommendations of NZS 4431:1989. These soil types (and loess SILT) will also need to be removed from areas where engineered fill is proposed.

Robust, shallow graded sediment control measures should be instigated during construction where rainwater and drainage run-off across exposed soils is anticipated. If slope gradients in excess of 4% are proposed in fine-grained soils then the construction and lining of drainage channels is recommended, e.g. with geotextile and suitably graded rock, or similarly effective armouring.

Water should not be allowed to pond or collect near or under a foundation slab. Positive grading of the subgrade should be undertaken to prevent water ingress or ponding.

All fill that is utilised as bearing for foundations should be placed and compacted in accordance with the recommendations of NZS 4431:1989 and certification provided to that effect. The outwash gravel soils can be used as engineered fill on site (during good weather and in accordance with an earthfill specification). The topsoil, loess and uncontrolled fill is not suitable as a fill source. Maximum density and optimum moisture content will vary in the outwash gravel. Boulders and cobbles over 100 mm in size will need to be screened from engineered fill sources.

6.4 Excavations

At this stage no earthworks plans have been provided, although it is expected cuts will be made within topsoil, uncontrolled fill, loess, and outwash soils. It is expected that only minor earthworks will take place across the site due to the generally sub-horizontal topography and the shallow depth to suitable bearing soils across the majority of the site. Earthworks plans have yet to be developed for the development.

Recommendations for temporary and permanent batter slope angles are described below in Table 4. Slopes that are required to be steeper than those described below should be structurally retained or subject to specific geotechnical design.

All slopes should be periodically monitored during construction for signs of instability and excessive erosion, and, where necessary, corrective measures should be implemented to the satisfaction of a Geotechnical Engineer or Engineering Geologist.

No seepage was encountered during test pitting and hence groundwater is unlikely to be encountered during excavations. However, a geotechnical practitioner should inspect any seepage, spring flow or under-runners that may be encountered during construction.

The soils are anticipated to be excavated by conventional methods, however boulders are likely to be encountered within the outwash gravel.

6.4.1 Cut Slopes in Soil Materials

Table 4 summarises the recommended batter angles for temporary and permanent slopes up to 3 m high, which are formed in the soil materials identified at the site.

Table 4: Recommended maximum batter angles for cut slopes up to 3 m high in site soils

Material Type	Recommended Maximum Batter Angles for Temporary Cut Slopes Formed in Soil (horizontal to vertical)		Recommended Maximum Batter Angles for Permanent Cut Slopes Formed in Soil – dry ground only (horizontal to vertical)
	Dry Ground	Wet Ground	
Topsoil/Loess/Uncontrolled Fill	2H: 1V	3H: 1V	3H: 1V
Outwash gravel	1H: 1V	2H: 1V	2H: 1V

6.5 Engineered Fill Slopes

All fill should be placed and compacted in accordance with the recommendations of NZS4431: 1989 and Queenstown Lakes District Council Standards. All cut and fill earthworks should be inspected and tested as appropriate during construction and certified by a Chartered Professional Engineer.

All un-retained fill slopes which are less than 3.0 m high should be constructed with a batter slope angle of 2.0H:1.0V (horizontal to vertical) or flatter and be benched into sloping ground.

Reinforced earth slopes can be considered if batters need to be steeper than 2H:1V.

6.6 Ground Retention

All retaining walls should be designed by a Chartered Professional Engineer using the geotechnical parameters recommended in Table 3 of this report. Due allowance should be made during the detailed design of all retaining walls for forces such as surcharge due to the sloping ground surface behind the retaining walls, groundwater, seismic and traffic loads.

All temporary slopes for retaining wall construction should be battered in accordance with the recommendations outlined in Table 4 of this report. Where these batter slopes cannot be achieved temporary retaining will be required.

Groundwater was not observed within a piezometer installed to 6.7 m beneath the site or within any of the test pit excavations. To ensure any groundwater seeps and flows are properly controlled behind the retaining walls, the following recommendations are provided:

- A minimum 0.3 m width of durable free draining granular material should be placed behind all retaining structures;
- A heavy duty non-woven geotextile cloth, such as Bidim A14, should be installed between the natural ground surface and the free draining granular material to prevent siltation and blockage of the drainage media;
- A heavy-duty (TNZ F/2 Class 500) perforated pipe should be installed within the drainage material at the base of all retaining structures to minimise the risk of

excessive groundwater pressures developing. This drainage pipe should be connected to the permanent piped storm water system, and;

- Comprehensive waterproofing measures should be provided to the back face of all retaining walls forming changes in floor level within the dwelling to minimise groundwater seepage into the finished buildings.

It is recommended that the retaining wall excavation batters are inspected by a suitably qualified and experienced Geotechnical Engineer or Engineering Geologist.

6.7 Rockfall Hazard

6.7.1 General

An engineering geologist has undertaken site mapping to assess the risk of rockfall hazard to the proposed development. The assessment reviews the risk of boulders originating as rockfall from the steep bluffs below Mount Iron rolling out into the proposed development and damaging proposed structures. Rockfall events require a trigger such as strong seismic shaking or long-term weathering and failure of the rock mass.

Numerous boulders of varying diameters and shapes have been observed on the sub-horizontal alluvial outwash surface at the base of Mount Iron. To assess the risk to the proposed development boulders observed on the ground surface were mapped and differentiated between those originating as rockfall and those originating as alluvial outwash boulders (Appendix A, Figure 2). Roll out distance between the base of Mount Iron and the north-western property boundary was also considered including any natural barriers against rockroll.

There is no evidence of historic rockroll boulders on the ground surface within the boundaries of the proposed development nor was there any evidence of historic rockroll boulders observed in test pits. All boulders observed in test pits are interpreted to be alluvial outwash boulders. The mapped maximum roll out distance of historic rockroll boulders from the base of Mount Iron onto the outwash surface ranges between 40-70 m. The minimum distance between the base of Mount Iron and the northwest property boundary is approximately 115 m at the southwest corner of the proposed development. The roll out distance between the base of Mount Iron and the proposed development gradually increases towards the northeast to a maximum distance of approximately 180 m. It is also noted on the proposed development plans provided by McCoy Wixon Architects that there is a designated “no build zone” on the southwest corner of the proposed development.

There are several existing natural barriers against rockroll present between the base of Mount Iron and the proposed development. Existing rockfall debris at the base of Mount Iron and the dense patches of native kanuka scrub on the outwash surface provide a natural barrier against rockroll. The wing of a lateral moraine ridge extends towards the northeast and acts as a natural rockroll bund for the southwest corner of the proposed development (see Appendix A, Figure 2). Numerous boulders resulting from rockroll have already been observed to be piled up behind this moraine ridge north of the Wanaka-

Luggate Highway. The sub-horizontal (0-5°) alluvial outwash surface from the base of Mount Iron to the proposed development provides a suitable setback for rockroll fallout.

Rockfall hazard mapping is shown on Appendix A, Figure 2.

6.7.2 Rockfall Hazard Considerations and Recommendations

Based on the mapping of historic rockroll boulders and the roll out distance from the base of Mount Iron the resulting hazard envelope does not reach the proposed development. Therefore, the rockfall hazard poses no risk to the proposed development and further detailed analysis of the rockfall hazard is not considered necessary.

As a precaution the existing row of pine trees along the northwest property boundary could be left in place to provide a further natural barrier against rockroll. Alternatively, the pine trees could be replaced with another tree species if this is desired.

6.8 Seismic Hazard

The Cardrona Fault is mapped near the southeast corner and eastern boundary of the property and its location is recorded as concealed on published geological mapping beneath the Albert Town area. The Cardrona Fault is indicated as 'active'. The risk of ground rupture on the site from known faulting is considered unlikely. Movement on the Cardona Fault would however result in ground shaking of the site, and the wider Wanaka area.

Geosolve have completed an assessment of the risk posed by the Cardona Fault using guidelines provided by the Ministry of Environment for developing land close to active faults. For the assessment, the Cardrona Fault has been categorised with a return period of 5,000 to 10,000 years (GNS Science website, Active Faults Database), and the location is assessed as uncertain, as indicated on published geological mapping.

Following the Ministry of the Environment guidelines provided in Section 11 "Taking a Risk-Based Approach to Resource Consents", building importance category structures 1, 2a and 2b, are a permitted activity and category 3 structures are a discretionary activity. NZS 3604 dwelling structures fall under category 2a, and are therefore considered to be a permitted activity in close proximity to the Cardrona Fault system.

In conclusion, given the relatively long return period for the Cardrona Fault (5,000 - 10,000 Years), the Alpine Fault, with a return period for major earthquakes of 300-350 years, and predicted ground accelerations an order of magnitude higher than the Nevis Cardona, is considered to provide the governing seismic risk to the area.

6.9 Groundwater Issues

The regional water table is expected to lie at depth below any future foundation levels and is not expected to be encountered during construction on this site. Dewatering or other groundwater-related construction issues are therefore unlikely to be required.

It is important that GeoSolve be contacted should there be any seepage, spring flow or under-runners encountered during construction.

6.10 Foundation Considerations

Topsoil, uncontrolled fill and loess should be stripped from the building platform areas. Foundation loads will be transferred to the outwash gravel or engineered fill overlying outwash gravel in all cases.

All unsuitable materials identified in foundation excavations, particularly those softened by exposure to water, should be undercut and replaced with engineered fill during construction. Any fill that is utilised as bearing for foundations should be placed and compacted in accordance with NZS 4431:1989 and certification provided to that effect.

To minimise the effects of freeze-thaw cycles in footings founded on soil, all shallow foundations should be founded a minimum of 0.4 m below the adjacent finished ground surface.

Figure 2 summarises the recommended working stresses for shallow footings, which bear upon outwash gravel and engineered fill overlying the same. It should be noted the foundation working stresses presented on Figure 2 are governed by bearing capacity in the case of narrow footings and settlement in the case of wide footings.

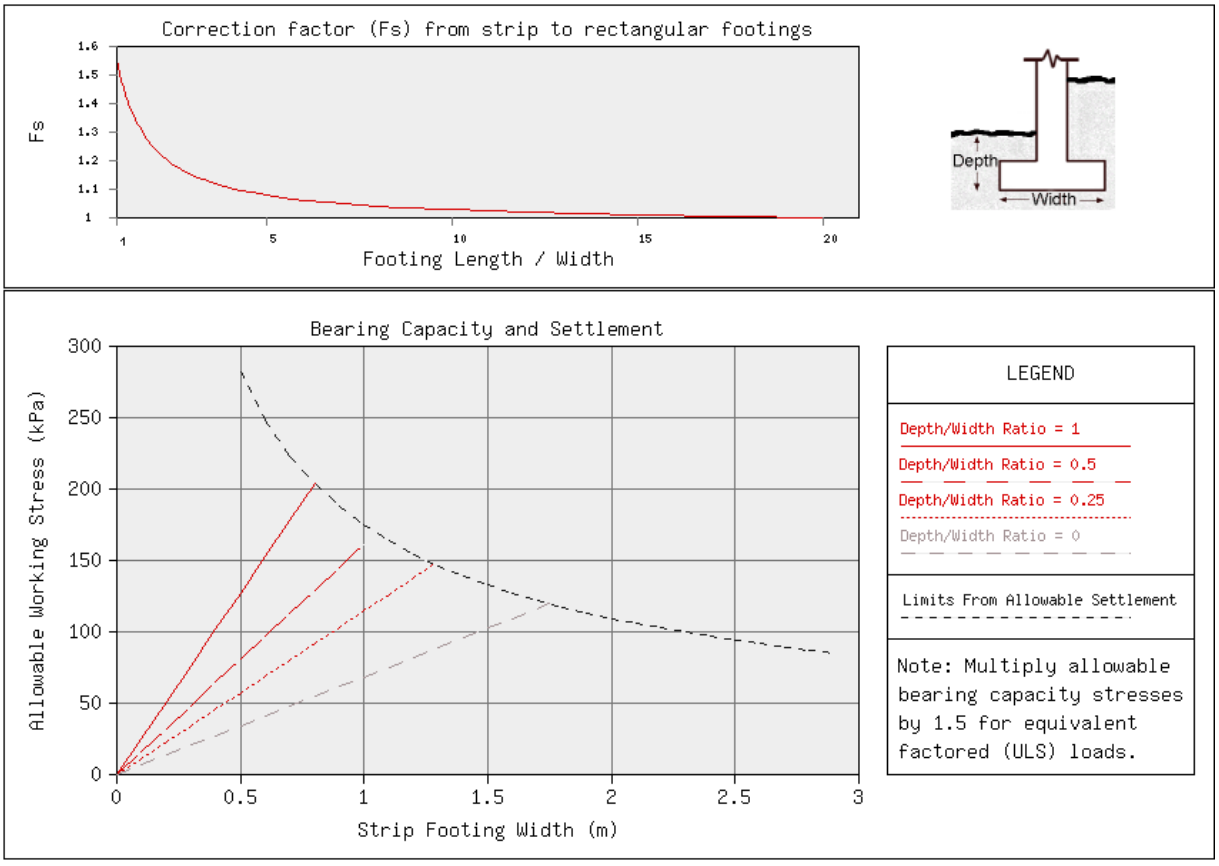

Figure 2. Recommended Bearing for Shallow Footings on Outwash Gravel and Engineered Fill overlying Outwash Gravel.

From Figure 2 it can be seen an allowable working stress of approximately 100 kPa is recommended for a 400 mm wide by 400 mm deep strip footing founded within outwash gravel and engineered fill overlying outwash gravel. This corresponds to a factored (ULS) bearing capacity of approximately 150 kPa and an ultimate geotechnical bearing capacity of 300 kPa.

Inspection and testing (dynamic probe/Scala penetrometers) should be completed along footing alignments during construction to confirm the above values are applicable and that the soil has not been softened by weather or excavation. Plate compaction or rolling is recommended following building platform and footing excavation.

6.10.1 Outwash Sand Bearing

Thin lenses of outwash sand have been observed in test pits. If substantial outwash sand is observed under a building platform bearing capacity should be assessed on a case by case basis.

6.11 Settlement

Settlement and differential settlement of shallow foundations are expected to be within structurally acceptable limits provided the recommendations of Section 6.10 are followed and all unsuitable materials, particularly those softened by water, are undercut and replaced with engineered fill during construction.

6.12 Site Subsoil Category

For detailed design purposes it is recommended the magnitude of seismic acceleration be estimated in accordance with the recommendations provided in NZS 1170.5:2004.

The site is “Class D” (Deep soil site) in accordance with NZS 1170.5:2004 seismic provisions.

6.13 QLDC Land Development and Subdivision Code of Practice

Section 2.2.4 of the QLDC Land Development and Subdivision Code of Practice (QLDC CoP) requires the developer of any subdivision to appoint a geo-professional to carry out the following functions from the planning to construction phases of the subdivision:

a) Check regional and district plans, records, and requirements prior to commencement of geotechnical assessment;
b) Prior to the detailed planning of any development, to undertake a site inspection and such investigations of subsurface conditions as may be required, and to identify geotechnical hazards affecting the land, including any special conditions that may affect the design of any pipelines, underground structures, or other utility services;
c) Before construction commences, to review the drawings and specifications defining any earthworks or other construction and to submit a written report to the Territorial Authority (TA) on the foundation and stability aspects of the project (if required);

d) Before and during construction, to determine the extent of further geo-professional services required (including geological investigation);
e) Any work necessary to manage the risk of geotechnical instability during the construction process;
f) Before and during construction, to determine the methods, location, and frequency of construction control tests to be carried out, determine the reliability of the testing, and to evaluate the significance of test results and field inspection reports in assessing the quality of the finished work;
g) During construction, to undertake regular inspection consistent with the extent and geotechnical issues associated with the project;
h) On completion, to submit a written report (i.e. Geotechnical Completion Report) to the Territorial Authority (TA) attesting to the compliance of the earthworks with the specifications and to the suitability of the development for its proposed use including natural ground within the development area. Where NZS 4431 is applicable, the reporting requirements of that Standard shall be used as a minimum requirement.

This resource consent level report can be considered to have completed items a) and b) from the above list. Once resource consent for the subdivision has been granted a geo-professional will need to be appointed by the developer to review the earthworks drawings and specifications prior to finalising the documentation for tendering and/or construction, and to oversee the construction phase of the project including certification of fill and provide a Geotechnical Completion Report (GCR) and Schedule 2A in accordance with the QLDC CoP.

The GCR and Schedule 2A should detail the results of site observations, testing and monitoring during earthworks construction, confirm the stability of the finished earthworks, and identify any specific geotechnical design requirements that must be addressed in order to construct a building on site. Any identified specific design requirements will then be registered on the subject lots' 'certificate of title' and will need to be addressed during the building consent process.

The geo-professional completing the GCR and Schedule 2A which includes the certification of fill should in all cases be engaged by the developer not the contractor. It is also advisable that the geo-professional review the earthworks contract to assist in managing the developers risk and ensuring that the contract is clear with respect to geotechnical risks and responsibilities during construction.

The use of this report and any of its findings or recommendations as part of the GCR and Schedule 2A may only be used with our prior review and written agreement.

7 Stormwater Disposal

7.1 Suitability of soil types

We understand that an on-site soakage system, in keeping with other developments nearby, will be adopted to manage stormwater at the site.

The geotechnical investigations identified that stormwater infiltration areas are located on a glacial outwash terrace that runs adjacent to Albert Town-Lake Hawea Road with the exception of soakage area one (SP1) where moderate depths of fill were observed, presumably associated with the historic construction of the adjacent highway.

Table 5. Suitability of soakage disposal based on soil type

Location	Stratigraphy	Suitability for Stormwater Disposal
SP1	1.8 m of fill and buried topsoil (SAND with some gravel and silt and organic SILT with minor rubbish) overlying outwash gravel and sand to base of pit.	Confirmed favourable from 1.8-2.6 m and 2.9-4.2 m (TP6 shows a 0.3 m thick sand lens at 2.6 m underlying outwash gravel). Soakage rate = 0.07 L/s/m^2
SP2	1.6 m of fill and buried topsoil (sandy GRAVEL and sandy organic SILT) overlying outwash gravel and sand to base of pit.	Confirmed favourable from 1.6-2.4 m and 2.9-4.2 m (TP6 shows 0.3 m thick sand lens at 2.6 m underlying outwash gravel). Soakage rate = 0.18 L/s/m^2
TP6	1.6 m of fill and buried topsoil (gravelly SAND and organic SILT) overlying outwash gravel with a 0.3 m thick gravelly SAND and SAND lens observed at 2.6 m.	Favourable from 1.6-2.6 m and 2.9-4.2 m depth. Will need to consider thin sand lens. No test completed in this test pit.
HT21 (1)	2.0 m of fill and buried topsoil (sandy GRAVEL and sandy organic SILT) overlying outwash gravel.	Favourable from 2 m (TP6 shows 0.3 m thick sand lens at 2.6-2.9 m depth in the outwash gravel). K (m/s) = 5 x10^{-5}
SP3	0.3 m of topsoil and loess overlying outwash gravel.	Favourable from 0.3 m. Soakage rate undetermined, water draining away faster than could put into test pit. Free draining.
SP4	0.3 m of topsoil and loess overlying outwash gravel.	Favourable from 0.3 m. Soakage rate undetermined, water draining away faster than could put into test pit. Free draining.
HT 21 (2)	0.3 m of topsoil and loess overlying outwash gravel.	Favourable from 0.3 m. K (m/s) = 2 x10^{-4}

7.2 Site testing

Standpipe field permeability testing and soakage testing of the outwash gravel was carried out at six field locations (see Site Plan, Appendix A and D for test locations and results respectively).

Four soakage pit tests and two standpipe field permeability tests were completed, all within the predominant sandy GRAVEL soils. It is important to note that the subordinate sand lenses will have significantly lower permeability than the gravels, possibly of the order of 1 x 10^{-5} m/sec which has likely influenced the testing in soakage area 1 and will affect long-term soakage rates.

Soakage testing was undertaken at the base of the soak pits in SP1-4. This was performed by introducing water from an 8,000L watercart until the water level of the pit reached the designated testing level. The inflow was then ceased and the time it took for the water level to drop recorded. The results were then analysed to determine indicative soakage rates, which are presented in Appendix D.

The standpipe field permeability test was undertaken using the HT21 methodology. Hydraulic conductivity was then obtained using published correlations (Van Hoorn, Glover, Phillip, HT21).

Table 6: Hydraulic Conductivity and Soakage Rate Values

Location	Test method	Output	Results
SP1	Open pit soakage test	Soakage Rate	0.07 L/s/m^2
SP2	Open pit soakage test	Soakage Rate	0.18 L/s/m^2
HT21 (1)	Standpipe field permeability test	Hydraulic Conductivity (K)	5x10^{-5} m/s
SP3	Open pit soakage test	Soakage Rate	Free draining*
SP4	Open pit soakage test	Soakage Rate	Free draining*
HT21 (2)	Standpipe field permeability test	Hydraulic Conductivity (K)	2 x10^{-4} m/s
*Insufficient water was able to be introduced to establish a pool of water at the base of the pit due to high soakage			

7.3 Infiltration design

Extensive permeability testing of outwash gravels was carried out for hydroelectric investigations in Upper Clutha Valley in the 1980s. This found typical bulk hydraulic conductivities (K) in outwash gravels, similar to those in soakage area 2 (SP3 and 4) of the proposed development at Mt Iron Junction, to be of the order of 4 x 10^{-4} m/s.

Standpipe field permeability HT21 (2) in outwash gravels within soakage area 2 found K=2 x 10^{-4} m/s which agrees well with the historic Upper Clutha Valley testing. HT21 (1),

however, indicates lower than anticipated hydraulic conductivity (5 x 10^{-5} m/s) which is interpreted to be influenced by the underlying sand lens observed in TP6.

Estimation of a representative average hydraulic conductivity of the outwash soils is difficult, due to the limited number of tests and importance that geological variations (i.e. discrete minor sand lenses) can have on these values. The presence of lenses and layers of sand in the sequence will tend to lower the overall [bulk] hydraulic conductivity compared with that of the gravel component. The test pit logs indicate the sand lenses constitute only a small minority of the soil materials across the site.

However, a provisional estimate of the order of K=2x 10^{-4} m/s is considered reasonable for this unit, based on the site data and comparison with the known hydraulic conductivities of similar local outwash gravels. It is considered a value of 1 x 10^{-5} to 5 x 10^{-5} is suitable within the outwash gravel with sand lenses in soakage area 1. It is recommended that the infiltration zone is excavated to at least 3 m bgl in soakage area 1 to pass through the observed sand lens (TP6) and uncontrolled fill. This is anticipated to increase soakage potential, however confirmation that no extensive sand lenses are present is required during construction excavation inspections.

SP1 and SP2 also appear to have been influenced by the underlying outwash sand lens observed in TP6. SP1 and 2 returned an estimated soakage rate of 0.07 and 0.18 L/s/m^2 respectively.

Soakage pit testing in SP3 and SP4 was unable to establish a full test due to high soakage rates, in both cases, draining away all introduced after the hole was pre-soaked.

Table 7 presents the recommended soakage rate and hydraulic conductivity values[5] to be used for design. We recommend a reduction factor of at least 0.5 be applied to these values to allow for any loss of soakage performance over time.

Table 7: Summary of results in soakage areas 1 and 2

Location	Soakage Rate	Hydraulic Conductivity (K)
Soakage Area 1*	0.07 – 0.18 L/s/m^2	5x10^{-5} m/s
Soakage Area 2	Free Draining**	2 x10^{-4} m/s
*Soakage Area 1 results likely influenced by sand lens observed from 2.6-2.9 m in TP6 **Water did not fill up bottom of soakage pit, draining away too fast		

Due to the uncertainties associated with soakage/permeability estimation and the importance that the value can have on design of soakage systems, we recommend that additional field tests (such as permeameter tests in 44 gallon drums) be conducted during construction to allow any necessary adjustments to be made to the design.

[5] It should be appreciated that estimation of soakage rates and hydraulic conductivity values utilize separate methods and hence cannot be balanced by unit conversion. We are happy to review our test results and provide alternative units (i.e. infiltration rates in mm/hr) if needed.

8 Neighbouring Structures/Hazards

Natural Hazards: Known seismic hazards affecting the development are detailed in Section 4.1 and appropriate allowance should be made for seismic loading during detailed design of the proposed building, foundations, and retaining walls. The development is not located within any mapped slope instability features, liquefaction susceptibility areas or any other hazard features on the QLDC or GeoSolve databases.

Liquefaction has been assessed using DPH testing, detailed in Section 5. Liquefaction risk is considered to be low due to the depth to groundwater and observed relative density of the site subsoils within the upper 11.5 m.

A rockfall hazard has been mapped within 70 m of the northwest boundary of the property on the QLDC hazard register. An assessment of the rockfall risk to this property has been completed and is detailed in section 6.7 of this report.

Seismic risk associated with the Cardrona Fault is detailed in Section 6.8.

Flooding has not been assessed as part of this assessment, the site is naturally free draining and the development is significantly higher than the closest body of flowing water that runs to the south of the site.

Distances to adjoining structures: It is assumed the existing buildings on site will be removed prior to construction and therefore no adverse geotechnical implications are expected to apply for neighbouring properties during construction provided appropriate vibration and dust mitigation measures are taken during construction. If existing buildings should remain onsite then the vibration effects should be considered if fill is to be compacted within 10 m of an existing structure.

Aquifers: No aquifer resource will be adversely affected by the development.

Erosion and Sediment Control: The site presents low potential to generate silt runoff during heavy rainfall events due to the predominately sub-horizontal topography and site geology. However if required effective systems for erosion control are runoff diversion drains and contour drains, while for sediment control, options are earth bunds, silt fences, hay bales, vegetation buffer strips and sediment ponds. Only the least amount of subsoil should be exposed at any stage and surfacing established as soon as practical. Details for implementation are given in Appendix B within the following link: http://esccanterbury.co.nz/.

Noise: It is expected that conventional earthmoving equipment, such as excavators, trucks and rollers will be required during construction. The earthworks contractor should take appropriate measures to control the construction noise, and ensure QLDC requirements are met in regard to this issue.

Dust: Regular dampening of soil materials with sprinklers to QLDC standards should be effective if required.

Vibration: No vibration induced settlement is expected in these soil types. The effects of vibrations from rollers and plate compactors on adjacent structures will need to be considered if fill is compacted within 10 m of an existing structure.

9 Conclusions and Recommendations

- The site is underlain by surficial topsoil and loess, which overlies outwash gravel with rare thin outwash sand lenses, which extends to at least 4.5 m beneath the surface of the proposed development. Isolated areas of uncontrolled fill were observed.
- Groundwater seepage was not observed during test pit investigations on the site completed to a maximum depth of 4.5 m. A piezometer was installed in close proximity DPH 1 to 6.7 m bgl and was dipped dry to full depth.
- No to minor liquefaction induced settlement (0-10 mm) is predicted across the site within the upper 10 m of the soil profile.
- No evidence of existing slope instability has been identified on site. Rockfall hazard is assessed as low risk and is detailed in section 6.7 of this report.
- Bearing on the site will be governed by the outwash gravel or engineered fill overlying outwash gravel. The outwash gravel and engineered fill will provide good bearing (100 kPa allowable), for 400 mm wide by 400 mm deep shallow footings.
- Recommendations for temporary and permanent batter slope angles are described in Table 4. Slopes that are required to be steeper than those described should be structurally retained or subject to specific geotechnical design.
- All retaining walls should be designed by a Chartered Professional Engineer using the geotechnical parameters recommended in Table 3 of this report.
- The outwash gravel soils are considered suitable for use as engineered fill (in accordance with an earthfill specification).
- All unsuitable soils identified in foundation excavations, particularly those softened by exposure to water, should be undercut and replaced with engineered fill during construction.
- Any fill that is utilised as bearing for foundations should be placed and compacted in accordance with NZS 4431:1989 and certification provided to that effect.
- For detailed design purposes it is recommended that the site is classified “Class D – Deep subsoil” in accordance with NZS 1170.5:2004 seismic provisions.
- Based on the geological conditions observed, testing data and experience with similar outwash gravel, the bulk permeability of the deposit is estimated to be in the order of 2 $x10^{-4}$ m/s in Soakage area 2. A lesser value of 1-5$x10^{-5}$ is recommended where sand lenses are present such as observed in Soakage area 1. Soakage rates are also provided in Table 7. To allow for any loss of soakage performance over time we recommend a reduction factor of at least 0.5 be applied to the value adopted in each of the two soakage areas for design purposes.
- A geotechnical practitioner should inspect all foundation excavations, batter slopes, soak pit excavations and additionally any seepage, spring flow or under-runners that may be encountered during construction.

10 Applicability

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

It is important that we be contacted if there is any variation in subsoil conditions from those described in this report.

Please don't hesitate to contact the undersigned if we can provide any further assistance with this project.

Report prepared by:

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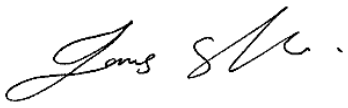
Mike Plunket

Geotechnical Engineer



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James Stewart

Engineering Geologist

Reviewed for GeoSolve Ltd by:

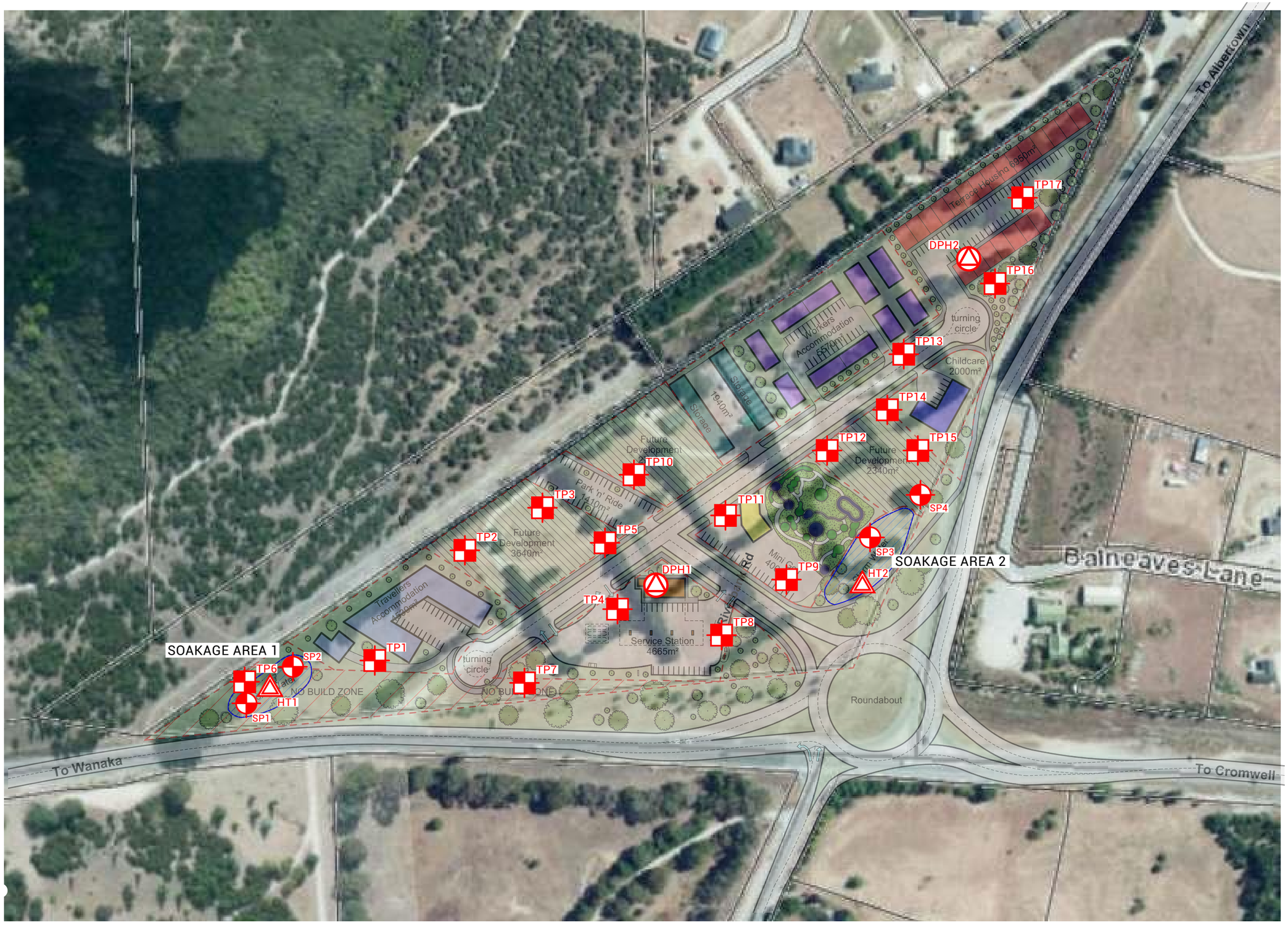
.....

Fraser Wilson

Senior Engineering Geologist

GeoSolve Ltd

Appendix A: Site Investigation Plan



Key

TP1 = Test Pit

DPH1 = Heavy Dynamic Probe (DPH) test location

SP1 = Soakage Pit Test

HT1 = HT21 Permeability Test

Scale 1:2000

0 20 40 60 80 (m)

GEOSOLVE

70 Macandrew Road, PO Box 2427,
South Dunedin 9044. ph 03 466 4024

DRAWN	MDP	2/18
DRAFTING CHECKED	FAW	2/18
APPROVED	FAW	2/18
FILE : PDF		
SCALE: (AT A3 SIZE) As Shown		
PROJECT No. 170839		

MT IRON JUNCTION LIMITED
Geotechnical Investigation
237 Wanaka-Luggate Highway
Site Plan

FIG No. Appendix A - Figure 1

REV. 0

Note: Boulders are not to scale

N

Sub-horizontal outwash surface (0-5°)

26
28
31
33
35
30
21
237

Albert Town-Lake Hawea Rd

Wanaka-Luggate Hwy

Key

= Observed rockroll boulder

= Observed outwash boulder

= Base of Mount Iron slopes

= Crest of lateral moraine ridge

= Property boundary

Scale 1:2000

0 20 40 60 80 (m)

GEOSOLVE

70 Macandrew Road, PO Box 2427,
South Dunedin 9044. ph 03 466 4024

DRAWN	MDP	2/18
DRAFTING CHECKED	JAS	2/18
APPROVED	FAW	2/18
FILE : PDF		
SCALE: (AT A3 SIZE) As Shown		
PROJECT No. 170839		

MOUNT IRON JUNCTION LTD
Geotechnical Investigation
237 Wanaka-Luggate Highway
Rockroll Hazard Map

FIG No. Appendix A - Figure 2

REV. 0

Appendix B: Investigation Data

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 1**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.15	TOPSOIL		Light brown/brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.2	OUTWASH GRAVEL		Brown/grey, sandy GRAVEL with trace cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 80 mm. Medium dense. Bedded. Dry.			
3.6	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.6 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 2**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

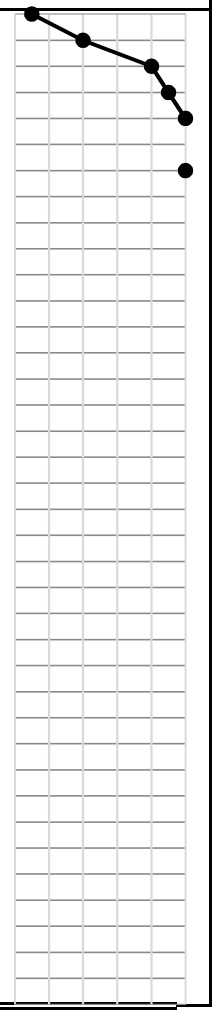
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.15	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.		
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
1.3	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor rootlets. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		
3.8	OUTWASH GRAVEL		Grey, sandy GRAVEL with trace cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER

Blows per 100mm

0 2 4 6 8 10



Total Depth = 3.8 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 3**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.15	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.35	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
0.6	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense.			
1.5	OUTWASH SAND		Grey/brown, SAND with some to minor gravel. Sand is fine to coarse. Medium dense. Bedded. Dry.			
4.0	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 4 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 4**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

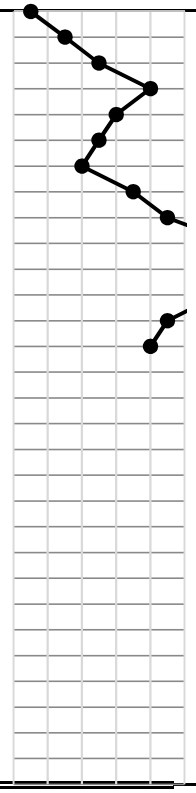
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.2	TOPSOIL		Brown, organic SILT with roots and rootlets. Silt is non-plastic. Dry.		
0.5	LOESS		Light brown, silty SAND with minor gravel. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
3.0	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor rootlets. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER

Blows per 100mm

0 2 4 6 8 10



Total Depth = 3 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 5**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.2	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
1.8	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor rootlets. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.			
3.5	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.5 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 6**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
1.3	UNCONTROLLED FILL		Grey, gravelly SAND with minor topsoil and trace sticks, rootlets and wire. Sand is fine to coarse. Gravel is fine to medium. Gravel is sub-angular to sub-rounded. Loose. Dry.			
1.6	BURIED TOPSOIL		Brown, organic SILT with rootlets and roots. Silt is non-plastic. Dry.			
2.6	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.			
2.9	OUTWASH SAND		Grey/brown, gravelly SAND to SAND with some gravel. Sand is fine to coarse. Medium dense. Bedded. Dry.			
4.2	OUTWASH GRAVEL		Grey, sandy GRAVEL with some cobbles and minor boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 4.2 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 7**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.15	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
2.3	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.			
4.0	OUTWASH GRAVEL		Dark grey, sandy GRAVEL with minor cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 250 mm. Medium dense. Bedded. Dry to moist.		NO SEEPAGE	

Total Depth = 4 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 8**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
2.6	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor rootlets, cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 200 mm. Medium dense. Bedded. Dry.			
3.8	OUTWASH GRAVEL		Dark grey, sandy GRAVEL with minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 90 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.8 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

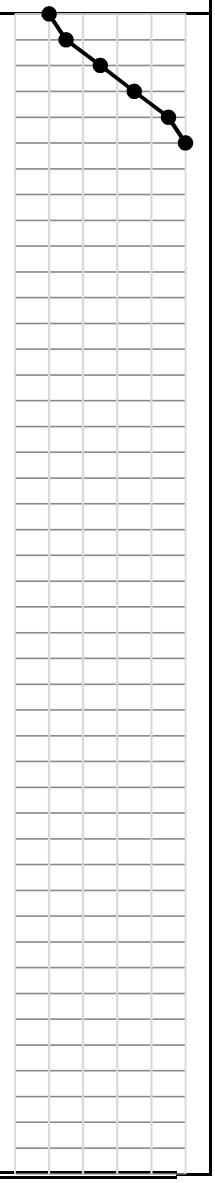
EXCAVATION LOG

EXCAVATION NUMBER: **TP 9**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.3	OUTWASH GRAVEL		Grey, sandy GRAVEL with some cobbles and minor boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 200 mm. Medium dense. Bedded. Dry.			
4.5	OUTWASH GRAVEL		Dark grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	



Total Depth = 4.5 m

COMMENT:

Logged By: MDP

Checked Date:

Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

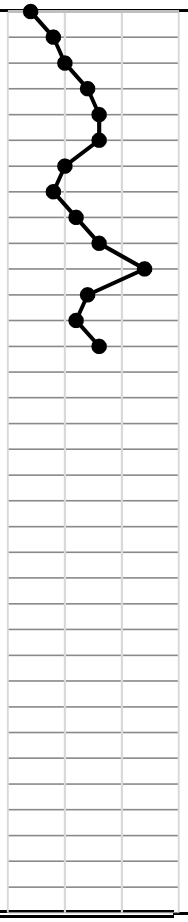
EXCAVATION NUMBER: **TP 10**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.		
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
2.4	OUTWASH GRAVEL		Brown/grey, sandy GRAVEL with minor rootlets and trace cobbles and roots. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 80 mm. Medium dense. Bedded. Dry.		
3.5	OUTWASH GRAVEL		Brown/grey, sandy GRAVEL with some to minor cobbles and minor boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER
Blows per 100mm
0 5 10 15



Total Depth = 3.5 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 11**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.1	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.			
2.5	OUTWASH GRAVEL		Grey, sandy GRAVEL with some to minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.			
2.9	OUTWASH SAND		Grey/brown, gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to sub-angular. Medium dense. Bedded. Dry.			
3.4	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.4 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

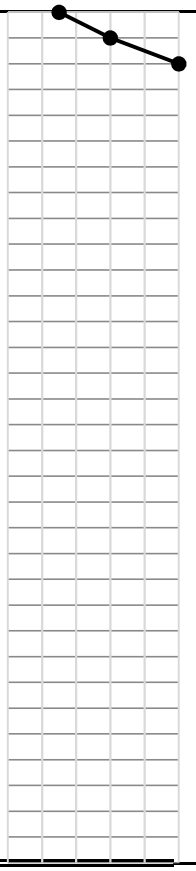
EXCAVATION NUMBER: **TP 12**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.1	TOPSOIL		Brown, organic SILT with rootlets and roots. Silt is non-plastic. Dry.		
0.3	LOESS		Light brown, silty SAND with minor rootlets and trace roots. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
1.9	OUTWASH GRAVEL		Grey, sandy GRAVEL with some cobbles, minor rootlets and trace boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		
3.3	OUTWASH GRAVEL		Dark grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER
Blows per 100mm
0 2 4 6 8 10



Total Depth = 3.3 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 13**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
2.5	OUTWASH GRAVEL		Grey/brown, sandy GRAVEL with some cobbles and trace rootlets. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.			
4.2	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 4.2 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 14**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.2	OUTWASH GRAVEL		Grey, sandy GRAVEL with some cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.			
3.1	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor to trace cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.1 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 15**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

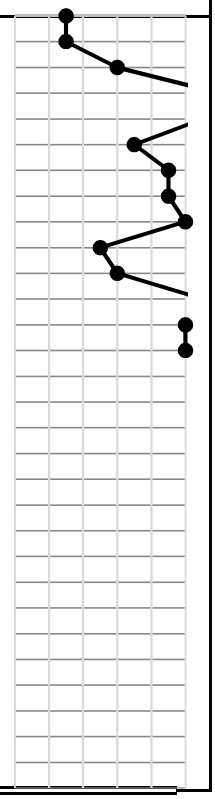
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.		
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
1.6	OUTWASH GRAVEL		Grey/brown, sandy GRAVEL with minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.		
3.0	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER

Blows per 100mm

0 2 4 6 8 10



Total Depth = 3 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 16**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.2	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
3.7	OUTWASH GRAVEL		Grey, sandy GRAVEL with trace rootlets and cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 200 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.7 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 17**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

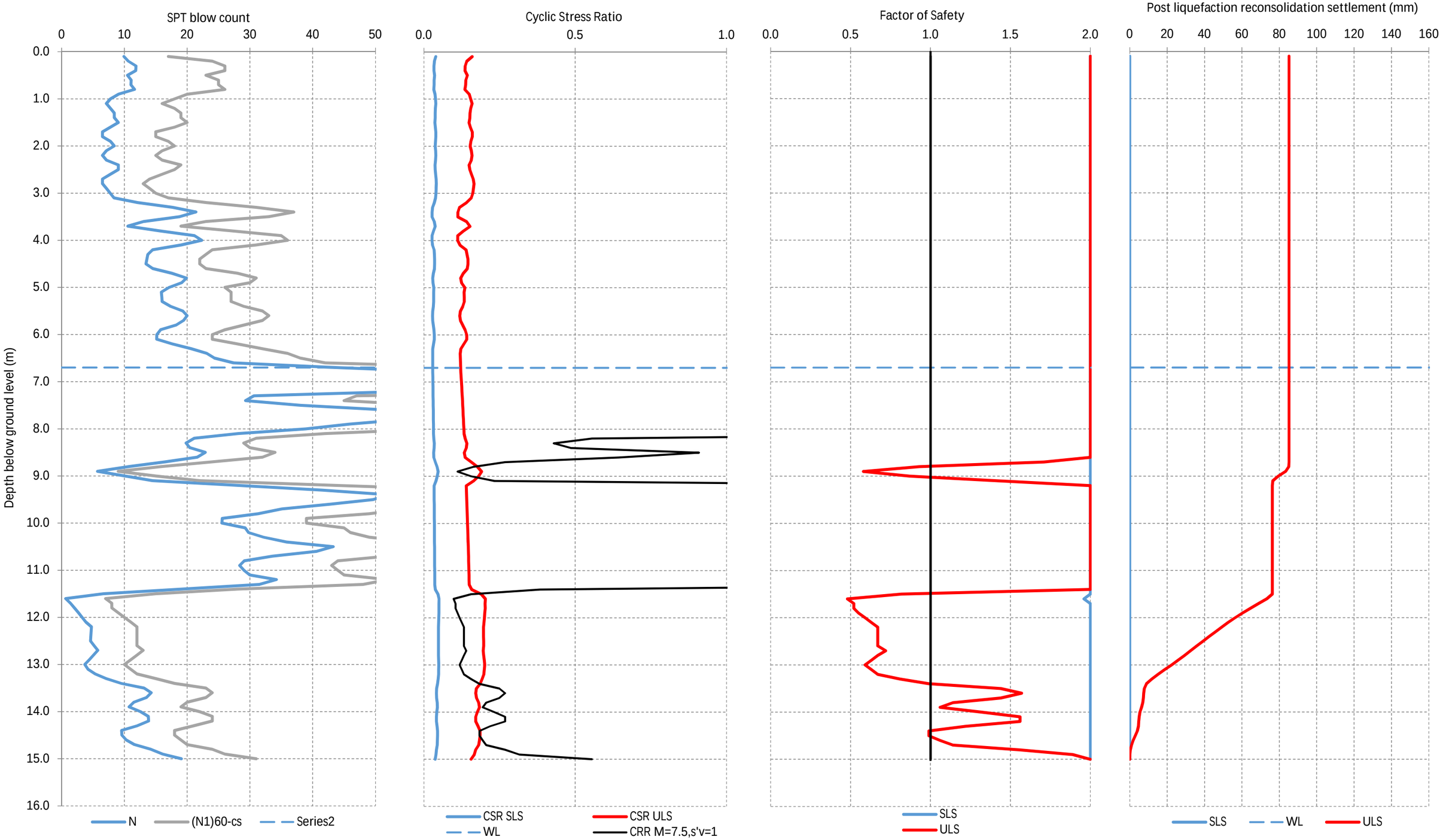
DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.2	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.9	OUTWASH GRAVEL		Grey, sandy GRAVEL with trace rootlets and cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 200 mm. Medium dense. Bedded. Dry.			
3.5	OUTWASH GRAVEL		Grey/brown, sandy GRAVEL with minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 200 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.5 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

Appendix C: Liquefaction Analysis

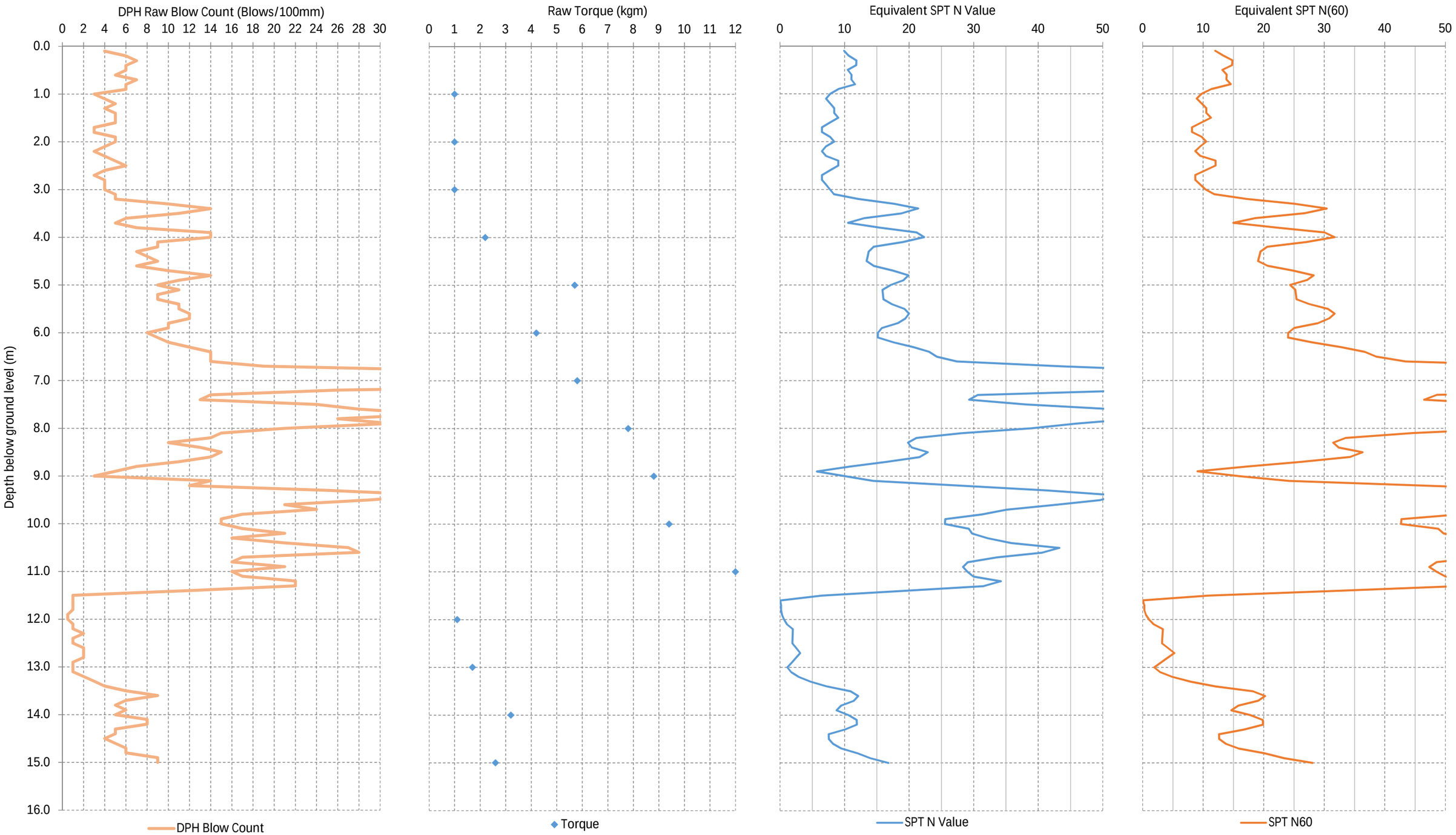
LSN (SLS)	LSN (ULS)	Crust Thickness (SLS)	Crust Thickness (ULS)
0.0	7.1	0.0	8.7



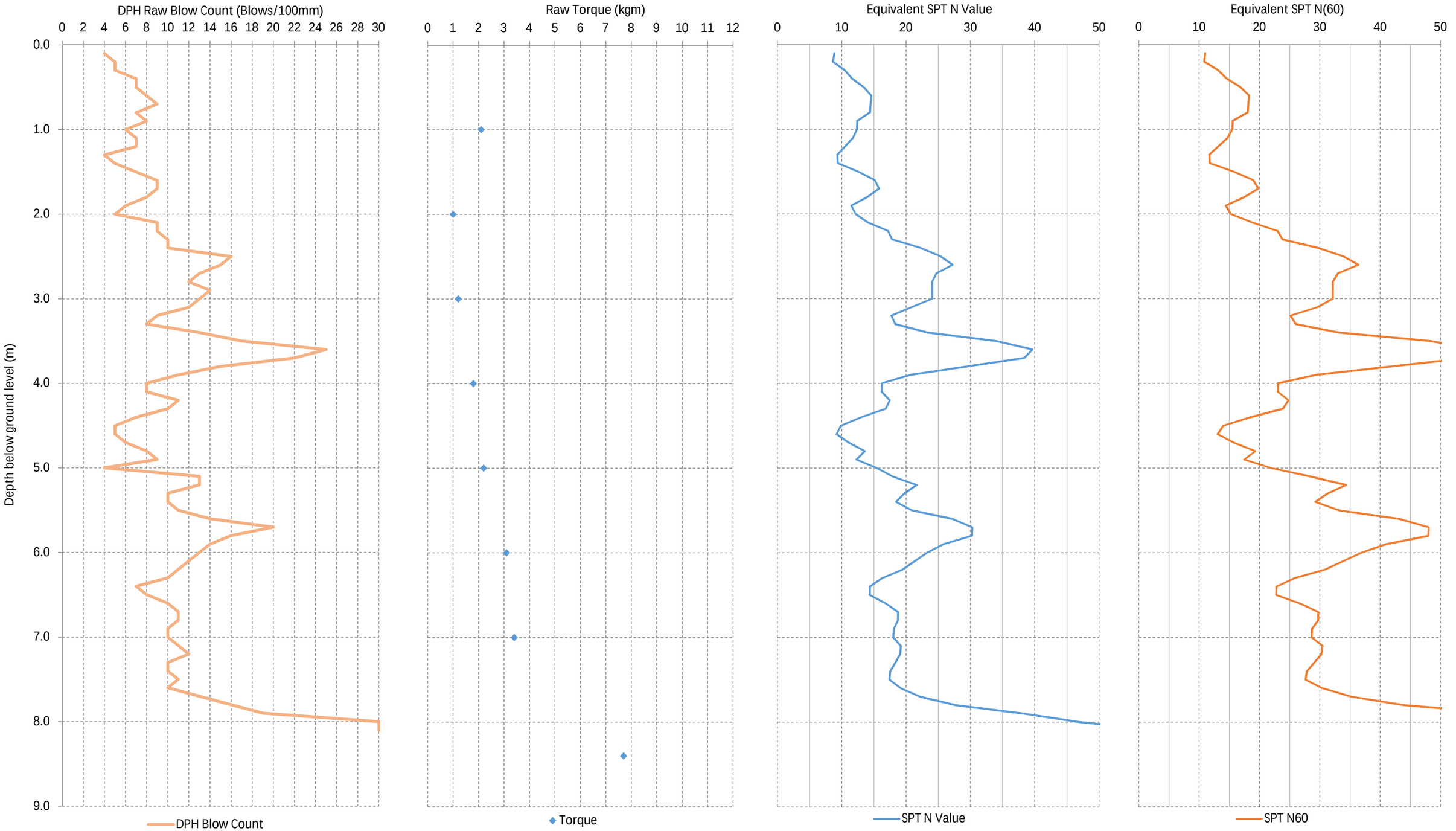
Note: Settlements as per Idriss and Boulanger (2014)

GEOSOLVE

PROJECT	170839 - Mt Iron Junction
DESCRIPTION	Liquefaction Analysis
LOCATION	Wanaka
CLIENT	Mt Iron Junction Limited
TEST NUMBER	DPH1
DATE	17/01/2018
LOGGED BY	RC
ANALYSED BY	MDP
CHECKED BY	FAW



GEOSOLVE	PROJECT	170839 - Mt Iron Junction	CLIENT: Mt Iron Junction Limited
	DESCRIPTION	Liquefaction Analysis	TEST NUMBER: DPH1
	LOCATION	Wanaka	DATE: 17/01/2018
			LOGGED BY: RC
			ANALYSED BY: MDP
			CHECKED BY: FAW



PROJECT	170839 - Mt Iron Junction	CLIENT	Mt Iron Junction Limited
DESCRIPTION	Liquefaction Analysis	TEST NUMBER	DPH2
LOCATION	Wanaka	DATE	17/01/2018
		LOGGED BY	RC
		ANALYSED BY	MDP
		CHECKED BY	FAW

Appendix D: Permeability Testing Results

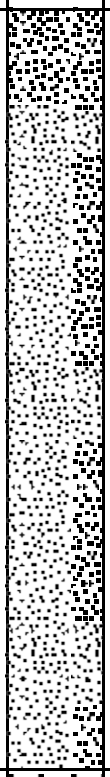
GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: SP 1

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
1.7	UNCONTROLLED FILL		Light grey, SAND with some gravel and silt, trace cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Boulders up to 700 mm diameter. Loose to medium dense. Massive. Dry.			
1.8	BURIED TOPSOIL		Brown, organic SILT with minor rubbish. Rubbish includes wire fence. Firm. Massive. Dry.			
2.6	OUTWASH GRAVEL		Grey, sandy GRAVEL with lenses of gravelly SAND and silty SAND. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Medium dense. Bedded. Moist.		NO SEEPAGE	

Total Depth = 2.6 m

COMMENT:	Logged By: JAS/MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **SP 2**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
1.2	UNCONTROLLED FILL		Light grey, sandy GRAVEL with trace cobbles and organic SILT. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Loose to medium dense. Massive. Dry.			
1.6	BURIED TOPSOIL		Dark brown, sandy organic SILT with minor gravel. Sand is fine. Gravel is fine to coarse. Firm. Massive. Moist.			
2.4	OUTWASH GRAVEL		Grey, sandy GRAVEL with trace cobbles. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Medium dense. Bedded. Moist.		NO SEEPAGE	

Total Depth = 2.4 m

COMMENT:

Logged By: JAS/MDP
Checked Date:
Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: SP 3

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.3	TOPSOIL/LOESS		Brown, organic SILT and silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Massive. Dry.			
1.3	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded to sub-angular. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 1.3 m

COMMENT:	Logged By: JAS/MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: SP 4

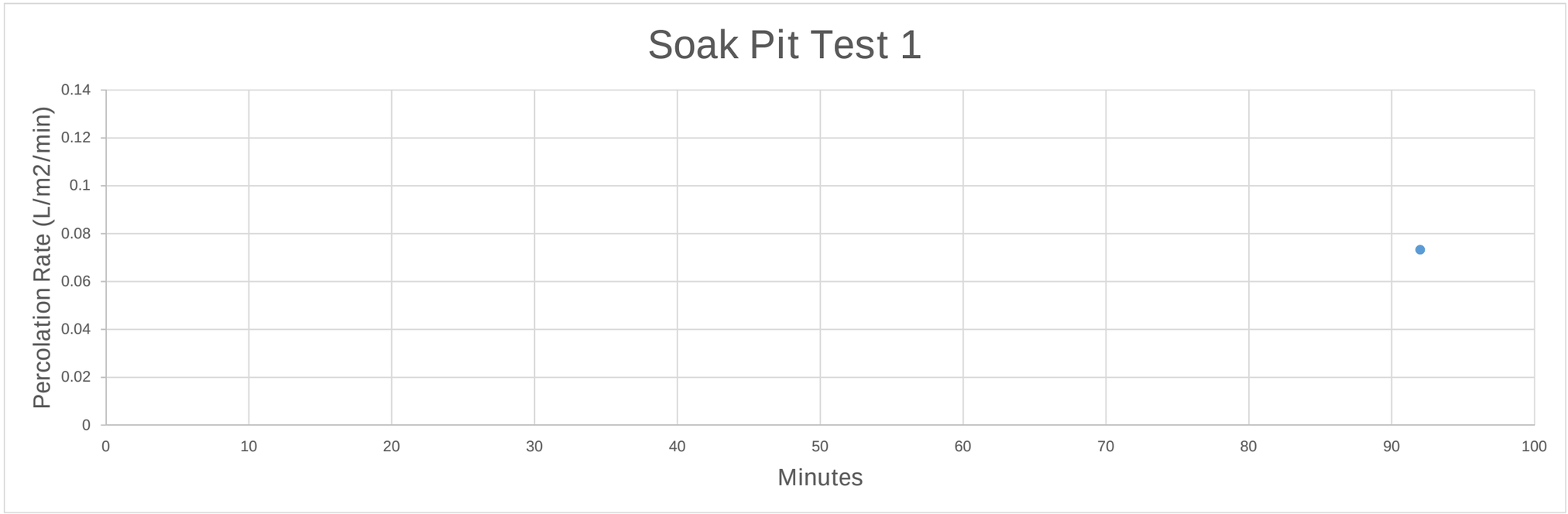
PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

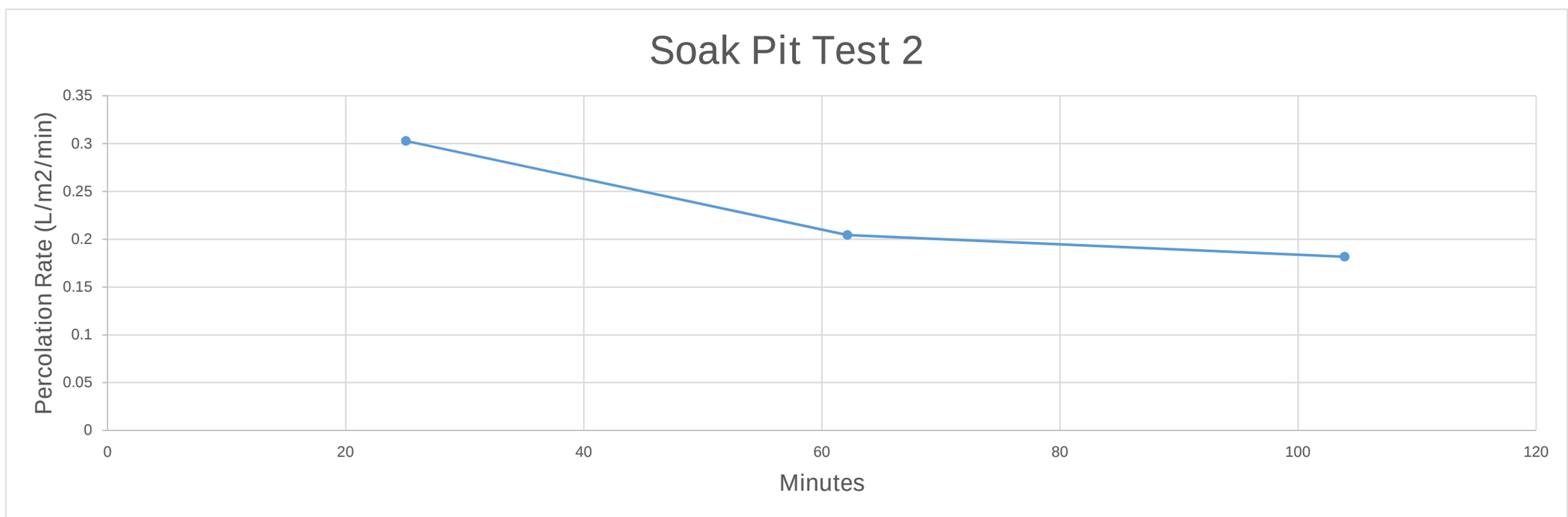
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.3	TOPSOIL/LOESS		Brown, organic SILT and silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Massive. Dry.			
1.2	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded to sub-angular. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 1.2 m

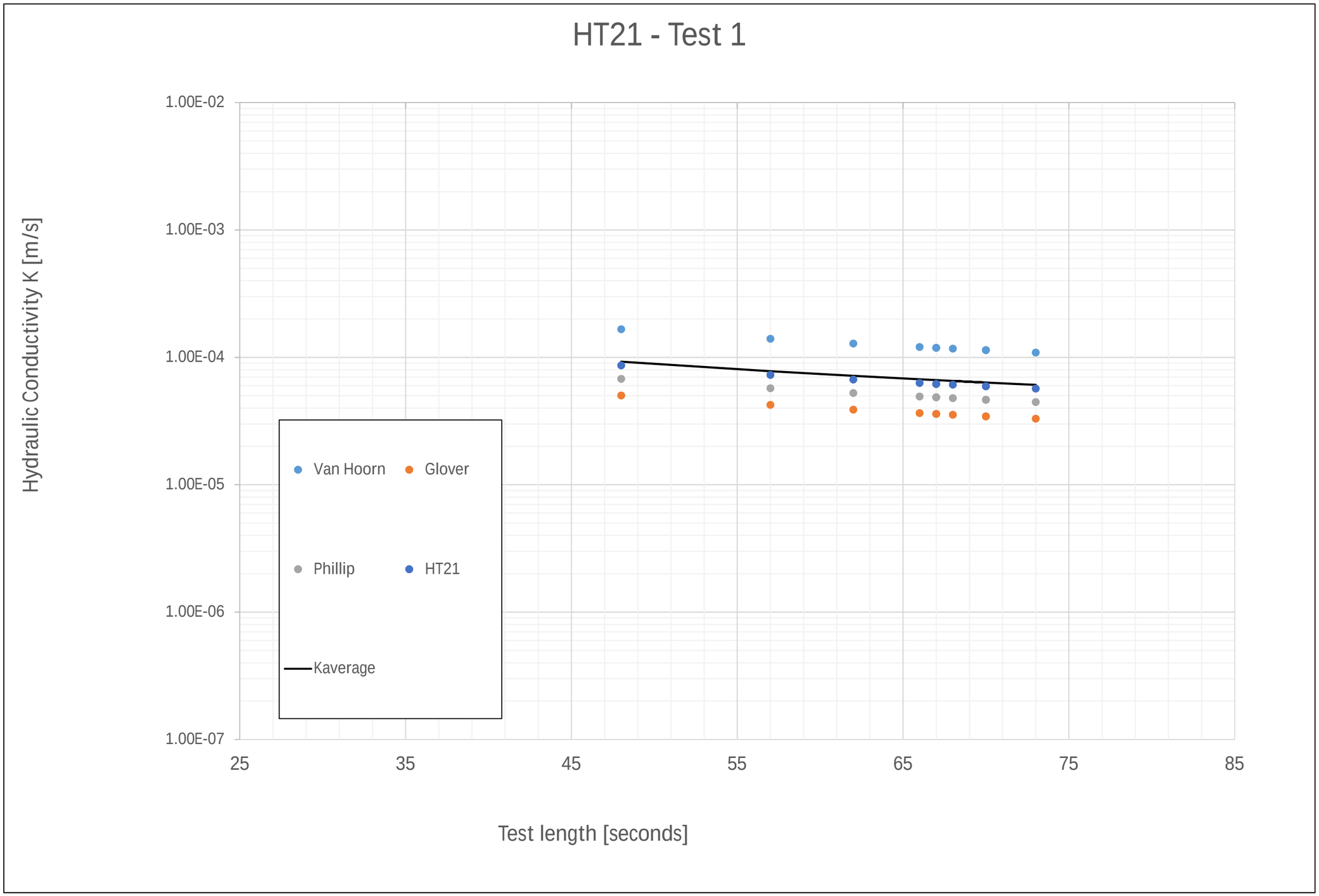
COMMENT:	Logged By: JAS/MDP
	Checked Date:
	Sheet: 1 of 1



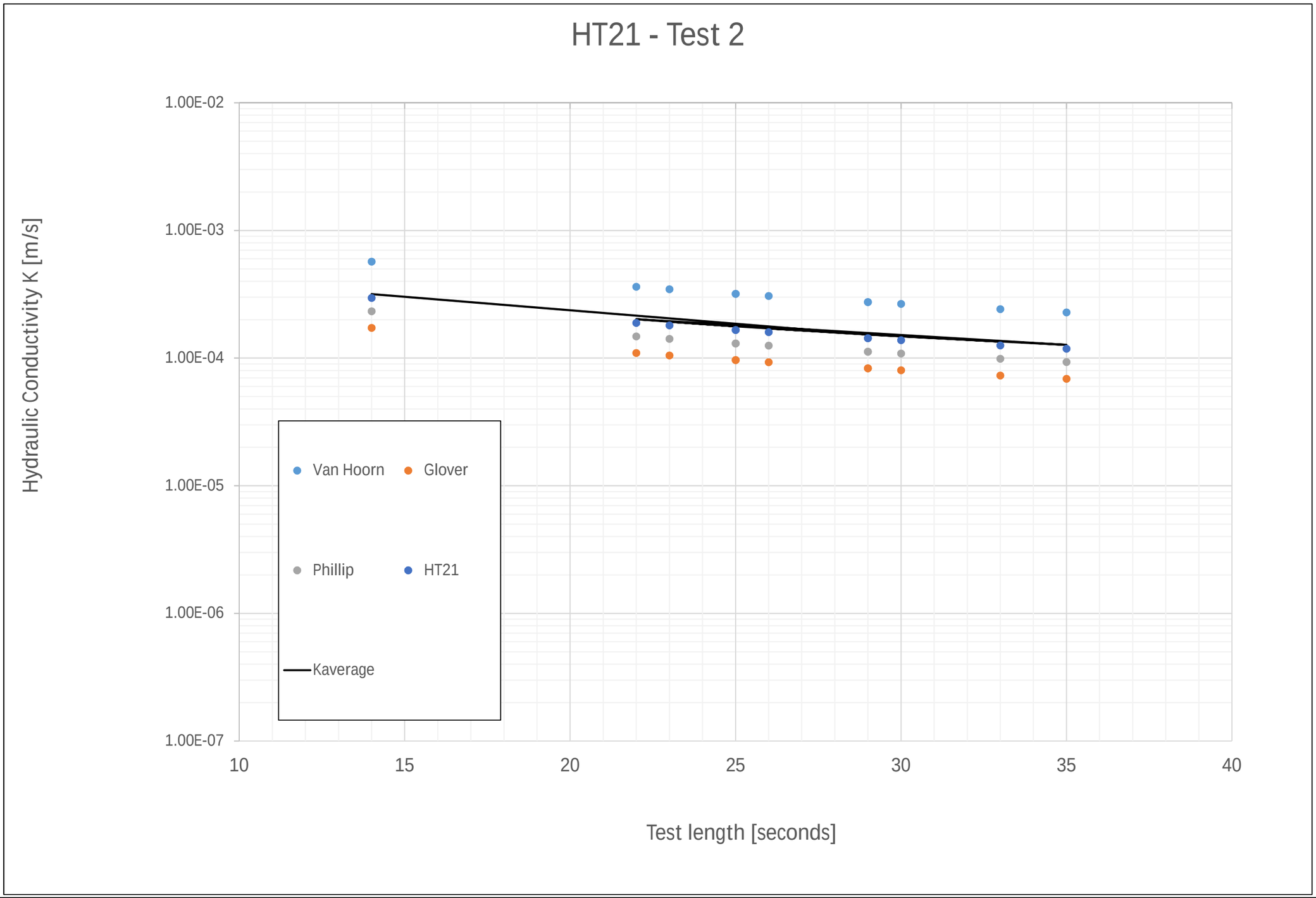


GEOSOLVE

PROJECT	170839 - Mt Iron Junction	CLIENT	Mt Iron Junction Limited
DESCRIPTION	Peremability Testing	TEST NUMBER	SP 1 and 2
LOCATION	Wanaka	DATE	18/12/2017
		LOGGED BY	JAS/MDP
		ANALYSED BY	MDP
		CHECKED BY	FAW



GEOSOLVE	PROJECT	170839 - Mt Iron Junction	CLIENT: Mt Iron Junction Limited
	DESCRIPTION	Peremability Testing	TEST NUMBER: HT21 1
	LOCATION	Wanaka	DATE: 18/12/2017
			LOGGED BY: JAS/MDP
			ANALYSED BY: MDP
			CHECKED BY: FAW



GEOSOLVE	PROJECT	170839 - Mt Iron Junction	CLIENT: Mt Iron Junction Limited
	DESCRIPTION	Peremability Testing	TEST NUMBER: HT21 2
	LOCATION	Wanaka	DATE: 18/12/2017
			LOGGED BY: JAS/MDP
			ANALYSED BY: MDP
			CHECKED BY: FAW

AURORA ENERGY LIMITED
PO Box 5140, Dunedin 9058
PH 0800 22 00 05
WEB www.auroraenergy.co.nz

26 June 2023

Phil Shipton
Paterson Pitts Group

Sent via email only: phil.shipton@ppgroup.co.nz

Dear Phil,

ELECTRICITY SUPPLY AVAILABILITY FOR A PROPOSED SIX LOT SUBDIVISION.
MOUNT IRON JUNCTION, WANAKA. LOTS ONE, TWO AND SIX OF LOT 5 DP 15016.

Thank you for your inquiry outlining the above proposed development.

Subject to technical, legal and commercial requirements, Aurora Energy can make a Point of Supply[1] (PoS) available for this development.

Disclaimer

This letter confirms that a PoS **can** be made available. This letter **does not** imply that a PoS is available now, or that Aurora Energy will make a PoS available at its cost.

Next Steps

To arrange an electricity connection to the Aurora Energy network, a connection application will be required. General and technical requirements for electricity connections are contained in Aurora Energy's Network Connection Standard. Connection application forms and the Network Connection Standard are available from www.auroraenergy.co.nz.

Yours sincerely

Niel Frear

CUSTOMER INITIATED WORKS MANAGER

[1] Point of Supply is defined in section 2(3) of the Electricity Act 1993.

New Property Development Contract

Development location (Site)	237 Wanaka-Luggate Highway , Wanaka, Queenstown-Lakes District, 9382		
Your project reference	McDonalds Wanaka		
Stage of development to which this contract applies	Not staged	Number of connections in the development/stage	1
Chorus reference ID	10494293	Charges (incl GST)	$ 0.00
Included products	Pre-built fibre Commercial fibre network		

DEVELOPER :	
Name	MCDONALD'S RESTAURANTS (NEW ZEALAND) LIMITED
Address	Great South Rd, Greenlane, Auckland, 1051

I confirm that I have read the Terms and Conditions of Chorus' NPD Contract and the related Policies, and that I agree to enter a binding contract with Chorus on those terms, in electronic form.

Agreed for and on behalf of MCDONALD'S RESTAURANTS (NEW ZEALAND) LIMITED by its authorised signatory:

Contact name	Leslie Eckard
Phone number	0272254454
Email address	*leslie@pcsltd.co.nz*

Date of acceptance: **18/07/2023**

Terms and Conditions

This New Property Development Contract ("NPD Contract") comprises of the cover page, these terms and conditions and the Policies and, other than those provisions expressed to survive expiry or termination, will expire 12 months after completion of the Services by Chorus. Terms used but not defined in this NPD Contract will have the meanings contained in the Policies.

Ordering Portal

1. A quote will be generated based on the information you supply in the portal relating to your development ("Development Scope"). You are solely responsible for any errors or omissions relating to the Development Scope. Chorus accepts no liability for any additional activities or services outside of the Development Scope.

2. Chorus will provide a quote based on the Development Scope for all design work, installation work and record updates Chorus will provide to you ("Services").

Quote

3. Any quote will be valid for 90 days from the date it is issued ("Quotation Period"). Upon expiry of the Quotation Period without acceptance by you and payment of the Charges, the quote will expire and be incapable of acceptance.

4. Prior to your acceptance of the quote, Chorus may alter the quote at any time if circumstances change such as where you change the Development Scope or there are technical issues with the portal. If you wish to change the Development Scope after your acceptance of a quote, the amendment process described in clause 8 below will apply.

Acceptance

5. If you wish to accept a quote you must communicate acceptance via the portal and pay the Charges within the Quotation Period. Once you have accepted the quote and paid the Charges within the Quotation Period, Chorus will proceed with your order ("Order"). If you do not pay the Charges within the Quotation Period your NPD Contract may be cancelled by us at our discretion. To restart the process you will need to begin the quotation process and accept the NPD Contract again.

6. Once created an Order can only be terminated in accordance with the terms of this NPD Contract.

7. If you are placing an Order on behalf of another party, you warrant that you are authorised to bind the relevant party to the terms of this NPD Contract and have all necessary authorities, powers and consents to act and contract with Chorus for the Services on behalf of that party.

Amendment to Order

8. Once an Order has been created, if you wish to amend the Order you must submit a written request to Chorus. Chorus will consider your request and respond with any changes to the current Order and may put your current Order on hold. If you accept these changes and pay any required Charges within 30 days, the Order will be amended. If you do not accept the amendment and pay any required Charges within the 30-day period, then the Development Scope will remain unchanged, the amendment may be cancelled by us at our discretion, and/or you may exercise any agreed termination rights under clause 24.

9. Chorus may amend an Order if:

a. You have not started to install the materials within 12 months of acceptance of the quote;

b. There is a change in any plans you provide or the Development Scope or there is a change in legal ownership of the Site;

c. Any additional services or costs are incurred for the relocation of any Chorus network equipment or infrastructure;

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Version: 1, Version Date: 20/11/2023

d. There are additional third-party requirements to complete the Services that were not known at the time the Order was processed or there are any other errors in the Order; and/or

e. There are any third-party objections which prevent or hinder the delivery of the Services or the withholding of third-party consents required to deliver the Services, that cannot be resolved within a reasonable time.

Alternatively, where Chorus has a right to exercise its amendment rights under this clause, it may instead terminate this NPD Contract on 30 days' notice provided Chorus is not in breach of this NPD Contract.

Payment of Chorus charges

10. Payment of the Charges set out in a quote (and confirmed in the personalised cover page of your NPD Contract) in full is required before Chorus commences the Services.

11. All Charges are exclusive of GST and any other tax or levies unless otherwise stated.

Policies

12. You will comply with all procedures and requirements contained in https://www.chorus.co.nz/develop-with-chorus/docs/npd-policy ("Policies"). The Policies protect Chorus' legitimate business interests and are a material term of this NPD Contract which you must follow. The Policies may be updated by Chorus from time to time, as follows:

a. without further notice to you where Chorus considers, acting reasonably, the update(s) not to be to your detriment; and/or

b. on at least 30 days' written notice to you where Chorus considers the update(s) to be to your detriment, unless an update to the Policies without such notice is reasonably necessary in order to protect Chorus' legitimate interests.

Initial Activities

13. You agree to provide us with any plans and documents prescribed in the Policies prior to commencement of the Services.

14. After you have accepted the terms and Chorus has received both full payment of the Charges and the plans we require from you, Chorus will provide confirmation as to whether you will be required to install any infrastructure at the Site.

15. Where the Policies require you to undertake certain work and activities you warrant that you will attend to these promptly. You acknowledge that Chorus will be relieved of its obligations to provide the Services to the extent Chorus is reliant on you carrying out work and activities that you have not done.

16. You must let Chorus know immediately if you become aware of something which might give rise to a change in any of your plans and/or the Development Scope (such as changes in the number of Connections, changes to boundaries or changes to road layouts) or any potential non-compliance with the Network Specifications or any other procedures or requirements contained in the Policies.

Materials

17. Chorus will supply some of the materials that are required for you to install related to any communal infrastructure. Chorus supplied materials ("Materials") are as itemised and defined in the Policies. You will be responsible for supplying any additional materials not itemised in the Policies.

18. You will be responsible for any loss or damage to any Materials while they are in your possession including when the Materials are at the Site. Title in the Materials will remain with Chorus at all times and you will ensure all Materials are clearly identified as Chorus property. You authorise us to enter onto any premises where the Materials are stored and collect any Materials that have not been installed.

Installation

19. Other than specific installation services included in your Order, you are responsible for installing the Materials in accordance with the Policies. You will promptly remedy any non-compliant or defective installations in accordance with the Policies or the defects may be remedied by us in accordance with the Policies and paid for by you. Where you or your agent carry out the installation works, you warrant you will carry out the installation using the degree of skill expected of a competent installer of telecommunications networks. Installation in line with the Policies and Network Specifications will meet this standard.

20. Chorus will:

a. Build the network to the exterior boundary of the Site; and

b. Undertake any additional works so that the Site can be linked to the Chorus network including jointing, testing, and commissioning works as prescribed in the Policies; and

c. As part of Pre-Built Fibre, Chorus will also install relevant End User Infrastructure to the relevant premises as defined in the Policies. You agree to grant to Chorus all access rights to the Site and the relevant premises that we require in order to install and maintain any End User Infrastructure.

21. If you have ordered specific installation services from us then you will complete the “pre-installation work” detailed in the Policies before we perform those installation services.

22. Chorus will issue a clearance letter and link the Site to our network when all the pre-requisites stated in the Policies have been met. Chorus may rescind any clearance letter if it becomes aware that your installation does not meet the Policies, applicable law or regulation and Chorus reserves the right to advise the relevant authority of any revocation or rescission of the clearance letter.

Termination

23. Either party may on written notice terminate this NPD Contract if the other party:

a. Has materially breached its obligations under this NPD Contract and if capable of remedy, has not remedied the breach within 30 days of being notified of the breach;

b. Purports to assign or otherwise goes into liquidation, has a receiver, administrator, statutory manager, or similar officer appointed; or

c. Becomes insolvent, ceases to carry on their business, makes any composition or arrangement with its creditors, or is deemed or perceived unable to pay its debts when they fall due.

24. You may terminate this NPD Contract at any time for any reason (including under clause 8) on 30 days’ notice and you must return any Materials in your possession that have not been installed at the date of termination.

25. If this NPD Contract is terminated by Chorus under clauses 9 or 23, or by you under clause 24, we will retain a proportion of the Charges paid by you in order to reimburse Chorus for the following costs it incurs up to the date of termination **(**“Termination Costs”**)**:

a. Any costs paid or payable to third parties;

b. A fixed cost to recover Chorus’ internal costs. The fixed costs will be calculated as follows:

i. $250 if termination occurs prior to completion of the design plan (as defined in the Policies);

ii. $350 if termination occurs after completion of the design plan but before commencement of any Chorus build work; or

iii. $600 if termination occurs after commencement of any Chorus build work; and

c. The costs of any Materials that have not been installed at the date of termination and that are not returned to Chorus within 10 days of termination or are returned in a condition which does not allow for the Materials to be reused by Chorus.

26. Termination Costs will not exceed the Charges payable under this NPD Contract but are without prejudice to Chorus' right to recover from you any other amounts you may owe us under this NPD Contract.

Liability

27. Other than liability arising under clause 30, each party's liability for any loss of income, profits, revenue or savings (whether direct or indirect), or any indirect or consequential loss or damages, is excluded.

28. Subject to clause 29, each party's total liability for all losses or damages arising out of or in connection with this NPD Contract, whether in contract, tort (including negligence), equity, or otherwise, will be limited to the greater of $100,000 or the Charges paid under this NPD Contract.

29. The limitations in clause 28 will not apply to any liability of a party arising out of:

a. a breach of confidentiality or a party's health and safety obligations;

a. the fraud or wilful breach of this NPD Contract by a party;

c. your indemnification obligations under clause 30; or

d. a failure to pay any amount due and owing under this NPD Contract.

30. You will indemnify and hold harmless Chorus from any loss arising in relation to your failure to comply with clause 19 or 21 of this NPD Contract or any damage you cause to our network. We may put your Order on hold until payment is received for any network damage you cause and/or terminate this NPD Contract under clause 23 in the event of non-payment by you.

Force Majeure

31. Non-performance by either party of its obligations due to an event beyond that party's reasonable control will be excused to the extent that performance is delayed or prevented by that force majeure event. If a force majeure event lasts for more than 60 days Chorus may terminate this NPD Contract.

Insurance

32. You will maintain during the term of this NPD Contract public liability insurance for an amount of not less than $1,000,000 and Chorus will maintain public liability insurance for an amount of not less than $10,000,000.

Confidentiality

33. Each party will keep confidential, secure, and not misuse any information received from the other in connection with this NPD Contract (including the contract itself). The disclosure and use of confidential information by either of us is permitted to the extent required by law or to comply with a party's obligations under this NPD Contract. Where required to disclose a party will where practical give prior written notice before disclosure. No written notice is required where confidential information is being disclosed by you to any contractor installing the Materials on your behalf, to any councils or other utilities companies solely for the purposes of consents and planning utilities corridors or by Chorus to our service companies.

Disputes

34. Any dispute or difference arising out of or in connection with this contract, or the subject matter of this contract, including any question about its existence, validity, or termination, shall be referred to mediation in the first instance and if not resolved, referred to arbitration in accordance with the Arbitration Act 1996. This will not prevent either party from seeking urgent interlocutory or injunctive relief from a Court.

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Assignment

35. You may not assign or novate any of your rights or obligations under this NPD Contract without Chorus' prior written consent (not being unreasonably withheld).

Precedence

36. In the event of conflict or inconsistency between any plans you prepare and provide us and the Chorus Design Plan (as defined in the Policies), the Chorus Design Plan will take precedence. In the event of any conflict or inconsistency between this NPD Contract and the Policies, this NPD Contract will take precedence.

General

37. Each notice or other communication will be made in writing and brought to the attention of the other party. No notice or communication will be effective until received.

38. In the event that any personal information (as that term is defined in the Privacy Act 2020) about you is disclosed to Chorus under or in relation to this NPD Contract, the use, disclosure and security of, and your access to, that information, will be as set out in our Privacy Policy, which can be found at https://www.chorus.co.nz/terms-and-conditions/our-privacy-policy.

39. You warrant you are acquiring the Services as a business in the course of trade and represent you are not a consumer.

40. Other than updates to the Policies as per clause 12 above, any amendment to this NPD Contract must be agreed by both parties and recorded in writing.

41. Clauses 7, 12, 18, 19, 22, 25 to 33 and 45 and the NPD Policies will survive termination or expiry of this NPD Contract.

42. No term or condition of the NPD Contract will be deemed to have been waived in part or in full and no delay, breach or default will be deemed to have been excused in part or in full unless the waiver or excuse is in writing and signed by an authorised representative of the relevant party.

43. Unless you have entered into a separate developer partnership agreement which refers to and incorporates the terms of this NPD Contract, this NPD Contract represents the entire agreement between the parties for the Services and supersedes all prior negotiations, representations, and agreements whether written or oral.

44. Each term in this NPD Contract is separately binding. If for any reason either of us cannot rely on any term then all the other terms remain binding.

45. This NPD Contract is governed by the laws of New Zealand. We both submit to the non-exclusive jurisdiction of the Courts of New Zealand.

MCDONALD'S RESTAURANTS NZ LTD
PROPOSED WANAKA RESTAURANT
INFRASTRUCTURE REPORT

PROJECT:	Proposed McDonald's Restaurant - Wanaka
PRINCIPAL:	McDonald's Restaurants NZ Limited
OUR REF:	W7173
DATE:	August 2023

REVISION / APPROVAL PANEL

Rev:	Date:	Prepared By:	Reviewed By:	Comments:
0	22/08/23	AT	-	Original issue

CONTENTS

1. SCOPE

This report covers the availability of the below listed infrastructure elements and is intended to accompany a resource consent application (RCA) for a proposed McDonald's restaurant to be located at 237 Wanaka-Luggate Highway, Wanaka

This report describes the following infrastructure elements for the development proposal

- Earthworks
- Stormwater
- Wastewater
- Water Supply
- Network Utility Services (electricity and telecommunications)

Separate transportation and geotechnical reports are included in the RCA.

This report has been prepared on the basis that the subdivision activity described by RM230506 is consented and implemented.

2. PROPOSED INFRASTRUCTURE

2.1 Earthworks

2.1.1 Overview

The topography of the site is generally flat and is currently being used as a laydown and stockpiling area as part of the Mt Iron roundabout construction and State Highway realignment works. The topography is more fully described in the Geosolve geotechnical report (July 2023) prepared for this project.

It is expected that on completion of the roundabout works, the site will be remediated more or less to its former condition.

The earthworks plans contained in **Appendix 1** describes the proposed earthworks for this site.

The proposed quantities are as shown in Table 1 below.

EARTHWORKS QUANTITIES	
Area of earthworks	2,840m²
Strip topsoil to waste offsite. An average depth of 200m has been allowed for.	560m³
Strip unsuitable material and loess to waste offsite. An average depth of 300mm has been allowed for.	840m³
Cut to fill from the underside of the loess layer to the underside of the subgrade. Subgrade has been nominally set at 350mm below design level.	CUT: 375m³ FILL: 275m³
TOTAL EARTHWORKS*	**2050m³**

Table 1: Earthworks Quantities

* The total earthworks exclude building footings and slab as well as carpark and footpath pavement and minor topsoiling of the landscape areas. Service trenching is also excluded.

2.1.2 Environmental Management Plan (EMP)

The QLDC Guidelines for Environmental Management Plans (Page 5) outlines three different categories of EMPs based on the anticipated level of environmental risk. We consider that that the proposed works fall into

the LOW RISK category. Whilst the total area of proposed earthworks is slightly larger than the upper limit for the low risk category (2840m² vs 2500m²), the site is generally flat (<5%), is not located within 50m of a Sensitive Environmental Receptor and the site is easily able to accommodate erosion and sediment controls. Furthermore, the underlying geology is highly permeable so stormwater will readily soak away.

The Geosolve geotechnical report notes at Section 6.2, that some of the soils present are 'moderately erodible' and that sediment controls should be utilised during the earthworks construction. This largely refers to the presence of a loess soil layer below the topsoil however the Geosolve report directs that the loess should be removed. Removing the loess to waste offsite will be undertaken immediately after the topsoil is stripped. This portion of the earthworks construction will be managed by preparing and implementing a sediment and erosion control plan specific to this construction process.

Prior to the commencement of the earthworks, a short form EMP will be prepared as well as a staged erosion and sediment control plan.

2.1.3 Dust Control

Appropriate controls measure such k-line irrigation, limiting exposed surfaces, use of water carts and prompt re-grassing/stabilization of exposed areas will used as necessary to effectively control dust throughout the construction period.

2.2 Stormwater

A stormwater report for this project has been prepared by CGW Consulting Engineers (CGW). Refer to Appendix 2.

CGW conclude that stormwater runoff from the proposed development can be controlled in such a way to comply with the QLDC LDSCoP.

2.2.1 QLDC Flood Modelling Maps

The proposed development has been reviewed against the QLDC Flood Hazard Mapping data that is available online at the following link:

https://experience.arcgis.com/experience/0b39760dc8fe4ddebac30e4ef397d716/page/Page-1/?data_id=dataSource_5-0%3A685499&views=Flooding-Info%2CFlood-Hazard-Map

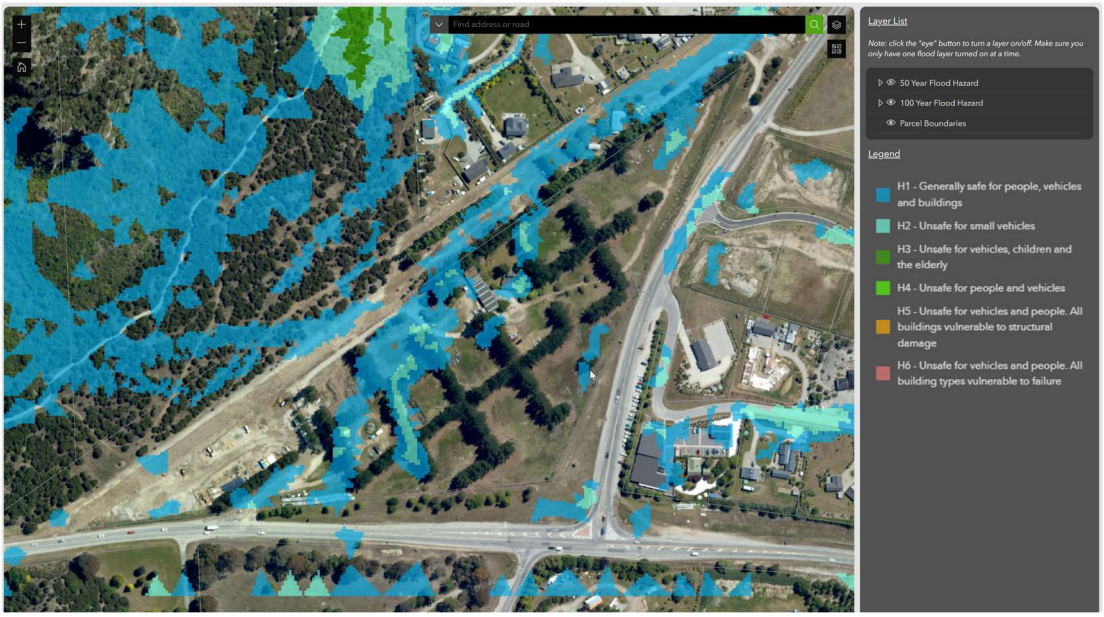

Figure 1: Extract from QLDC Flood Hazard Map

Figure 1 shows that some of the current site, being Lot 5 DP 15016, contains areas of H1 (generally safe for people, vehicles and buildings) and smaller areas of H2 (unsafe for small vehicles) identified in the Flood Hazard Map in a 100-year flood hazard. Similar areas, though to a lesser extent, are identified in the 50-year flood hazard.

The area of the current site that will contain the proposed McDonald's restaurant does not contain any flood hazard areas identified for the wider site. Furthermore, the flood hazard areas identified in these maps relate to the pre-development topography. On completion of the internal roading (for the site wide development i.e. RM230506), future site wide development, internal roading / carparking for the proposed McDonald's restaurant etc, these areas identified as being susceptible to low levels of flooding will be graded out and no longer relevant.

Overall, we do not consider there to be any flood hazard risks associated with the proposed development.

2.2.2 Ownership of Stormwater Assets

All stormwater assets will remain in private ownership.

2.3 Wastewater

2.3.1 Overview

Refer to Sheet 101 in **Appendix 1**. This sheet shows the overall servicing information for this site and the surrounding area.

Lot 2 RM230506, being the site subject to this application, does not have an existing wastewater connection to Council infrastructure. Lot 3 DP 359869, which runs along part of the northwestern edge of Lot 2 RM230506 does contain an existing Ø375mm PVC wastewater gravity main that is owned by QLDC. This wastewater main discharges the Albert Town # 2 pump station located adjacent to the Albert Town – Lake Hawea Road as shown on Sheet 101. Lot 2 RM230506 and Lot 3 DP 359869 are currently owned by the same company (Mt Iron Junction Limited).

The existing Ø375mm in Lot 3 DP 359869 is only around 1m deep and is therefore of limited use to Lot 2 RM230506 not only because it is too shallow but also because the topography in this area grades northwest to southeast i.e., the existing wastewater main is located in an area that is higher than the proposed development.

The most viable wastewater solution to service the proposed development, and the balance of Lot 2 RM230506 in the future, is to construct a new gravity wastewater main along the boundary with the Albert Town – Lake Hawea Road as shown on Sheet 101. This new wastewater main would require a new pump station to be designed and constructed in the northern corner of either Lot 2 RM230506 or Lot 3 DP 359869 since the existing manholes that drain to the Albert Town # 2 pump station are too high to connect to directly from a new gravity wastewater main.

A consent condition requiring that detailed design calculations and plans be provided to QLDC for review and acceptance prior to the commencement of any works required for both a new gravity wastewater main and pump station will be appropriate.

2.3.2 Ownership of Wastewater Assets

The proposal is that all new wastewater assets (gravity wastewater reticulation and pump station) will vest in Council.

2.4 Water Supply

2.4.1 Existing and Proposed Water Supply Network

Refer to Sheet 101 in **Appendix 1**. This sheet shows the overall servicing information for this site and the surrounding area.

On completion of RM230506, Lot 2 RM230506 will be serviced by a DN250 watermain, which in turn is supplied by the newly constructed QLDC owned DN450 trunk main located in reserve and Lot 3 DP 359869 that run along the northwest boundary of the site.

It is proposed that the DN250 will be extended within Lot 2 RM230506 following the alignment of a future road corridor. A DN125 off the DN250 will supply the proposed development site.

A standard water supply backflow preventer and bulk flow meter will be installed at the nominal boundary of the proposed development as shown on Sheet 101 in **Appendix 1**. This will be detailed in accordance with QLDC LDSCoP Appendix B drawing B2-8.

2.4.2 Firefighting

The proposed development is a restaurant building with a footprint of approximately 450m². The proposed building will not have sprinklers fitted therefore the water supply classification per PAS4509:2008 will be FW4.

This assessment is based on PAS4509:2008 Table 1, the floor area of the proposed building and a Fire Hazard Category of FHC 2 (FHC 2 is for crowd activities of <100 people, libraries, book storage, night clubs, restaurants, working / business / storage activities with low fire load such as hairdressers, banks, medical consulting rooms and offices).

PAS4509:2008 Table 2 indicates that a FW4 fire water classification requires a reticulated water supply that provides 50L/s within a distance of 135m of the building, and a further 50L/s within 270m of the building. This required water flow can be sourced from a maximum of 4 hydrants. On completion of RM230506 there will be two hydrants at the intersection of Lots 3 & 5 RM230506 as well as a further hydrant in the northeast corner of Lot 3 RM 230506. An additional hydrant may need to be installed as part of this proposed development however that requirement can be determined at detailed design stage.

The distance from the corner intersection of Lots 3 & 5 RM230506 is only 150m therefore the PAS4509:2008 distance requirements will easily be achieved.

2.4.3 Ownership of Water Supply Assets

The proposal is that all new water supply assets up to and including the bulk flow meter will be owned by QLDC. All assets after the bulk flow meter will remain in private ownership.

2.5 Network Utility Services

2.5.1 Electricity

Aurora have confirmed that an electrical supply is able to be made available to the lots proposed in RM230506. A letter from Aurora confirming this is attached in **Appendix 3**.

2.5.2 Telecommunications

Chorus have confirmed that telecommunications can be made available to the proposed development and a supply contract has been agreed, a copy of which is attached in **Appendix 4**.

Alex Todd
Principal, MS+SNZ
Paterson Pitts Limited Partnership

Appendix 1: PPG – Engineering Drawings

237 WANAKA - LUGGATE HIGHWAY, WANAKA - ENGINEERING DRAWINGS

CLIENT:	MCDONALD'S RESTAURANTS NZ LTD	**PPG JOB NUMBER:**	W7173							
PROJECT NAME:	237 WANAKA - LUGGATE HIGHWAY, WANAKA	**DAY**	22	23						
		MONTH	08	08						
		YEAR	2023	2023						
SHEET NO.	**SHEET TITLE**	**DRAWING REVISIONS**								
100	INDEX SHEET	0	1							
101	OVERVIEW SERVICING PLAN	0	1							
200	EXISTING CONTOURS	0	0							
201	PROPOSED CONTOURS	0	0							
202	CUT/FILL CONTOURS	0	0							
203	EARTHWORKS CROSS SECTIONS	0	0							
DISTRIBUTION:										
MCDONALD'S RESTAURANTS NZ LIMITED		1	1							
CONSULTANTS TEAM										
QUEENSTOWN LAKES DISTRICT COUNCIL										
CONTRACTOR										
REASONS FOR ISSUE:		P	P							
DRAWING SIZE:		A3	A3							
MEDIA:		PDF	PDF							

A = APPROVAL D = DESIGN X = PRICING I = INFORMATION P = PRELIMINARY
C = CONSTRUCTION T = TENDER Y = CONSENT R = REQUESTED E = DXF OR DWG

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E wanaka@ppgroup.co.nz

Client & Location:

MCDONALD'S RESTAURANTS NZ LTD

237 WANAKA-LUGGATE HIGHWAY
WANAKA

Purpose & Drawing Title:

ENGINEERING DRAWINGS

INDEX SHEET

PRELIMINARY

Surveyed by:	-	Original Size:	Scale:		
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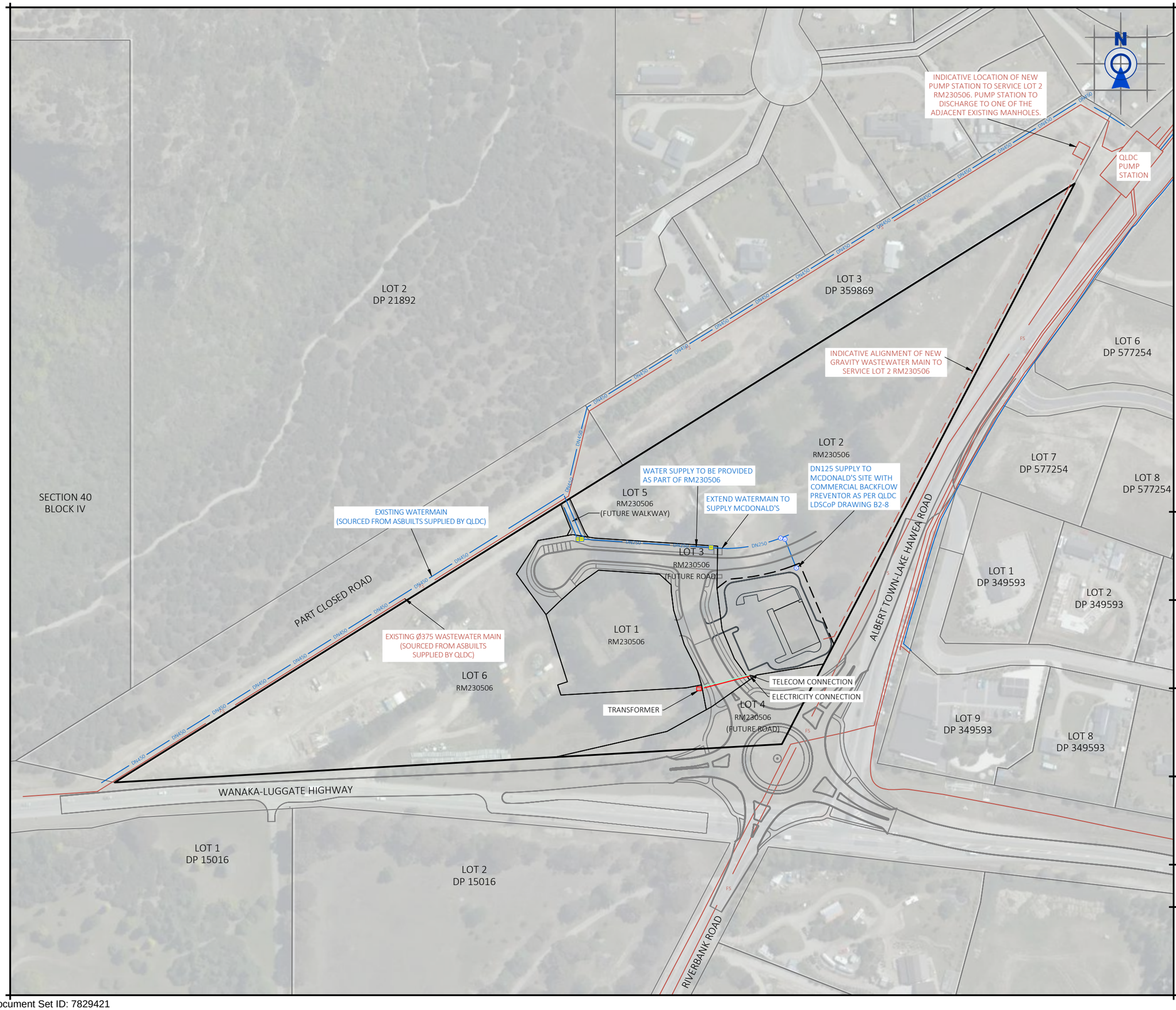
Drawn by:	LJB				
Checked by:	AGT				
Approved by:	AGT		DO NOT SCALE		
Job No:	Drawing No:	Sheet No:	Revision No:	Date:	
W7173	001	100	1	23/08/2023	



NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.

LEGEND

- KERBS
- PROPOSED BUILDING FOOTPRINT
- EXISTING BOUNDARY
- PROPOSED BOUNDARIES RM230506
- NOTIONAL FUTURE SITE BOUNDARY
- EXISTING FOULSEWER MAIN
- EXISTING WATER SUPPLY MAIN
- WATER HYDRANT
- WATER VALVE
- POWER
- TRANSFORMER
- TELECOM

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Client & Location:

MCDONALD'S RESTAURANTS NZ LTD

237 WANAKA-LUGGATE HIGHWAY
WANAKA

Purpose & Drawing Title:

ENGINEERING DRAWINGS

OVERVIEW SERVICING PLAN

PRELIMINARY

Surveyed by:	-	Original Size:	Scale:	
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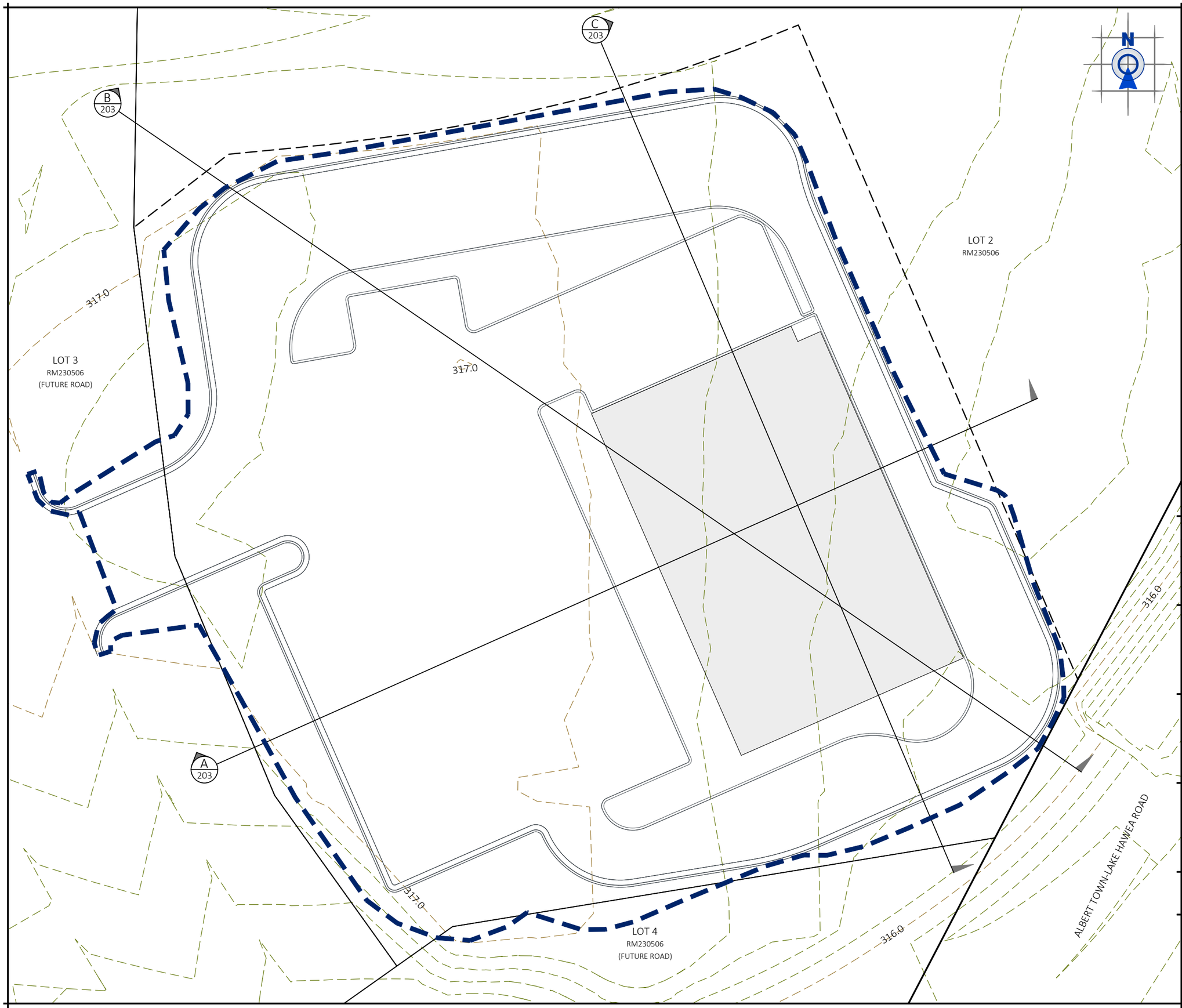

NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.

2. EXISTING CONTOURS SHOWN ARE A COMBINED DESIGN SURFACE FROM THE UNDERLYING DEVELOPMENT RM230506 AND NZTA ROUNDABOUT WORKS

LEGEND

- EXISTING CONTOURS MINOR (0.2m INTERVAL)
- EXISITING CONTOURS MAJOR (1.0m INTERVAL)
- EXTENTS OF EARTHWORKS
- KERBS
- PROPOSED BUILDING FOOTPRINT
- EXISTING BOUNDARY
- PROPOSED BOUNDARIES RM230506
- NOTIONAL FUTURE SITE BOUNDARY

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Client & Location:

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237 WANAKA-LUGGATE HIGHWAY
WANAKA

Purpose & Drawing Title:

ENGINEERING DRAWINGS

EXISTING CONTOURS

PRELIMINARY

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Checked by:	AGT		DO NOT SCALE	
Approved by:	AGT			
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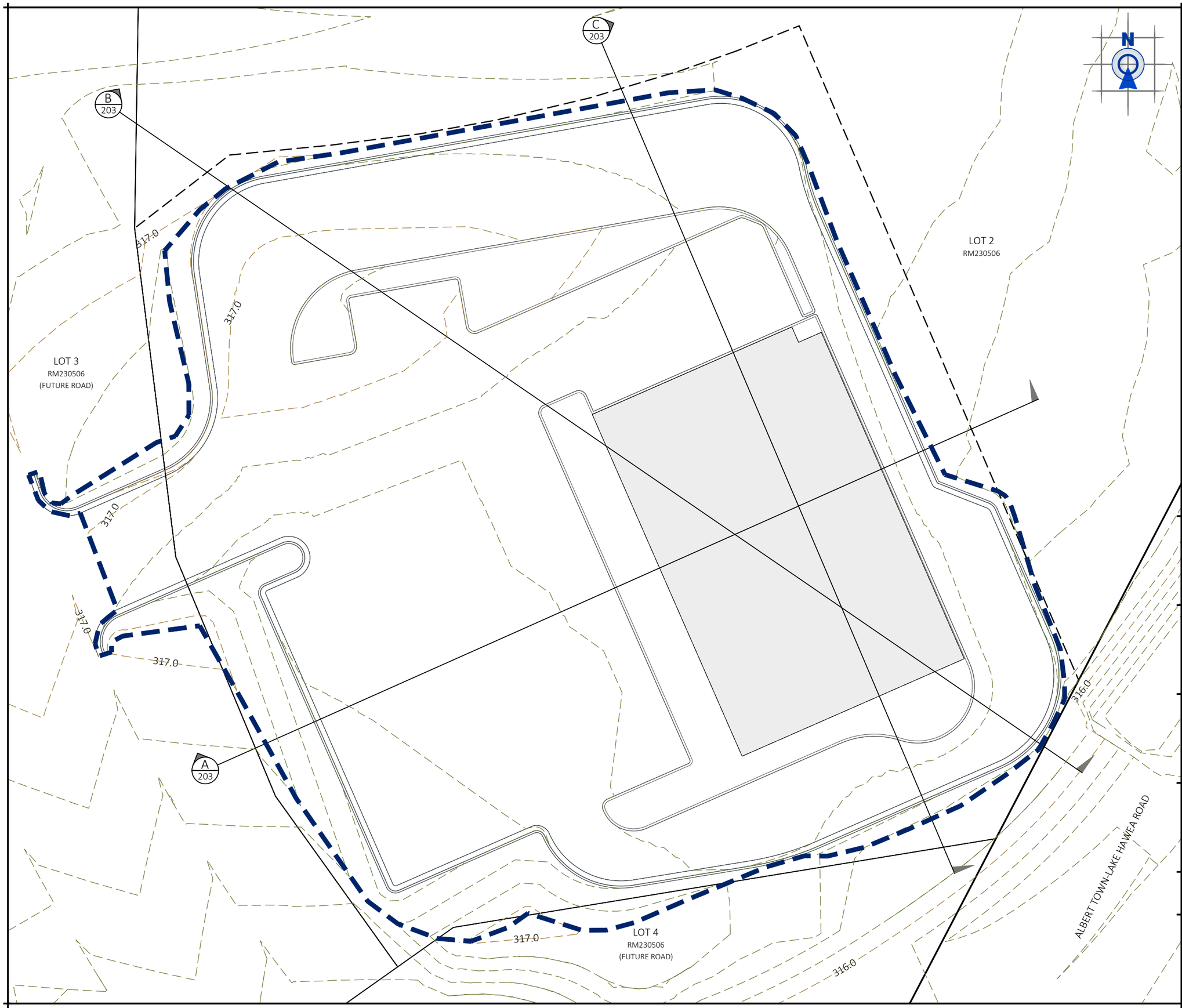

NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.

LEGEND

- PROPOSED CONTOURS MINOR (0.2m INTERVAL)
- PROPOSED CONTOURS MAJOR (1.0m INTERVAL)
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Purpose & Drawing Title:

ENGINEERING DRAWINGS

PROPOSED CONTOURS

PRELIMINARY

Surveyed by:	-	Original Size:	Scale:	
Designed by:	PPG	A3	1:250	
Drawn by:	LJB			
Checked by:	AGT		DO NOT SCALE	
Approved by:	AGT			
Job No:	Drawing No:	Sheet No:	Revision No:	Date:
W7173	001	201	0	23/08/2023

EARTHWORKS QUANTITIES

AREA OF EARTHWORKS	2,840m²
STRIP TOPSOIL TO WASTE OFFSITE (ALLOWED AVERAGE DEPTH OF 200mm)	560m³
STRIP INSUITABLE MATERIAL AND LOESS TO WASTE OFFSITE (ALLOWED AVERAGE DEPTH OF 300mm)	840m³
CUT TO FILL FROM UNDERSIDE OF LOESS TO SUBGRADE (NOMINALLY 350mm BELOW DESIGN RL)	CUT : 375m³ FILL : 275m³
TOTAL EARTHWORKS (EXCLUDNG BUILDING FOOTINGS/SLAB, CARPARK AND FOOTPATH PAVEMENTS AND MINOR TOP SOILING OF GARDEN AREAS)	2050m³

NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.
2. MAXIMUM CUT DEPTH 0.9m
   MAXIMUM FILL DEPTH 0.4m
3. CUT-FILL DEPTHS ARE FROM PRE MOUNT IRON JUNCTION ROUNDABOUT SURFACE TO DESIGN SURFACE

LEGEND

CUT
- 3.0m +
- 2.5m to 3.0m
- 2.0m to 2.5m
- 1.5m to 2.0m
- 1.0m to 1.5m
- 0.5m to 1.0m
- 0.25m to 0.5m
- 0.0m to 0.25m

FILL
- 0.0m to 0.25m
- 0.25m to 0.5m
- 0.5m to 1.0m
- 1.0m to 1.5m
- 1.5m to 2.0m
- 2.0m to 2.5m
- 2.5m to 3.0m
- 3.0m +

- KERBS
- EXISTING BOUNDARY
- PROPOSED BOUNDARIES RM230506
- NOTIONAL FUTURE SITE BOUNDARY
- DEPTH CONTOURS (AT 0.5m INTERVALS)
- EXTENTS OF POSSIBLE UNDERCUT

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E wanaka@ppgroup.co.nz

Client & Location:

MCDONALD'S RESTAURANTS NZ LTD

237 WANAKA-LUGGATE HIGHWAY
WANAKA

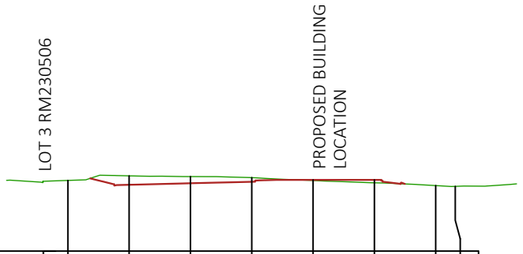
Purpose & Drawing Title:

ENGINEERING DRAWINGS

CUT/FILL CONTOURS

PRELIMINARY

Surveyed by:	-	Original Size:	Scale:	
Designed by:	PPG	A3	1:250	
Drawn by:	LJB			
Checked by:	AGT		DO NOT SCALE	
Approved by:	AGT			
Job No:	Drawing No:	Sheet No:	Revision No:	Date:
W7173	001	202	0	23/08/2023

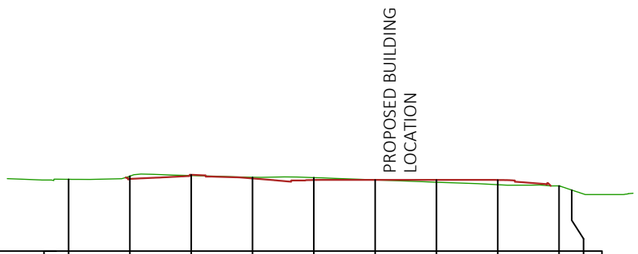


DATUM RL 311.0									
DESIGN SURFACE		316.40	316.52	316.64	316.80	316.80			
-CUT / +FILL TO DESIGN		-0.7	-0.5	-0.3	0.1	0.2			
NATURAL SURFACE	316.75	317.13	317.07	316.98	316.75	316.56	316.33	316.27	
CHAINAGE	0	10	20	30	40	50	60	63	

EARTHWORKS CROSS SECTION A

A3 HORZ SCALE 1:1000

A3 VERT SCALE 1:500

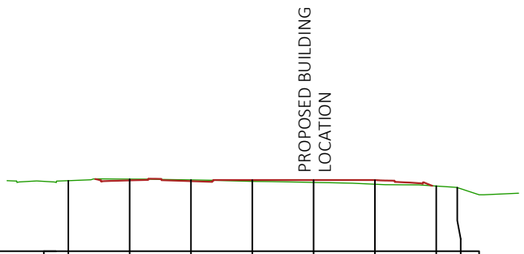


DATUM RL 311.0										
DESIGN SURFACE		316.87	317.21	316.92	316.79	316.80	316.80	316.79		
-CUT / +FILL TO DESIGN		-0.2	0.1	-0.1	-0.2	0	0.2	0.4		
NATURAL SURFACE	316.84	317.10	317.15	317.01	316.98	316.80	316.60	316.40	316.31	315.97
CHAINAGE	0	10	20	30	40	50	60	70	80	82

EARTHWORKS CROSS SECTION B

A3 HORZ SCALE 1:1000

A3 VERT SCALE 1:500



DATUM RL 311.0									
DESIGN SURFACE		316.77	316.71	316.80	316.80	316.80			
-CUT / +FILL TO DESIGN		-0.1	-0.1	0.1	0.2	0.3			
NATURAL SURFACE	316.75	316.87	316.81	316.69	316.61	316.46	316.31	316.18	
CHAINAGE	0	10	20	30	40	50	60	63	

EARTHWORKS CROSS SECTION C

A3 HORZ SCALE 1:1000

A3 VERT SCALE 1:500

NOTES

1. LEVELS ARE IN TERMS OF DUNEDIN VERTICAL DATUM 1958.

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Client & Location:

MCDONALD'S RESTAURANTS NZ LTD

237 WANAKA-LUGGATE HIGHWAY
WANAKA

Purpose & Drawing Title:

ENGINEERING DRAWINGS

EARTHWORKS CROSS SECTIONS

PRELIMINARY

Surveyed by:	-	Original Size:	Scale:	
Designed by:	PPG	A3	1:1,000 Hz	
Drawn by:	LJB			
Checked by:	AGT		DO NOT SCALE	
Approved by:	AGT			
Job No:	Drawing No:	Sheet No:	Revision No:	Date:
W7173	001	203	0	23/08/2023

Appendix 2: CGW – Stormwater Design Report

CGW Ref: 230374-LET-C-001-A
Date: 2 August 2023

Paterson Pitts Limited Partnership
19 Reece Crescent

Wanaka
Attention: Alex Todd

Dear Alex,

RE: 230374 – McDonalds Wanaka – Mt Iron Junction

1. Introduction

CGW Consulting Engineers have been engaged by the client (Paterson Pitts Group) to provide a stormwater attenuation design for the proposed McDonalds development located at the new Mt Iron Junction development.

The purpose of this design is to support a resource consent application to Queenstown Lakes District Council (QLDC) and show that the development can meet the stormwater requirements of the QLDC Land Development and Subdivision Code of Practice (LDSCoP).

We have referred to the resource consent plans provided by the client, and proposed layout and site levels from Paterson Pitts Group (PPG) for this design assessment.

Our limitations are attached in Appendix A.

1.1 Background

The development consists of the construction of a new restaurant building, parking areas, drive through lanes, footpaths, and a loading bay to support the new proposed restaurant building.

There is no existing QLDC stormwater network available in this area. Therefore, stormwater runoff from new hardstanding areas will be required to discharge to ground via soak pits.

Previous geotechnical testing has been carried out by Geosolve, detailed in their report dated March 2018. This report includes the results of soakage testing carried out within the proposed restaurant location. The results show that soakage conditions are favourable, with a recommended unfactored rate of 720 mm/hr.

The development will have greater than 10 carparks, so as per section 4.2.8 of the LDSCoP a stormwater treatment device is required to provide treatment for the water quality flow from all hardstanding pavement areas.

2. Design

2.1 Design Parameters

Table 1 below provides the design parameters used for the design of the soak pits.

Table 1 - Design Inputs

Input	Note	Source
Catchments	Roof: 445 m^2 (C: 0.90) Hardstand: 1876 m^2 (C: 0.85) Landscaping: 697 m^2 (C: 0.30)	Supplied Plans from Client C values from NZBC E1
Infiltration Rate	720 mm/hr reduced to 360 mm/hr to allow for loss of performance over time.	Soakage testing carried out by Geosolve near the proposed building location
1% AEP 2-hour design intensity used in calculations	23.0 mm/hr (2-hour)	NIWA HIRDS V4 RCP8.5 2081 - 2100

No slope correction factors have been applied to the C-values shown above. A time of concentration of 10 minutes has been used for peak runoff dues to the compact nature of the site. Soakpits have been assessed across a range of durations to identify the critical duration of the soakpits.

2.2 Pre and Post Development Stormwater Runoff

The proposed development includes a significant increase in hardstanding area, as there is no QLDC stormwater network in the vicinity of the site, and the high permeability of the underlying gravels, we have designed the soak pits to cater for the 100-year rainfall event.

Tertiary flow paths have been provided in the event that the system becomes blocked or its capacity is exceeded. Tertiary flow paths discharge from site at the two low points located at the south-eastern and south-western corners of the site.

2.3 Stormwater Layout

Two separate networks have been proposed for the site.

The first network is located to the North East for clean runoff from new restaurant roof areas only. Runoff from new building downpipes will be directed to a soakpit along the North East boundary.

The second stormwater network is proposed for runoff from the remainder of the site, including trafficable hardstanding areas. This system will comprise of stormwater sumps located in the low points of the kerb and channels, a stormwater treatment device, and soakpit located under the proposed new carpark.

2.4 Pipework Design

An indicative stormwater pipe network has been shown in drawing 230374-DWG-C-01-01-A. Detailed design of the stormwater pipework will be required in the future detailed design phase. Detailed pipework design will be undertaken in accordance with NZBC E1 and the QLDC LDSCoP.

Stormwater pipework will be designed for a 1% AEP event to match the soakpit design event.

From our concept design, the peak flow rate to soakpit 1 is approx. 32.9 L/s and the peak runoff to soakpit 2 is approx. 7.3 L/s.

2.5 Stormwater Treatment

As per local best practice a water quality flow (WQF) of 10mm/hr has been adopted.

In a WQF event, the peak flow rate from impervious hardstanding areas is approx. 5.0 L/s.

The proposed SPEL Vortceptor treatment device can treat a maximum water quality flow rate of 26 Litres/second. The bypass flow capacity of this device is 280 L/s therefore the treatment device has sufficient capacity both for the treatment flows and peak flows.

Alternative treatment options include Hynds UpFlo modules (4 cartridges) and a Stormwater360 Jellyfish device (2 cartridges).

The final selection of the treatment device and specification will be confirmed during the detailed design phase.

2.6 Soakage Design

Two separate soakage devices have been designed to cater to all rainfall events up to and including the 100-year ARI. The larger soakage device will receive the surface runoff from all of the pavement, landscaping and footpath areas with a total area of 2,573 m^2 and a C-value of 0.7. This soakage device will include a SPEL Vortceptor treatment device (or similar) to treat the water quality flow including oil and grease treatment. The larger soak pit will be placed centrally within the main car park at a

depth allowing trafficable loads above. Due to space constraints, it is proposed that the soak pit will be constructed utilizing proprietary devices with a void ratio of 95% such as Rain Smart modules or Flo-Vault systems. The soak pit must be trafficable and will therefore require increased cover as well as geogrid reinforcement of backfill layers above the device in accordance with the suppliers' requirements.

The second soak pit will service the roof area with an area of 445 m^2 and a C-value of 0.9 and is proposed to be placed along the north-eastern boundary of the site within the proposed landscaping area. This soakage device will treat the runoff from the prosed building roof and therefore will not need to pass through a treatment device first. This second soak pit will also utilize proprietary devices with 95% void ratio due to site size constraints. However, this soak pit does not need to be trafficable as it's in the landscaped berm, however consideration will need to be made to potential side loading from the drive through lane.

3. Conclusion

Our concept stormwater design assessment indicates that the stormwater from the proposed development can comply with the QLDC LDSCoP requirements.
Previous testing by others indicates that the underlying soils at the site are suitable for stormwater discharge to ground via soakpits.
It is proposed to discharge stormwater for all events up to and including the 1% AEP event to ground utilizing two separate soak pits constructed using proprietary chambers to achieve high void ratios. Indicative catch pits locations and a water quality treatment device sizing has been assessed as part of this preliminary concept design. The findings of this preliminary concept design will need to be confirmed and detailed further during future detailed design phases.

Yours faithfully,

Prepared by

Cameron Tulett

Civil Engineer

BE (Civil), MEngNZ

Reviewed

P.P.

Nathan Borger

Senior Civil Engineer

BEngTech, MEngNZ

Appendix A. Limitations

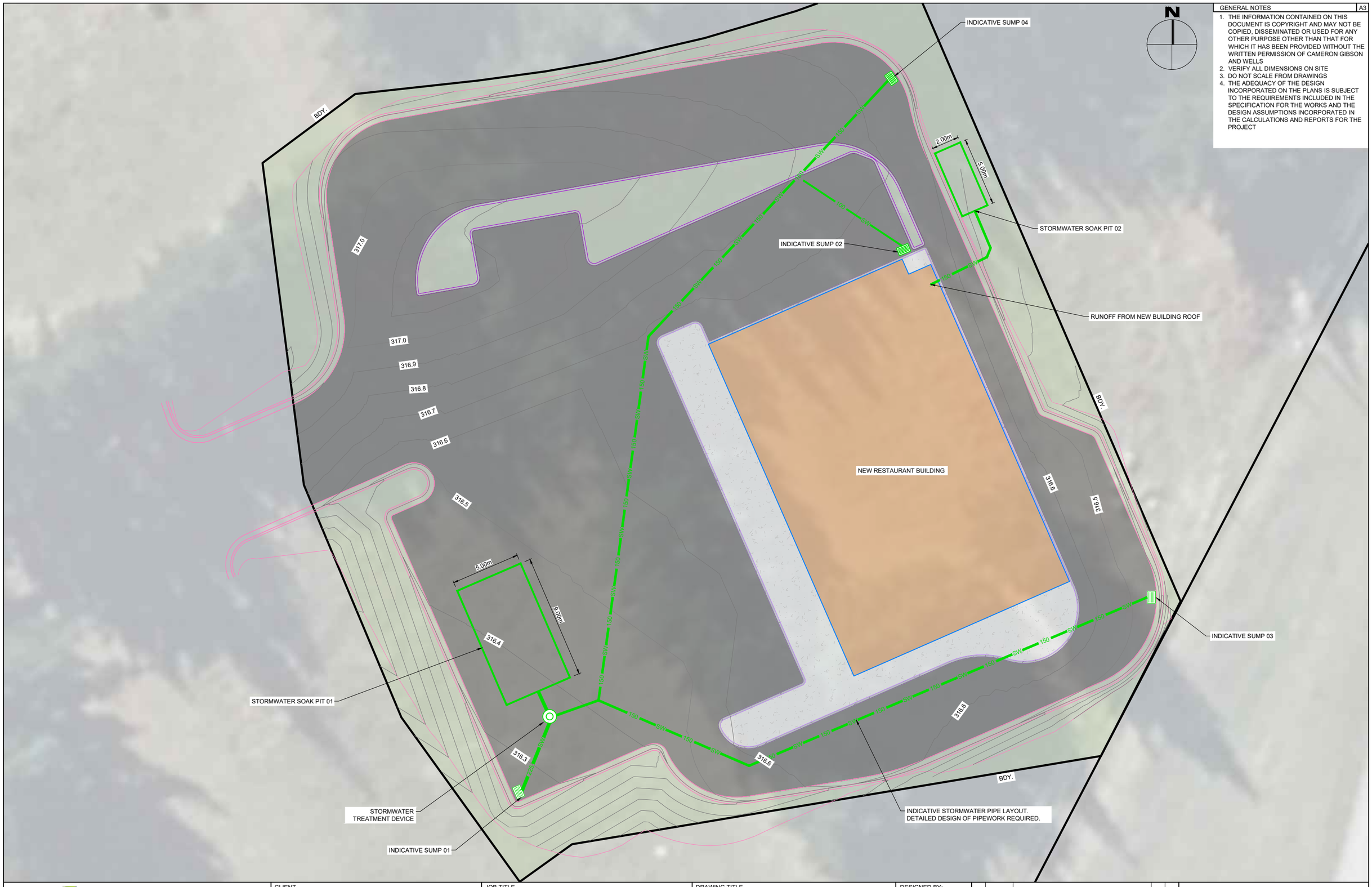
This report has been prepared solely for the benefit of our client, Paterson Pitts Group, as per our brief and an agreed consultancy agreement. The reliance by any other parties on the information or opinions contained in this report shall, without our prior agreement in writing, be at such parties' sole risk.

The conclusions and recommendations contained within this report are based on the investigations as described in detail above. Defects and unforeseen ground conditions may remain undetected which might adversely affect the stability of the site and the recommendation made herein.

This report has been prepared solely to address the issues raised in our brief and shall not be relied on for any other purpose.

In the event the third-party investigation data has been provided to us, the client acknowledges that we have placed reliance on this information to produce our report and CGW will accept no liability resulting from any errors or defects in the third-party data provided to us.

Appendix B. Concept Stormwater Layout



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www.cgwl.co.nz • office@cgwl.co.nz • Tel: +64 3 548 8259

CLIENT: PATERSON PITTS LIMITED PARTNERSHIP

JOB TITLE: NEW RESTAURANT IN WANAKA

DRAWING TITLE: STORMWATER DISCHARGE LAYOUT

DESIGNED BY: CAMERON TULETT

DRAFTED BY: CAMERON TULETT

REV	DATE	REVISION	CHD	APD
A	01.08.23	FIRST ISSUE		

RESOURCE CONSENT

SCALE	SIZE
1:250 A3	A3

PROJECT NO	TYPE	SHEET	REV
230374	DWG	C-01-01	A

Original Sheet Size A3 (420x297) File Path: C:\12dS\data\APP-SERVER\230374 - New Restaurant in Wanaka_139415 - Drawings\CAD\230374-DWG-C-01-01-A - Overall Plan.dwg - CGW A3

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CLIENT: PATERSON PITTS LIMITED PARTNERSHIP

JOB TITLE: NEW RESTAURANT IN WANAKA

DRAWING TITLE: CONCEPT CATCHMENT PLAN

DESIGNED BY: CAMERON TULETT

DRAFTED BY: CAMERON TULETT

REV	DATE	REVISION	CHD	APD
A	01.08.23	FIRST ISSUE		

RESOURCE CONSENT

SCALE	SIZE
1:250 A3	A3

PROJECT NO	TYPE	SHEET	REV
230374	DWG	C-01-01	A

Original Sheet Size A3 (420x297) File Path: C:\12dS\data\APP-SERVER\230374 - New Restaurant in Wanaka_139415 - Drawings\CAD\230374-DWG-C-05-01-A - Catchment Plan.dwg - CGW A3

Appendix C. Concept Stormwater Calculations

Job Number	230374	**Prepared by**	CT
Job Name	New Restaurant	**Reviewed by**	NB
Calc Purpose	BC	**Date**	2/08/2023

Soakage Device Calculator

Key: Input | Design Variable | Calculation | Output | Check Cell

Good | Neutral | Bad | Warning | *Explanatory*

Results

Sufficient storage for primary flow? **Yes** *for a 100 year, 120-minute duration storm event*

Design Variables

Device Type	Proprietary	
Void Ratio	0.95	*per product literature*
Reduction for loss of performance	0.5	
Soakage Device Length	9.00m	
Soakage Device Width	5.00m	
Soakage Device Depth	1.32m	

Inputs

Table 1 - Catchment Areas and Parameters

Sub-Catchment Description	Abbrev	Runoff Coeff (C)	Area (A)	CA	Primary CIA	Secondary CIA	Predeveloped C
Roof	**Aroof**	0.90	0.0m²	**0.0**	**0.0m³**	**0.0m³**	0.30
Hardstand	**Ahard**	0.85	1876.0m²	**1594.6**	**73.4m³**	**42.4m³**	0.30
Permeable	**Aperm**	0.50	0.0m²	**0.0**	**0.0m³**	**0.0m³**	0.00
Grassed	**Agrass**	0.30	697.0m²	**209.1**	**9.6m³**	**5.6m³**	0.30
Total	**Atotal**	**0.70**	**2573.0m²**	**1803.7**	**83.0m³**	**48.0m³**	**0.30**

Rainfall data inputs located at the end of the spreadsheet

Tested Soakage Rate Sr: 720mm/hr *From previous infiltration testing on the site*

Calculations for Primary Flow Assessment - NZBC E1/VM1 Soakage Device Design

Annual Recurrence Interval	ARI	100 years	
Duration (mins)		**120 mins**	*60min max for NZBC, Critical Storm of 120 min is from table 3 below*
Design intensity	I	**23.0mm/hr**	*NIWA HIRDSv4 - RCP8.5 2081-2100*
Runoff to soak pit	Rc	**82.97m³**	
Area of soak pit	Asp	**45m²**	
Design soakage rate	Srd	**360mm/hr**	
Volume disposed by soak pit by duration	Vsoak	**32.40m³**	*Asp x Srd / 1000 x duration*
Volume of storage required in soak pit	Vstor Req	**50.57m³**	*Rc - Vsoak*
Volume of storage provided in soak pit	Vstor Pro	**56.43m³**	*Length x Width x Depth x Void Ratio. Must be greater than Vstor Req*

Primary Flow - Soakage Sizing for all Storm Events

v4. Volumes greater than the soakpit volume will be highlighted in red. Green box shows NZBC requirement of 10 year ARI up to 60 minutes.

Table 4 - Data Table Assessment of Volume Required in Soakpit

Pre Development Runoff	50.6m³	Duration 10	20	30	60	120	360	720	1440	2880	4320	5760	7200
ARI	**1.58**	2.771	3.07739	2.903	1.18767	-5.49	-46.3	-122	-291	-654	-1029	-1409	-1792
	2	3.463	4.09949	4.255	3.27996	-2.31	-40.8	-115	-281	-642	-1016	-1396	-1779
	5	6.018	7.88726	9.035	10.4948	8.364	-21.7	-88.6	-248	-602	-972	-1351	-1733
	10	8.122	10.9535	12.91	16.2666	17.02	-7.05	-69.1	-223	-572	-940	-1318	-1699
	20	10.44	14.3205	17.15	22.5796	26.04	8.641	-48.3	-198	-541	-908	-1285	-1667
	30	11.94	16.4849	19.86	26.5477	31.81	18.6	-35.7	-182	-523	-888	-1264	-1647
	40	13.05	18.1082	21.84	29.4336	35.78	25.09	-26.2	-171	-510	-874	-1250	-1632
	50	13.98	19.4309	23.46	31.7784	39.39	31.58	-19.1	-162	-499	-864	-1238	-1621
	60	14.74	20.5132	24.82	33.7625	42.27	35.91	-12.8	-154	-491	-853	-1230	-1613
	80	16.03	22.3169	27.07	37.0092	46.96	43.49	-3.06	-142	-476	-840	-1216	-1598
	100	17.02	23.7598	28.88	39.5343	50.57	49.98	4.945	-133	-466	-829	-1204	-1587
	250	21.53	30.1329	36.72	50.7173	66.08	74.87	37.2	-93.6	-422	-783	-1157	-1539

Source Rainfall Data

HIRDS V4 Intensity-Duration-Frequency Results

Site name:	Custom Location
Coordinate system:	WGS84
Longitude:	169.1705
Latitude:	-44.6959

DDF Model

Parameters:	c	d	e	f	g	h	i
Values:	-0.01402	0.657	-0.00475	-0.01	0.286	-0.01	1.999

Table 5 - Rainfall Intensities (mm/hr) from HIRDSv4 :: RCP8.5 for the period 2081-2100

ARI	AEP	10	20	30	60	120	360	720	1440	2880	4320	5760	7200
1.58	**0.633**	18.2	14.1	12.2	9.64	7.46	4.7	3.33	2.26	1.43	1.06	0.843	0.7
2	**0.5**	20.5	15.8	13.7	10.8	8.34	5.21	3.69	2.48	1.57	1.16	0.922	0.763
5	**0.2**	29	22.1	19	14.8	11.3	6.98	4.89	3.25	2.03	1.5	1.18	0.973
10	**0.1**	36	27.2	23.3	18	13.7	8.33	5.79	3.82	2.38	1.74	1.37	1.13
20	**0.05**	43.7	32.8	28	21.5	16.2	9.78	6.75	4.41	2.73	1.99	1.56	1.28
30	**0.033**	48.7	36.4	31	23.7	17.8	10.7	7.33	4.77	2.94	2.14	1.68	1.37
40	**0.025**	52.4	39.1	33.2	25.3	18.9	11.3	7.77	5.04	3.09	2.25	1.76	1.44
50	**0.02**	55.5	41.3	35	26.6	19.9	11.9	8.1	5.24	3.22	2.33	1.83	1.49
60	**0.017**	58	43.1	36.5	27.7	20.7	12.3	8.39	5.42	3.31	2.41	1.88	1.53
80	**0.012**	62.3	46.1	39	29.5	22	13	8.84	5.7	3.48	2.51	1.96	1.6
100	**0.01**	65.6	48.5	41	30.9	23	13.6	9.21	5.92	3.6	2.6	2.03	1.65
250	**0.004**	80.6	59.1	49.7	37.1	27.3	15.9	10.7	6.82	4.11	2.95	2.3	1.87

Job Number	230324	**Prepared by**	CT
Job Name	12 Tomtit Crescent, Hawea	**Reviewed by**	NB
Calc Purpose	BC	**Date**	2/08/2023

Soakage Device Calculator

Key: Input | Design Variable | Calculation | Output | Check Cell
Good | Neutral | Bad | Warning | *Explanatory*

Results

Sufficient storage for primary flow? **Yes** *for a 100 year, 360-minute duration storm event*

Design Variables

Device Type	Proprietary	
Void Ratio	0.95	*per product literature*
Reduction for loss of performance	0.5	
Soakage Device Length	5.00m	
Soakage Device Width	2.00m	
Soakage Device Depth	1.32m	

Inputs

Table 1 - Catchment Areas and Parameters

Sub-Catchment Description	Abbrev	Runoff Coeff (C)	Area (A)	CA	Primary CIA	Secondary CIA	Predeveloped C
Roof	**Aroof**	0.90	445.0m²	400.5	32.7m³	10.7m³	0.30
Hardstand	**Ahard**	0.85	0.0m²	0.0	0.0m³	0.0m³	0.30
Permeable	**Aperm**	0.50	0.0m²	0.0	0.0m³	0.0m³	0.00
Grassed	**Agrass**	0.30	0.0m²	0.0	0.0m³	0.0m³	0.30
Total	**Atotal**	0.90	445.0m²	400.5	32.7m³	10.7m³	0.30

Rainfall data inputs located at the end of the spreadsheet

Tested Soakage Rate Sr: 720mm/hr *From previous infiltration testing on the site*

Calculations for Primary Flow Assessment - NZBC E1/VM1 Soakage Device Design

Annual Recurrence Interval	ARI	100 years	
Duration (mins)		360 mins	*60min max for NZBC, Critical Storm of 120 min is from table 3 below*
Design intensity	I	13.6mm/hr	*NIWA HIRDSv4 - RCP8.5 2081-2100*
Runoff to soak pit	Rc	32.68m³	
Area of soak pit	Asp	10m²	
Design soakage rate	Srd	360mm/hr	
Volume disposed by soak pit by duration	Vsoak	21.60m³	*Asp x Srd / 1000 x duration*
Volume of storage required in soak pit	Vstor Req	11.08m³	*Rc - Vsoak*
Volume of storage provided in soak pit	Vstor Pro	12.54m³	*Length x Width x Depth x Void Ratio. Must be greater than Vstor Req*

Primary Flow - Soakage Sizing for all Storm Events

v4. Volumes greater than the soakpit volume will be highlighted in red. Green box shows NZBC requirement of 10 year ARI up to 60 minutes.

Table 4 - Data Table Assessment of Volume Required in Soakpit

Pre Development Runoff	11.1m³	Duration 10	20	30	60	120	360	720	1440	2880	4320	5760	7200
ARI	1.58	0.615	0.68235	0.643	0.26082	-1.22	-10.3	-27.2	-64.7	-145	-229	-313	-398
	2	0.768	0.9093	0.943	0.7254	-0.52	-9.08	-25.5	-62.6	-143	-226	-310	-395
	5	1.336	1.75035	2.005	2.3274	1.851	-4.83	-19.7	-55.2	-134	-216	-300	-385
	10	1.803	2.4312	2.866	3.609	3.774	-1.58	-15.4	-49.7	-127	-209	-293	-378
	20	2.317	3.1788	3.807	5.01075	5.776	1.901	-10.8	-44	-120	-202	-286	-370
	30	2.651	3.6594	4.408	5.89185	7.058	4.112	-7.97	-40.6	-116	-197	-281	-366
	40	2.898	4.01985	4.848	6.53265	7.939	5.554	-5.86	-38	-113	-194	-278	-363
	50	3.105	4.31355	5.209	7.0533	8.74	6.996	-4.27	-36	-111	-192	-275	-360
	60	3.272	4.55385	5.509	7.49385	9.381	7.957	-2.88	-34.3	-109	-190	-273	-358
	80	3.559	4.95435	6.01	8.21475	10.42	9.639	-0.71	-31.6	-106	-187	-270	-355
	100	3.779	5.27475	6.41	8.77545	11.22	11.08	1.063	-29.5	-104	-184	-268	-353
	250	4.78	6.68985	8.152	11.2586	14.67	16.61	8.224	-20.8	-93.8	-174	-257	-342

Source Rainfall Data

HIRDS V4 Intensity-Duration-Frequency Results

Site name:	Custom Location							
Coordinate system:	WGS84							
Longitude:	169.1705							
Latitude:	-44.6959							
DDF Model	Parameters:	c	d	e	f	g	h	i
	Values:	-0.01402	0.657	-0.00475	-0.01	0.286	-0.01	1.999

Table 5 - Rainfall Intensities (mm/hr) from HIRDSv4 :: RCP8.5 for the period 2081-2100

ARI	AEP	10	20	30	60	120	360	720	1440	2880	4320	5760	7200
1.58	**0.633**	18.2	14.1	12.2	9.64	7.46	4.7	3.33	2.26	1.43	1.06	0.843	0.7
2	**0.5**	20.5	15.8	13.7	10.8	8.34	5.21	3.69	2.48	1.57	1.16	0.922	0.763
5	**0.2**	29	22.1	19	14.8	11.3	6.98	4.89	3.25	2.03	1.5	1.18	0.973
10	**0.1**	36	27.2	23.3	18	13.7	8.33	5.79	3.82	2.38	1.74	1.37	1.13
20	**0.05**	43.7	32.8	28	21.5	16.2	9.78	6.75	4.41	2.73	1.99	1.56	1.28
30	**0.033**	48.7	36.4	31	23.7	17.8	10.7	7.33	4.77	2.94	2.14	1.68	1.37
40	**0.025**	52.4	39.1	33.2	25.3	18.9	11.3	7.77	5.04	3.09	2.25	1.76	1.44
50	**0.02**	55.5	41.3	35	26.6	19.9	11.9	8.1	5.24	3.22	2.33	1.83	1.49
60	**0.017**	58	43.1	36.5	27.7	20.7	12.3	8.39	5.42	3.31	2.41	1.88	1.53
80	**0.012**	62.3	46.1	39	29.5	22	13	8.84	5.7	3.48	2.51	1.96	1.6
100	**0.01**	65.6	48.5	41	30.9	23	13.6	9.21	5.92	3.6	2.6	2.03	1.65
250	**0.004**	80.6	59.1	49.7	37.1	27.3	15.9	10.7	6.82	4.11	2.95	2.3	1.87

Vortex Seperator

Inflows

Table 1. Catchments

Sub-Catchment Description	Post-Dev Runoff Coeff (C)	Area (A) m^2	CA
1	0.700	2573.0	1801.1
			0.0

Water quality intensity	iwq	10.0 mm/hr
Water quality flow	wqf	**0.005 m^3/s**
	wqf	**5.0 L/s**

Time of concentration of primary network:	ToC	10.0 min
1% AEP 10 min Peak Flow Rate		**32.8 L/s**

Vortex Devices

Table 3. Comparison of Devices

Supplier/Manufacturer	Make	Model	Chamber Dia (mm)	Max. Pipe Size (mm)	Efficiency	Mean Particle Size	Head-loss at Max Flow (mm)	WQF (L/s)	Max Flow Rate (L/s)
SPEL	Vortceptor	SVI.025	1200	-	70%	-	-	26	280
SW360	Jellyfish 2 x cartridge		1050					10	
Hynds	UpFlo 4 x cartridge		1200					6.32	

Job Number	230374	**Prepared**	CT
Job Name	New Restaurant in Wanaka	**Reviewed**	NB
Calc Purpose		**Date**	2/08/2023

CGW CONSULTING ENGINEERS

Stormwater - Small Development Calculator

This calculator is based on NZBC E1 VM1 inlcuding Rational Method for runoff estimation and Mannings formula for full pipe flow (non-surchaged)

Key:

Design Variable	Input	Output		Constant		linked cell
Explanatory	Calc	Note	Good	Neutral	Bad	Warning

Catchments

Table 1 - Catchments

ID		Areas					Area (m2)	Weighted C Value	ARI (Year)	T.O.C. (min.)	I (mm/hr)	Q (L/s)
		Roof	Asphalt/Pave	Gravel	Landscaping	Misc						
1	South-west sump (SUMP 01)		1102		389		1491	0.706	100	10	65.6	19.2
2	Sump northern end of building (SUMP 02)		134		100		234	0.615	100	10	65.6	2.6
3	South-east sump (SUMP 03)		302.5		208		510.5	0.626	100	10	65.6	5.8
4	North-east sump (SUMP 04)		338				338	0.850	100	10	65.6	5.2
5	Roof soak pit	445					445	0.900	100	10	65.6	7.3
6												
7	SW Treatment Device Bypass flow		1876		697		2573	0.701	100	10	65.6	32.9
8	SW Treatment Device WQF		1876		697		2573	0.701			10.0	5.0
9												
10												

Pipe Sizing

Table 2 - Pipe Sizing

ID		Catchment(s)	∑ Q (L/s)	Dia (mm)	Grade (1 in)	Material	Velocity (m/s)	Capacity (%)
A		1	19.20	225	100	UPVC	0.43	31%
B		2	2.62	100	100	UPVC	0.31	38%
C		3	5.83	150	100	UPVC	0.32	31%
D		4	5.24	150	100	UPVC	0.29	28%
E		5	7.30	150	100	UPVC	0.40	39%
F		2,4	7.86	150	100	UPVC	0.43	42%
G		2,3,4	13.69	150	100	UPVC	0.76	74%
H		1,2,3,4	32.89	225	100	UPVC	0.74	54%

Appendix D. Geosolve Geotech Report

Geotechnical Report

237 Wanaka-Luggate Highway,

Wanaka

Report prepared for:

Mt Iron Junction Limited

Report prepared by:

GeoSolve Limited

Distribution:

Mt Iron Junction Limited

Paterson Pitts Group

GeoSolve Limited (File)

March 2018

GeoSolve Ref: 170839

GEOTECHNICAL WATER RESOURCES PAVEMENTS

Table of Contents

1 Introduction

1.1 General

This report presents the results of a geotechnical investigation carried out by GeoSolve Ltd in order to determine subsoil conditions, stormwater soakage capability and earthworks recommendations at 237 Wanaka-Luggate Highway, Wanaka. Geotechnical design parameters and foundation bearing parameters are provided. Rockfall and seismic hazard has been assessed. The proposed development plan area has been provided by McCoy Wixon Architects via Paterson Pitts Group.

Photo 1. View of the site looking northeast from TP1.

The investigation was carried out for Mount Iron Junction Limited in accordance with GeoSolve Ltd.'s proposal dated 27 October 2017, which outlines the scope of work and conditions of engagement. This report will supplement a resource and earthworks consent application.

1.2 Proposed Development

We understand it is proposed to develop the above property into a commercial area and this requires geotechnical assessment of the site to assess suitability for development and to identify any geotechnical issues.

Figure 1, Appendix A shows a concept plan for the proposed development.

2 Site Description

2.1 General

The subject property, legally described as Lot 5 DP 15016, is located approximately 2.5 km east of central Wanaka, as shown in Figure 1 below.

Figure 1: Site location (blue symbol) in relation to Wanaka township (Source: http://maps.qldc.govt.nz/qldcviewer/)

The property is accessed off Wanaka-Luggate Highway and is situated to the southeast of Mt Iron.

Two dwellings, a large garage and a sleepout currently occupy the site. The remaining area of the site has been divided into small paddocks which are separated by fencing. Unsealed roads have been created to access the dwellings with some asphalt poured within the driveway of the northeast dwelling. Ground cover comprises grass, shrubs and pine trees.

The site is bounded by the Wanaka-Luggate Highway to the south, Albert Town-Lake Hawea Road to the east and Crown Land and 37 Albert Town-Lake Hawea Road to the northwest.

2.2 Topography and Surface Drainage

The site topography is generally sub-horizontal across the property. The site was observed to be naturally free-draining. No earthworks plans have been provided to GeoSolve at this stage although these are anticipated to be relatively minor.

No spring flows or seepages were observed during site investigations.

3 Geotechnical Investigations

GeoSolve Ltd visited the subject property on the 18th and 19th of December 2017 and the 17th of January 2018 undertaking an engineering geological site inspection with confirmatory subsurface investigations.

The investigations carried out for the purposes of this report are as follows:

- A site inspection and field mapping by an engineering geologist to assess rockfall risk for the proposed development;
- 17 Test pits (TP), extending to a maximum depth of 4.5 m below ground level (bgl) to produce geological logs of the subsoils;
- 10 Scala penetrometer tests extending to a maximum depth of 1.4 m bgl to assess relative density of the subsoils;
- 2 Heavy Dynamic Probe (DPH) tests, extending to a maximum depth of 15 m bgl to assess relative density of subsoils at depth and confirm the ground water model below the site;
- Piezometer installation;
- 4 Soakage pits and 2 HT21 standpipe permeability tests to assess permeability in the two proposed soakage areas at the development.

Test pit and Scala penetrometer locations and logs are presented in Appendices A and B respectively.

DPH locations and logs are presented in Appendices A and C.

Permeability test locations and logs are presented in Appendices A and D.

4 Subsurface Conditions

4.1 Geological Setting

The site is located in the Wanaka Basin, a feature formed predominantly by glacial advances. The schist bedrock within the basin has been extensively scoured by ice and lies at considerable depth below this site. Overburden material above the schist in this region includes glacial till, alluvial outwash sediments, lake sediment and beach deposits.

During the Mt Iron and Hawea Glacial Advances 18-23,000 years before present, the glaciers terminated upstream from Albert Town forming moraine loops and outwash terraces. Well-consolidated glacial till gravels were laid down on the flanks and beds of the glaciers. With the final retreat of the ice, about 16,000 years ago, Lake Wanaka formed and the Clutha River became entrenched in the glacial deposits.

Mt Iron lies directly to the north of the property where bedrock is exposed along the face of the southeastern bluff.

The Cardrona fault is mapped near the southeast corner of the property, this fault is considered capable of earthquakes of Magnitude 7.3 but has an average return period of

5,000-10,000 years. The Alpine Fault, located approximately 70 km away, runs along the western foothills of the Southern Alps, and is likely to present a more significant seismic risk to the site in the short term. There is a high probability that an earthquake of Magnitude 8 or more will occur along the Alpine Fault within the next 50 years and such a rupture is likely to result in strong ground shaking in the vicinity of Wanaka.

4.2 Stratigraphy

Results from the test pitting indicate the sub-surface stratigraphy comprises:

- 0.1 to 0.2 m of topsoil, overlying;
- Isolated uncontrolled fill (1.2-1.7 m in TP6, SP1 and 2 only), overlying;
- Isolated buried topsoil (0.1-0.4 m in TP6, SP1 and 2 only), overlying;
- 0.1 to 0.3 m of loess, overlying;
- 0.3 to 4.2 m+ of outwash gravel, interbedded with;
- Lenses of outwash sand, 0.3-0.9 m thick were observed within the outwash gravel.
- Lake sediment is inferred to underlie the outwash gravel at approximately 11-12 m bgl in the area of DPH 1.

Topsoil was observed at the surface of all test pits except SP1 and 2 and predominately comprises brown, organic SILT with roots and rootlets.

Uncontrolled fill was observed to underlie the topsoil in TP6, SP 1 and 2 and extends to 1.2 to 1.7 m bgl. The fill comprises light grey/grey, loose to medium dense, gravelly SAND with minor organic silt and trace sticks, rootlets and wire, SAND with some gravel and silt, and sandy GRAVEL with trace cobbles, boulders and organic silt.

Buried topsoil was observed to underlie the uncontrolled fill in TP6, SP1 and 2 and extends to 1.6 to 1.8 m bgl. Buried topsoil comprises, brown sandy organic SILT with minor rubbish and gravel.

Loess was observed to underlie the topsoil in 15 of the 17 test pits and extends to a depth of 0.2 to 0.5 m bgl. The loess predominately comprises light brown, firm silty SAND with minor rootlets.

Outwash gravel was observed to underlie the loess, topsoil or buried topsoil in all test pits. Outwash gravel typically comprises brown, grey and dark grey medium dense, sandy GRAVEL with some to trace cobbles and trace boulders. Boulders up to 0.7 m diameter were observed. Outwash gravel was observed to the termination depth of all test pits.

0.3 to 0.9 m thick outwash sand lenses were observed in TPs 3, 6 and 11 and typically comprise grey/brown, medium dense SAND with minor to some gravel and gravelly SAND.

Lake sediment is inferred to underlie the outwash gravel at 11-12 m bgl in the DPH 1 area from the relative density observed in the DPH test and knowledge of relative levels and relative density of lake sediment in the Albert Town area.

Full details of the observed subsurface stratigraphy can be found within the test pit and soakage pit logs contained in Appendix B and D respectively.

4.3 Groundwater

Groundwater was not observed during test pit investigations which extend to 4.5 m bgl.

A piezometer was installed to 6.7 m depth in close proximity to DPH2 and was dipped dry to full depth. Piezometers could not be installed any deeper to reach the water table due to coarse cobbles and boulders within the outwash gravel unit.

4.4 Slope Stability

No instability features were observed on the site during investigations.

The bluffs of Mt Iron outcrop to the north of the site and a rockroll hazard is shown on the QLDC hazard database within 70 m of the north-western boundary. Rockfall from the bluffs to the north has been assessed as part of site investigations, this is detailed in section 6.7 of this report.

5 Liquefaction Analysis

5.1 Introduction

A preliminary liquefaction assessment has been undertaken using test pit and heavy dynamic probe (DPH) data. Two Heavy Dynamic Probe (DPH) tests were undertaken within the site to assess liquefaction risk.

5.2 Earthquake Scenarios

In accordance with NZS1170 – Structural Design Actions[1], the following two earthquake scenarios were considered based on a building with Importance Level 2 with a 50 year design life.

These scenarios represent the following design performance requirements:

- Serviceability Limit State (SLS) – to avoid damage that would prevent the structure from being used as originally intended, without repair, and;
- Ultimate Limit State (ULS) – to avoid collapse of the structural system.

In terms of NZS 1170, Class D subsoil conditions (deep soils) were assumed to underlie the site.

The methods presented within the NZTA Bridge Manual (2014)[2] have been adopted for deriving the site peak ground accelerations (PGA) as they use unweighted seismic hazard factors and corresponding (effective) earthquake magnitudes that are better suited to be used in the assessment of liquefaction.

[1]NZS1170-5 (2004) Structural Design Actions, Part 5: Earthquake Actions – New Zealand.
[2] NZTA Bridge Manual, Third Addition, Amendment 2, Effective from May 2016 (Manual Number SP/M/022).

Table 1 below provides a summary of the annual exceedance probability, effective magnitude and PGA adopted for each seismic case analysed in the liquefaction assessment.

Table 1: Annual exceedance probability, effective earthquake magnitude and peak horizontal ground accelerations for each seismic case

Seismic Case	Annual Exceedance Probability (AEP)	Effective Magnitude	Peak Horizontal Ground Acceleration (g)
Serviceability Limit State (SLS) design earthquake	1/25	6.1	0.08
Ultimate Limit State (ULS) design earthquake	1/500	6.2	0.32

5.3 Liquefaction Assessment

5.3.1 General

Liquefaction occurs when susceptible, saturated soils attempt to move to a denser state under cyclic shearing. In this report, liquefaction is defined as when pore pressures rise to reach the overburden stress. When this occurs, the following effects can happen at flat sites:

- Loss of strength;
- Ejection of material under pressure to the ground surface (i.e. surface disruptions), and;
- Post-liquefaction volumetric densification as the soils reconsolidate.

In addition, sloping sites or sites with a 'free face' may experience lateral spreading or movement.

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

5.3.2 DPH Analysis

Analyses were performed to evaluate the liquefaction potential of the lake sediment unit underlying the outwash gravel and the discrete sand lenses within the outwash gravel unit utilising the methods recommended by Idriss & Boulanger (2014)[3]. These methods use information obtained from soil logging and in situ testing, such as soil type, fines content, layer thicknesses, and blow count.

[3] Boulanger R.W. and Idriss, I.M. (2014). 'CPT and SPT Based Liquefaction Triggering Procedures,' Report No. UCD/CMG–14/01, Dept. of Civil & Environmental Engineering, University of California at Davis.

A piezometer was installed to 6.7 m bgl in close proximity to DPH 1 which was dipped dry to full depth. This has been assumed as the water table depth for analysis purposes even though this is likely a conservative assumption.

The liquefaction analysis results are summarised below in Table 2.

Table 2: Summary of liquefaction results from DPH testing

Factor	Assessment		Implications
Crust thickness	The crust thickness is determined to be at least 8.7 m for the ULS design earthquake. Data from the Canterbury earthquake sequence plus other historic earthquakes[4] has been collated and observed surface damage compared with crust thickness. This data indicates that surface damage is likely for crusts of less than about 3.5 m thickness.		The crust is significantly thicker than 3.5 m and therefore should be sufficiently thick to limit surface damage in a ULS seismic event. Particularly given the minor (0-10 mm) predicted liquefaction induced settlement within the upper 10 m of the soil profile.
LSN	1/500 AEP (ULS)	LSN range = 0-7	Surface expression of liquefaction unlikely.
Free field settlement	1/500 AEP (ULS)	0-10 (80) mm	0-10 mm estimated in the upper 10 m in the areas tested. 80 mm of total settlement is predicted within testing completed to 15 m depth. Lake sediment is inferred at 11.5-14.5 m bgl in DPH 1 which is predicted to liquefy under ULS seismic loading.
Lateral spread	Lateral spreading under seismic loading is not expected to occur as the site is relatively flat without any nearby free face.		None.

[4] Bowen, H.J. and Jacka, M.E. (2013). Liquefaction induced ground damage in the Canterbury Earthquake: Predictions versus reality. Proceedings of the 19th NZGS Geotechnical Symposium. Editor CY Chin. Queenstown, New Zealand.

6 Engineering Considerations

6.1 General

The recommendations and opinions contained in this report are based upon ground investigation data obtained at discrete locations on site and historical information held on the GeoSolve database. The nature and continuity of subsoil conditions away from the investigation locations is inferred and cannot be guaranteed.

6.2 Geotechnical Parameters

Table 3 provides a summary of the recommended geotechnical design parameters for the soils expected to be encountered during construction of any future buildings and retaining walls.

Table 3: Recommended Geotechnical Design Parameters

Unit	Thickness (m)	Bulk Density γ (kN/m^3)	Effective Cohesion c' (kPa)	Effective Friction ϕ' (deg)	Elastic Modulus E (kPa)	Poissons Ratio ν
Topsoil/Buried Topsoil (organic SILT with roots and rootlets and sandy organic SILT with minor rubbish and gravel)	0.1-0.4	16	To be removed from building and engineered fill footprints			
Uncontrolled Fill (loose to medium dense, gravelly SAND with minor organic silt, SAND with some gravel an silt and sandy GRAVEL with trace organic silt, cobbles and boulders)	1.2-1.7	18	To be removed from building and engineered fill footprints			
Loess (firm, silty SAND)	0.1-0.3	18	0	31	5,000	0.3
Outwash Gravel with Outwash Sand lenses (medium dense, sandy GRAVEL with trace to some cobbles and trace boulders. Lenses of gravelly SAND to SAND with minor gravel)	0.3-4.2	18	0	36 (32 in Sand)	10,000-20,000	0.3

6.3 Site Preparation/Earthworks

During the earthworks operations all topsoil, uncontrolled fill, organic matter and other unsuitable materials should be removed from the construction areas in accordance with

the recommendations of NZS 4431:1989. These soil types (and loess SILT) will also need to be removed from areas where engineered fill is proposed.

Robust, shallow graded sediment control measures should be instigated during construction where rainwater and drainage run-off across exposed soils is anticipated. If slope gradients in excess of 4% are proposed in fine-grained soils then the construction and lining of drainage channels is recommended, e.g. with geotextile and suitably graded rock, or similarly effective armouring.

Water should not be allowed to pond or collect near or under a foundation slab. Positive grading of the subgrade should be undertaken to prevent water ingress or ponding.

All fill that is utilised as bearing for foundations should be placed and compacted in accordance with the recommendations of NZS 4431:1989 and certification provided to that effect. The outwash gravel soils can be used as engineered fill on site (during good weather and in accordance with an earthfill specification). The topsoil, loess and uncontrolled fill is not suitable as a fill source. Maximum density and optimum moisture content will vary in the outwash gravel. Boulders and cobbles over 100 mm in size will need to be screened from engineered fill sources.

6.4 Excavations

At this stage no earthworks plans have been provided, although it is expected cuts will be made within topsoil, uncontrolled fill, loess, and outwash soils. It is expected that only minor earthworks will take place across the site due to the generally sub-horizontal topography and the shallow depth to suitable bearing soils across the majority of the site. Earthworks plans have yet to be developed for the development.

Recommendations for temporary and permanent batter slope angles are described below in Table 4. Slopes that are required to be steeper than those described below should be structurally retained or subject to specific geotechnical design.

All slopes should be periodically monitored during construction for signs of instability and excessive erosion, and, where necessary, corrective measures should be implemented to the satisfaction of a Geotechnical Engineer or Engineering Geologist.

No seepage was encountered during test pitting and hence groundwater is unlikely to be encountered during excavations. However, a geotechnical practitioner should inspect any seepage, spring flow or under-runners that may be encountered during construction.

The soils are anticipated to be excavated by conventional methods, however boulders are likely to be encountered within the outwash gravel.

6.4.1 Cut Slopes in Soil Materials

Table 4 summarises the recommended batter angles for temporary and permanent slopes up to 3 m high, which are formed in the soil materials identified at the site.

Table 4: Recommended maximum batter angles for cut slopes up to 3 m high in site soils

Material Type	Recommended Maximum Batter Angles for Temporary Cut Slopes Formed in Soil (horizontal to vertical)		Recommended Maximum Batter Angles for Permanent Cut Slopes Formed in Soil – dry ground only (horizontal to vertical)
	Dry Ground	Wet Ground	
Topsoil/Loess/Uncontrolled Fill	2H: 1V	3H: 1V	3H: 1V
Outwash gravel	1H: 1V	2H: 1V	2H: 1V

6.5 Engineered Fill Slopes

All fill should be placed and compacted in accordance with the recommendations of NZS4431: 1989 and Queenstown Lakes District Council Standards. All cut and fill earthworks should be inspected and tested as appropriate during construction and certified by a Chartered Professional Engineer.

All un-retained fill slopes which are less than 3.0 m high should be constructed with a batter slope angle of 2.0H:1.0V (horizontal to vertical) or flatter and be benched into sloping ground.

Reinforced earth slopes can be considered if batters need to be steeper than 2H:1V.

6.6 Ground Retention

All retaining walls should be designed by a Chartered Professional Engineer using the geotechnical parameters recommended in Table 3 of this report. Due allowance should be made during the detailed design of all retaining walls for forces such as surcharge due to the sloping ground surface behind the retaining walls, groundwater, seismic and traffic loads.

All temporary slopes for retaining wall construction should be battered in accordance with the recommendations outlined in Table 4 of this report. Where these batter slopes cannot be achieved temporary retaining will be required.

Groundwater was not observed within a piezometer installed to 6.7 m beneath the site or within any of the test pit excavations. To ensure any groundwater seeps and flows are properly controlled behind the retaining walls, the following recommendations are provided:

- A minimum 0.3 m width of durable free draining granular material should be placed behind all retaining structures;
- A heavy duty non-woven geotextile cloth, such as Bidim A14, should be installed between the natural ground surface and the free draining granular material to prevent siltation and blockage of the drainage media;
- A heavy-duty (TNZ F/2 Class 500) perforated pipe should be installed within the drainage material at the base of all retaining structures to minimise the risk of

excessive groundwater pressures developing. This drainage pipe should be connected to the permanent piped storm water system, and;

- Comprehensive waterproofing measures should be provided to the back face of all retaining walls forming changes in floor level within the dwelling to minimise groundwater seepage into the finished buildings.

It is recommended that the retaining wall excavation batters are inspected by a suitably qualified and experienced Geotechnical Engineer or Engineering Geologist.

6.7 Rockfall Hazard

6.7.1 General

An engineering geologist has undertaken site mapping to assess the risk of rockfall hazard to the proposed development. The assessment reviews the risk of boulders originating as rockfall from the steep bluffs below Mount Iron rolling out into the proposed development and damaging proposed structures. Rockfall events require a trigger such as strong seismic shaking or long-term weathering and failure of the rock mass.

Numerous boulders of varying diameters and shapes have been observed on the sub-horizontal alluvial outwash surface at the base of Mount Iron. To assess the risk to the proposed development boulders observed on the ground surface were mapped and differentiated between those originating as rockfall and those originating as alluvial outwash boulders (Appendix A, Figure 2). Roll out distance between the base of Mount Iron and the north-western property boundary was also considered including any natural barriers against rockroll.

There is no evidence of historic rockroll boulders on the ground surface within the boundaries of the proposed development nor was there any evidence of historic rockroll boulders observed in test pits. All boulders observed in test pits are interpreted to be alluvial outwash boulders. The mapped maximum roll out distance of historic rockroll boulders from the base of Mount Iron onto the outwash surface ranges between 40-70 m. The minimum distance between the base of Mount Iron and the northwest property boundary is approximately 115 m at the southwest corner of the proposed development. The roll out distance between the base of Mount Iron and the proposed development gradually increases towards the northeast to a maximum distance of approximately 180 m. It is also noted on the proposed development plans provided by McCoy Wixon Architects that there is a designated “no build zone” on the southwest corner of the proposed development.

There are several existing natural barriers against rockroll present between the base of Mount Iron and the proposed development. Existing rockfall debris at the base of Mount Iron and the dense patches of native kanuka scrub on the outwash surface provide a natural barrier against rockroll. The wing of a lateral moraine ridge extends towards the northeast and acts as a natural rockroll bund for the southwest corner of the proposed development (see Appendix A, Figure 2). Numerous boulders resulting from rockroll have already been observed to be piled up behind this moraine ridge north of the Wanaka-

Luggate Highway. The sub-horizontal (0-5°) alluvial outwash surface from the base of Mount Iron to the proposed development provides a suitable setback for rockroll fallout.

Rockfall hazard mapping is shown on Appendix A, Figure 2.

6.7.2 Rockfall Hazard Considerations and Recommendations

Based on the mapping of historic rockroll boulders and the roll out distance from the base of Mount Iron the resulting hazard envelope does not reach the proposed development. Therefore, the rockfall hazard poses no risk to the proposed development and further detailed analysis of the rockfall hazard is not considered necessary.

As a precaution the existing row of pine trees along the northwest property boundary could be left in place to provide a further natural barrier against rockroll. Alternatively, the pine trees could be replaced with another tree species if this is desired.

6.8 Seismic Hazard

The Cardrona Fault is mapped near the southeast corner and eastern boundary of the property and its location is recorded as concealed on published geological mapping beneath the Albert Town area. The Cardrona Fault is indicated as 'active'. The risk of ground rupture on the site from known faulting is considered unlikely. Movement on the Cardona Fault would however result in ground shaking of the site, and the wider Wanaka area.

Geosolve have completed an assessment of the risk posed by the Cardona Fault using guidelines provided by the Ministry of Environment for developing land close to active faults. For the assessment, the Cardrona Fault has been categorised with a return period of 5,000 to 10,000 years (GNS Science website, Active Faults Database), and the location is assessed as uncertain, as indicated on published geological mapping.

Following the Ministry of the Environment guidelines provided in Section 11 "Taking a Risk-Based Approach to Resource Consents", building importance category structures 1, 2a and 2b, are a permitted activity and category 3 structures are a discretionary activity. NZS 3604 dwelling structures fall under category 2a, and are therefore considered to be a permitted activity in close proximity to the Cardrona Fault system.

In conclusion, given the relatively long return period for the Cardrona Fault (5,000 - 10,000 Years), the Alpine Fault, with a return period for major earthquakes of 300-350 years, and predicted ground accelerations an order of magnitude higher than the Nevis Cardona, is considered to provide the governing seismic risk to the area.

6.9 Groundwater Issues

The regional water table is expected to lie at depth below any future foundation levels and is not expected to be encountered during construction on this site. Dewatering or other groundwater-related construction issues are therefore unlikely to be required.

It is important that GeoSolve be contacted should there be any seepage, spring flow or under-runners encountered during construction.

6.10 Foundation Considerations

Topsoil, uncontrolled fill and loess should be stripped from the building platform areas. Foundation loads will be transferred to the outwash gravel or engineered fill overlying outwash gravel in all cases.

All unsuitable materials identified in foundation excavations, particularly those softened by exposure to water, should be undercut and replaced with engineered fill during construction. Any fill that is utilised as bearing for foundations should be placed and compacted in accordance with NZS 4431:1989 and certification provided to that effect.

To minimise the effects of freeze-thaw cycles in footings founded on soil, all shallow foundations should be founded a minimum of 0.4 m below the adjacent finished ground surface.

Figure 2 summarises the recommended working stresses for shallow footings, which bear upon outwash gravel and engineered fill overlying the same. It should be noted the foundation working stresses presented on Figure 2 are governed by bearing capacity in the case of narrow footings and settlement in the case of wide footings.

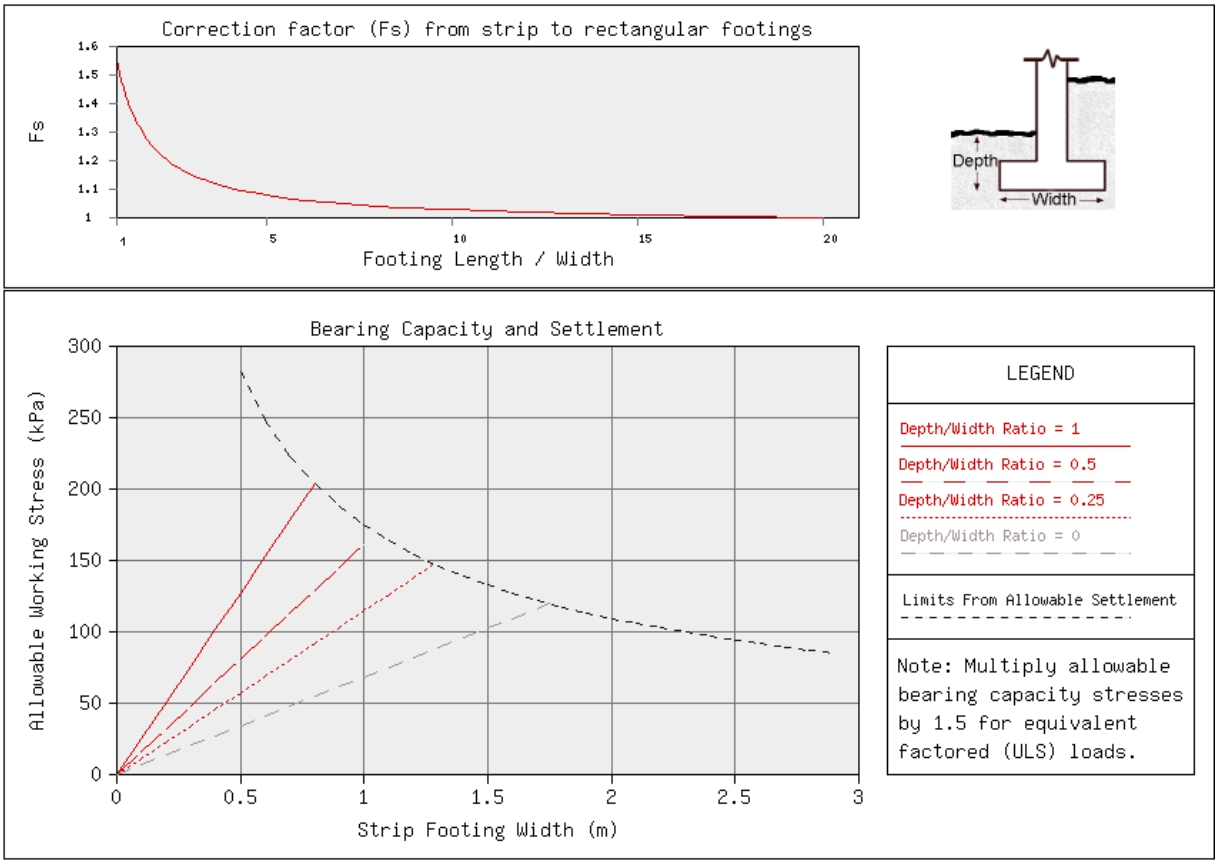

Figure 2. Recommended Bearing for Shallow Footings on Outwash Gravel and Engineered Fill overlying Outwash Gravel.

From Figure 2 it can be seen an allowable working stress of approximately 100 kPa is recommended for a 400 mm wide by 400 mm deep strip footing founded within outwash gravel and engineered fill overlying outwash gravel. This corresponds to a factored (ULS) bearing capacity of approximately 150 kPa and an ultimate geotechnical bearing capacity of 300 kPa.

Inspection and testing (dynamic probe/Scala penetrometers) should be completed along footing alignments during construction to confirm the above values are applicable and that the soil has not been softened by weather or excavation. Plate compaction or rolling is recommended following building platform and footing excavation.

6.10.1 Outwash Sand Bearing

Thin lenses of outwash sand have been observed in test pits. If substantial outwash sand is observed under a building platform bearing capacity should be assessed on a case by case basis.

6.11 Settlement

Settlement and differential settlement of shallow foundations are expected to be within structurally acceptable limits provided the recommendations of Section 6.10 are followed and all unsuitable materials, particularly those softened by water, are undercut and replaced with engineered fill during construction.

6.12 Site Subsoil Category

For detailed design purposes it is recommended the magnitude of seismic acceleration be estimated in accordance with the recommendations provided in NZS 1170.5:2004.

The site is “Class D” (Deep soil site) in accordance with NZS 1170.5:2004 seismic provisions.

6.13 QLDC Land Development and Subdivision Code of Practice

Section 2.2.4 of the QLDC Land Development and Subdivision Code of Practice (QLDC CoP) requires the developer of any subdivision to appoint a geo-professional to carry out the following functions from the planning to construction phases of the subdivision:

a) Check regional and district plans, records, and requirements prior to commencement of geotechnical assessment;
b) Prior to the detailed planning of any development, to undertake a site inspection and such investigations of subsurface conditions as may be required, and to identify geotechnical hazards affecting the land, including any special conditions that may affect the design of any pipelines, underground structures, or other utility services;
c) Before construction commences, to review the drawings and specifications defining any earthworks or other construction and to submit a written report to the Territorial Authority (TA) on the foundation and stability aspects of the project (if required);

d) Before and during construction, to determine the extent of further geo-professional services required (including geological investigation);
e) Any work necessary to manage the risk of geotechnical instability during the construction process;
f) Before and during construction, to determine the methods, location, and frequency of construction control tests to be carried out, determine the reliability of the testing, and to evaluate the significance of test results and field inspection reports in assessing the quality of the finished work;
g) During construction, to undertake regular inspection consistent with the extent and geotechnical issues associated with the project;
h) On completion, to submit a written report (i.e. Geotechnical Completion Report) to the Territorial Authority (TA) attesting to the compliance of the earthworks with the specifications and to the suitability of the development for its proposed use including natural ground within the development area. Where NZS 4431 is applicable, the reporting requirements of that Standard shall be used as a minimum requirement.

This resource consent level report can be considered to have completed items a) and b) from the above list. Once resource consent for the subdivision has been granted a geo-professional will need to be appointed by the developer to review the earthworks drawings and specifications prior to finalising the documentation for tendering and/or construction, and to oversee the construction phase of the project including certification of fill and provide a Geotechnical Completion Report (GCR) and Schedule 2A in accordance with the QLDC CoP.

The GCR and Schedule 2A should detail the results of site observations, testing and monitoring during earthworks construction, confirm the stability of the finished earthworks, and identify any specific geotechnical design requirements that must be addressed in order to construct a building on site. Any identified specific design requirements will then be registered on the subject lots' 'certificate of title' and will need to be addressed during the building consent process.

The geo-professional completing the GCR and Schedule 2A which includes the certification of fill should in all cases be engaged by the developer not the contractor. It is also advisable that the geo-professional review the earthworks contract to assist in managing the developers risk and ensuring that the contract is clear with respect to geotechnical risks and responsibilities during construction.

The use of this report and any of its findings or recommendations as part of the GCR and Schedule 2A may only be used with our prior review and written agreement.

7 Stormwater Disposal

7.1 Suitability of soil types

We understand that an on-site soakage system, in keeping with other developments nearby, will be adopted to manage stormwater at the site.

The geotechnical investigations identified that stormwater infiltration areas are located on a glacial outwash terrace that runs adjacent to Albert Town-Lake Hawea Road with the exception of soakage area one (SP1) where moderate depths of fill were observed, presumably associated with the historic construction of the adjacent highway.

Table 5. Suitability of soakage disposal based on soil type

Location	Stratigraphy	Suitability for Stormwater Disposal
SP1	1.8 m of fill and buried topsoil (SAND with some gravel and silt and organic SILT with minor rubbish) overlying outwash gravel and sand to base of pit.	Confirmed favourable from 1.8-2.6 m and 2.9-4.2 m (TP6 shows a 0.3 m thick sand lens at 2.6 m underlying outwash gravel). Soakage rate = 0.07 L/s/m^2
SP2	1.6 m of fill and buried topsoil (sandy GRAVEL and sandy organic SILT) overlying outwash gravel and sand to base of pit.	Confirmed favourable from 1.6-2.4 m and 2.9-4.2 m (TP6 shows 0.3 m thick sand lens at 2.6 m underlying outwash gravel). Soakage rate = 0.18 L/s/m^2
TP6	1.6 m of fill and buried topsoil (gravelly SAND and organic SILT) overlying outwash gravel with a 0.3 m thick gravelly SAND and SAND lens observed at 2.6 m.	Favourable from 1.6-2.6 m and 2.9-4.2 m depth. Will need to consider thin sand lens. No test completed in this test pit.
HT21 (1)	2.0 m of fill and buried topsoil (sandy GRAVEL and sandy organic SILT) overlying outwash gravel.	Favourable from 2 m (TP6 shows 0.3 m thick sand lens at 2.6-2.9 m depth in the outwash gravel). K (m/s) = 5 x10^{-5}
SP3	0.3 m of topsoil and loess overlying outwash gravel.	Favourable from 0.3 m. Soakage rate undetermined, water draining away faster than could put into test pit. Free draining.
SP4	0.3 m of topsoil and loess overlying outwash gravel.	Favourable from 0.3 m. Soakage rate undetermined, water draining away faster than could put into test pit. Free draining.
HT 21 (2)	0.3 m of topsoil and loess overlying outwash gravel.	Favourable from 0.3 m. K (m/s) = 2 x10^{-4}

7.2 Site testing

Standpipe field permeability testing and soakage testing of the outwash gravel was carried out at six field locations (see Site Plan, Appendix A and D for test locations and results respectively).

Four soakage pit tests and two standpipe field permeability tests were completed, all within the predominant sandy GRAVEL soils. It is important to note that the subordinate sand lenses will have significantly lower permeability than the gravels, possibly of the order of 1 x 10^{-5} m/sec which has likely influenced the testing in soakage area 1 and will affect long-term soakage rates.

Soakage testing was undertaken at the base of the soak pits in SP1-4. This was performed by introducing water from an 8,000L watercart until the water level of the pit reached the designated testing level. The inflow was then ceased and the time it took for the water level to drop recorded. The results were then analysed to determine indicative soakage rates, which are presented in Appendix D.

The standpipe field permeability test was undertaken using the HT21 methodology. Hydraulic conductivity was then obtained using published correlations (Van Hoorn, Glover, Phillip, HT21).

Table 6: Hydraulic Conductivity and Soakage Rate Values

Location	Test method	Output	Results
SP1	Open pit soakage test	Soakage Rate	0.07 L/s/m^2
SP2	Open pit soakage test	Soakage Rate	0.18 L/s/m^2
HT21 (1)	Standpipe field permeability test	Hydraulic Conductivity (K)	5x10^{-5} m/s
SP3	Open pit soakage test	Soakage Rate	Free draining*
SP4	Open pit soakage test	Soakage Rate	Free draining*
HT21 (2)	Standpipe field permeability test	Hydraulic Conductivity (K)	2 x10^{-4} m/s
*Insufficient water was able to be introduced to establish a pool of water at the base of the pit due to high soakage			

7.3 Infiltration design

Extensive permeability testing of outwash gravels was carried out for hydroelectric investigations in Upper Clutha Valley in the 1980s. This found typical bulk hydraulic conductivities (K) in outwash gravels, similar to those in soakage area 2 (SP3 and 4) of the proposed development at Mt Iron Junction, to be of the order of 4 x 10^{-4} m/s.

Standpipe field permeability HT21 (2) in outwash gravels within soakage area 2 found K=2 x 10^{-4} m/s which agrees well with the historic Upper Clutha Valley testing. HT21 (1),

however, indicates lower than anticipated hydraulic conductivity (5 x 10^{-5} m/s) which is interpreted to be influenced by the underlying sand lens observed in TP6.

Estimation of a representative average hydraulic conductivity of the outwash soils is difficult, due to the limited number of tests and importance that geological variations (i.e. discrete minor sand lenses) can have on these values. The presence of lenses and layers of sand in the sequence will tend to lower the overall [bulk] hydraulic conductivity compared with that of the gravel component. The test pit logs indicate the sand lenses constitute only a small minority of the soil materials across the site.

However, a provisional estimate of the order of K=2x 10^{-4} m/s is considered reasonable for this unit, based on the site data and comparison with the known hydraulic conductivities of similar local outwash gravels. It is considered a value of 1 x 10^{-5} to 5 x 10^{-5} is suitable within the outwash gravel with sand lenses in soakage area 1. It is recommended that the infiltration zone is excavated to at least 3 m bgl in soakage area 1 to pass through the observed sand lens (TP6) and uncontrolled fill. This is anticipated to increase soakage potential, however confirmation that no extensive sand lenses are present is required during construction excavation inspections.

SP1 and SP2 also appear to have been influenced by the underlying outwash sand lens observed in TP6. SP1 and 2 returned an estimated soakage rate of 0.07 and 0.18 L/s/m^2 respectively.

Soakage pit testing in SP3 and SP4 was unable to establish a full test due to high soakage rates, in both cases, draining away all introduced after the hole was pre-soaked.

Table 7 presents the recommended soakage rate and hydraulic conductivity values[5] to be used for design. We recommend a reduction factor of at least 0.5 be applied to these values to allow for any loss of soakage performance over time.

Table 7: Summary of results in soakage areas 1 and 2

Location	Soakage Rate	Hydraulic Conductivity (K)
Soakage Area 1*	0.07 – 0.18 L/s/m^2	5x10^{-5} m/s
Soakage Area 2	Free Draining**	2 x10^{-4} m/s
*Soakage Area 1 results likely influenced by sand lens observed from 2.6-2.9 m in TP6 **Water did not fill up bottom of soakage pit, draining away too fast		

Due to the uncertainties associated with soakage/permeability estimation and the importance that the value can have on design of soakage systems, we recommend that additional field tests (such as permeameter tests in 44 gallon drums) be conducted during construction to allow any necessary adjustments to be made to the design.

[5] It should be appreciated that estimation of soakage rates and hydraulic conductivity values utilize separate methods and hence cannot be balanced by unit conversion. We are happy to review our test results and provide alternative units (i.e. infiltration rates in mm/hr) if needed.

8 Neighbouring Structures/Hazards

Natural Hazards: Known seismic hazards affecting the development are detailed in Section 4.1 and appropriate allowance should be made for seismic loading during detailed design of the proposed building, foundations, and retaining walls. The development is not located within any mapped slope instability features, liquefaction susceptibility areas or any other hazard features on the QLDC or GeoSolve databases.

Liquefaction has been assessed using DPH testing, detailed in Section 5. Liquefaction risk is considered to be low due to the depth to groundwater and observed relative density of the site subsoils within the upper 11.5 m.

A rockfall hazard has been mapped within 70 m of the northwest boundary of the property on the QLDC hazard register. An assessment of the rockfall risk to this property has been completed and is detailed in section 6.7 of this report.

Seismic risk associated with the Cardrona Fault is detailed in Section 6.8.

Flooding has not been assessed as part of this assessment, the site is naturally free draining and the development is significantly higher than the closest body of flowing water that runs to the south of the site.

Distances to adjoining structures: It is assumed the existing buildings on site will be removed prior to construction and therefore no adverse geotechnical implications are expected to apply for neighbouring properties during construction provided appropriate vibration and dust mitigation measures are taken during construction. If existing buildings should remain onsite then the vibration effects should be considered if fill is to be compacted within 10 m of an existing structure.

Aquifers: No aquifer resource will be adversely affected by the development.

Erosion and Sediment Control: The site presents low potential to generate silt runoff during heavy rainfall events due to the predominately sub-horizontal topography and site geology. However if required effective systems for erosion control are runoff diversion drains and contour drains, while for sediment control, options are earth bunds, silt fences, hay bales, vegetation buffer strips and sediment ponds. Only the least amount of subsoil should be exposed at any stage and surfacing established as soon as practical. Details for implementation are given in Appendix B within the following link: http://esccanterbury.co.nz/.

Noise: It is expected that conventional earthmoving equipment, such as excavators, trucks and rollers will be required during construction. The earthworks contractor should take appropriate measures to control the construction noise, and ensure QLDC requirements are met in regard to this issue.

Dust: Regular dampening of soil materials with sprinklers to QLDC standards should be effective if required.

Vibration: No vibration induced settlement is expected in these soil types. The effects of vibrations from rollers and plate compactors on adjacent structures will need to be considered if fill is compacted within 10 m of an existing structure.

9 Conclusions and Recommendations

- The site is underlain by surficial topsoil and loess, which overlies outwash gravel with rare thin outwash sand lenses, which extends to at least 4.5 m beneath the surface of the proposed development. Isolated areas of uncontrolled fill were observed.
- Groundwater seepage was not observed during test pit investigations on the site completed to a maximum depth of 4.5 m. A piezometer was installed in close proximity DPH 1 to 6.7 m bgl and was dipped dry to full depth.
- No to minor liquefaction induced settlement (0-10 mm) is predicted across the site within the upper 10 m of the soil profile.
- No evidence of existing slope instability has been identified on site. Rockfall hazard is assessed as low risk and is detailed in section 6.7 of this report.
- Bearing on the site will be governed by the outwash gravel or engineered fill overlying outwash gravel. The outwash gravel and engineered fill will provide good bearing (100 kPa allowable), for 400 mm wide by 400 mm deep shallow footings.
- Recommendations for temporary and permanent batter slope angles are described in Table 4. Slopes that are required to be steeper than those described should be structurally retained or subject to specific geotechnical design.
- All retaining walls should be designed by a Chartered Professional Engineer using the geotechnical parameters recommended in Table 3 of this report.
- The outwash gravel soils are considered suitable for use as engineered fill (in accordance with an earthfill specification).
- All unsuitable soils identified in foundation excavations, particularly those softened by exposure to water, should be undercut and replaced with engineered fill during construction.
- Any fill that is utilised as bearing for foundations should be placed and compacted in accordance with NZS 4431:1989 and certification provided to that effect.
- For detailed design purposes it is recommended that the site is classified “Class D – Deep subsoil” in accordance with NZS 1170.5:2004 seismic provisions.
- Based on the geological conditions observed, testing data and experience with similar outwash gravel, the bulk permeability of the deposit is estimated to be in the order of 2 $x10^{-4}$ m/s in Soakage area 2. A lesser value of 1-5$x10^{-5}$ is recommended where sand lenses are present such as observed in Soakage area 1. Soakage rates are also provided in Table 7. To allow for any loss of soakage performance over time we recommend a reduction factor of at least 0.5 be applied to the value adopted in each of the two soakage areas for design purposes.
- A geotechnical practitioner should inspect all foundation excavations, batter slopes, soak pit excavations and additionally any seepage, spring flow or under-runners that may be encountered during construction.

10 Applicability

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

It is important that we be contacted if there is any variation in subsoil conditions from those described in this report.

Please don't hesitate to contact the undersigned if we can provide any further assistance with this project.

Report prepared by:

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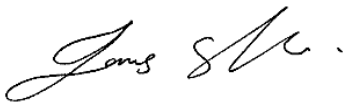
Mike Plunket

Geotechnical Engineer



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James Stewart

Engineering Geologist

Reviewed for GeoSolve Ltd by:

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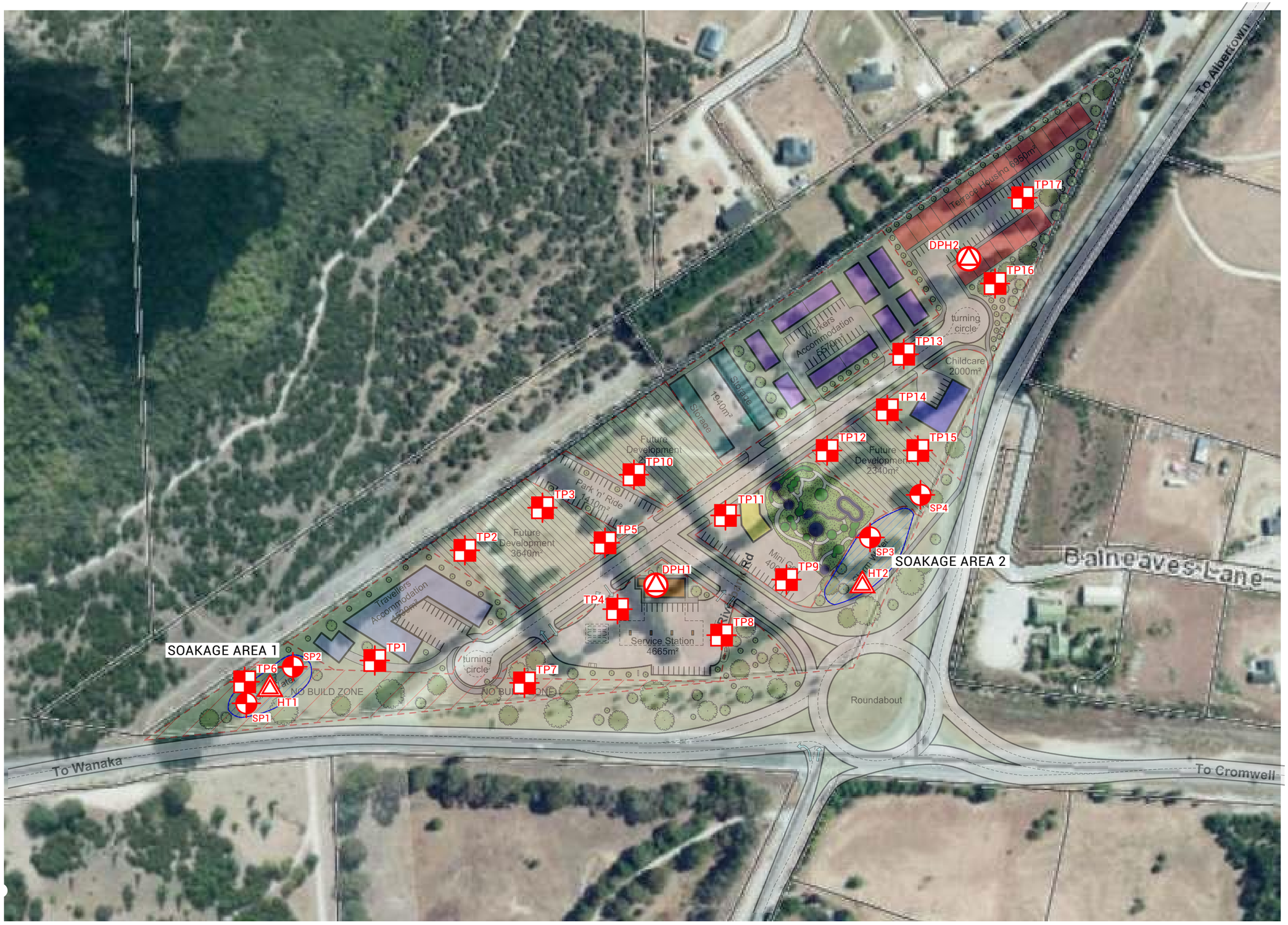
Fraser Wilson

Senior Engineering Geologist

GeoSolve Ltd

Appendix A: Site Investigation Plan



Key

TP1 = Test Pit

DPH1 = Heavy Dynamic Probe (DPH) test location

SP1 = Soakage Pit Test

HT1 = HT21 Permeability Test

Scale 1:2000

0 20 40 60 80 (m)

GEOSOLVE

70 Macandrew Road, PO Box 2427,
South Dunedin 9044. ph 03 466 4024

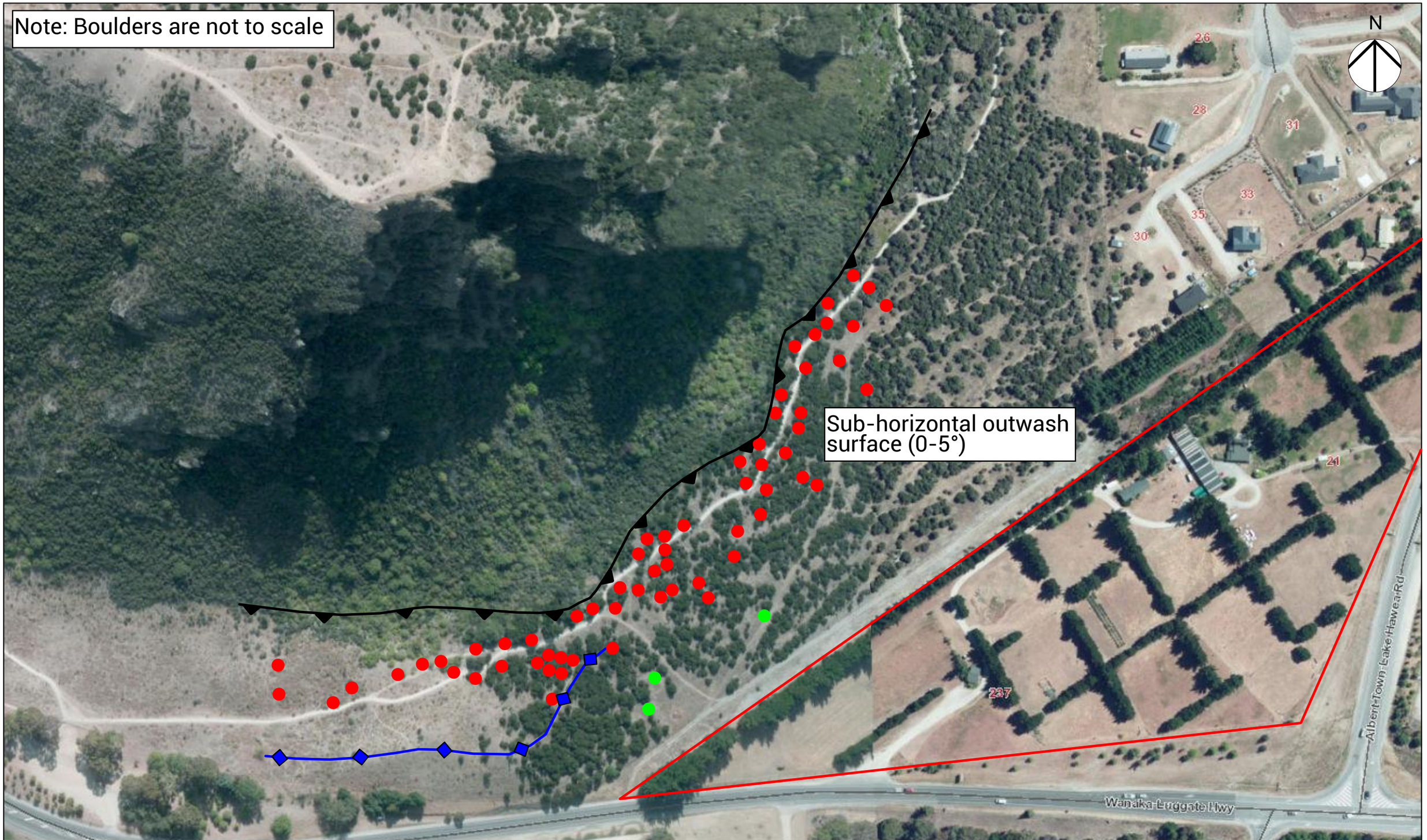
DRAWN	MDP	2/18
DRAFTING CHECKED	FAW	2/18
APPROVED	FAW	2/18
FILE : PDF		
SCALE: (AT A3 SIZE) As Shown		
PROJECT No. 170839		

MT IRON JUNCTION LIMITED
Geotechnical Investigation
237 Wanaka-Luggate Highway
Site Plan

FIG No. Appendix A - Figure 1

REV. 0

Note: Boulders are not to scale



Key

- = Observed rockroll boulder
- = Observed outwash boulder
- = Base of Mount Iron slopes
- = Crest of lateral moraine ridge
- = Property boundary

Scale 1:2000

0 20 40 60 80 (m)

GEOSOLVE

70 Macandrew Road, PO Box 2427,
South Dunedin 9044. ph 03 466 4024

DRAWN	MDP	2/18
DRAFTING CHECKED	JAS	2/18
APPROVED	FAW	2/18
FILE : PDF		
SCALE: (AT A3 SIZE) As Shown		
PROJECT No. 170839		

MOUNT IRON JUNCTION LTD
Geotechnical Investigation
237 Wanaka-Luggate Highway
Rockroll Hazard Map

FIG No. Appendix A - Figure 2

REV. 0

Appendix B: Investigation Data

GEOSOLVE

EXCAVATION LOG

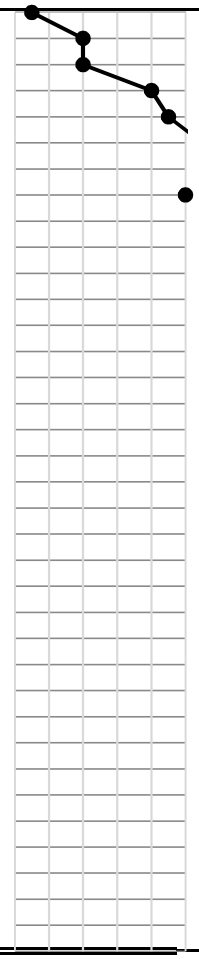
EXCAVATION NUMBER: **TP 1**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.15	TOPSOIL		Light brown/brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.2	OUTWASH GRAVEL		Brown/grey, sandy GRAVEL with trace cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 80 mm. Medium dense. Bedded. Dry.			
3.6	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.6 m



COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 2**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

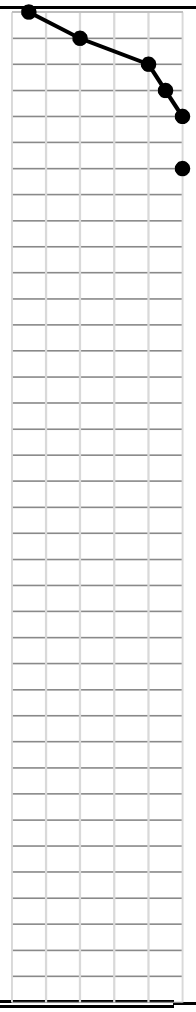
DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.15	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.		
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
1.3	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor rootlets. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		
3.8	OUTWASH GRAVEL		Grey, sandy GRAVEL with trace cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		NO SEEPAGE

Total Depth = 3.8 m

SCALA PENETROMETER

Blows per 100mm

0 2 4 6 8 10



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	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 3**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.15	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.35	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
0.6	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense.			
1.5	OUTWASH SAND		Grey/brown, SAND with some to minor gravel. Sand is fine to coarse. Medium dense. Bedded. Dry.			
4.0	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 4 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 4**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

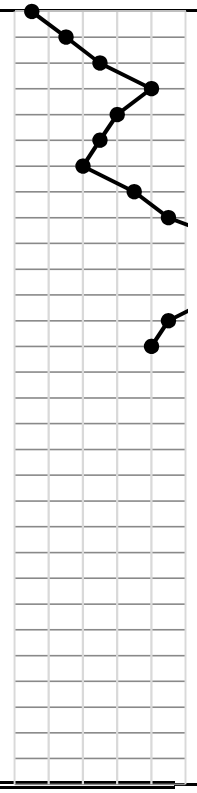
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.2	TOPSOIL		Brown, organic SILT with roots and rootlets. Silt is non-plastic. Dry.		
0.5	LOESS		Light brown, silty SAND with minor gravel. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
3.0	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor rootlets. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER

Blows per 100mm

0 2 4 6 8 10



Total Depth = 3 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 5**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.2	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
1.8	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor rootlets. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.			
3.5	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.5 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 6**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
1.3	UNCONTROLLED FILL		Grey, gravelly SAND with minor topsoil and trace sticks, rootlets and wire. Sand is fine to coarse. Gravel is fine to medium. Gravel is sub-angular to sub-rounded. Loose. Dry.			
1.6	BURIED TOPSOIL		Brown, organic SILT with rootlets and roots. Silt is non-plastic. Dry.			
2.6	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.			
2.9	OUTWASH SAND		Grey/brown, gravelly SAND to SAND with some gravel. Sand is fine to coarse. Medium dense. Bedded. Dry.			
4.2	OUTWASH GRAVEL		Grey, sandy GRAVEL with some cobbles and minor boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 4.2 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 7**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.15	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
2.3	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.			
4.0	OUTWASH GRAVEL		Dark grey, sandy GRAVEL with minor cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 250 mm. Medium dense. Bedded. Dry to moist.		NO SEEPAGE	

Total Depth = 4 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 8**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
2.6	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor rootlets, cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 200 mm. Medium dense. Bedded. Dry.			
3.8	OUTWASH GRAVEL		Dark grey, sandy GRAVEL with minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 90 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.8 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 9**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

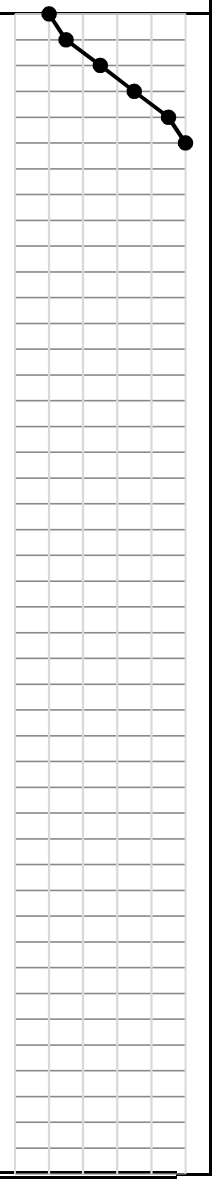
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.		
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
1.3	OUTWASH GRAVEL		Grey, sandy GRAVEL with some cobbles and minor boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 200 mm. Medium dense. Bedded. Dry.		
4.5	OUTWASH GRAVEL		Dark grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER

Blows per 100mm

0 2 4 6 8 10



Total Depth = 4.5 m

COMMENT:

Logged By: MDP

Checked Date:

Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 10**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.		
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
2.4	OUTWASH GRAVEL		Brown/grey, sandy GRAVEL with minor rootlets and trace cobbles and roots. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 80 mm. Medium dense. Bedded. Dry.		
3.5	OUTWASH GRAVEL		Brown/grey, sandy GRAVEL with some to minor cobbles and minor boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER
Blows per 100mm
0 5 10 15

Total Depth = 3.5 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 11**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.1	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.			
2.5	OUTWASH GRAVEL		Grey, sandy GRAVEL with some to minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.			
2.9	OUTWASH SAND		Grey/brown, gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to sub-angular. Medium dense. Bedded. Dry.			
3.4	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.4 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 12**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.1	TOPSOIL		Brown, organic SILT with rootlets and roots. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets and trace roots. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.9	OUTWASH GRAVEL		Grey, sandy GRAVEL with some cobbles, minor rootlets and trace boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Boulders to 300 mm. Medium dense. Bedded. Dry.			
3.3	OUTWASH GRAVEL		Dark grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.3 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 13**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 2 4 6 8 10)
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
2.5	OUTWASH GRAVEL		Grey/brown, sandy GRAVEL with some cobbles and trace rootlets. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.			
4.2	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 4.2 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 14**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.2	OUTWASH GRAVEL		Grey, sandy GRAVEL with some cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.			
3.1	OUTWASH GRAVEL		Grey, sandy GRAVEL with minor to trace cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.1 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 15**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

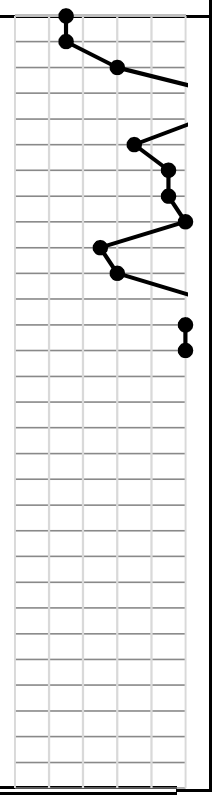
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.		
0.3	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
1.6	OUTWASH GRAVEL		Grey/brown, sandy GRAVEL with minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 100 mm. Medium dense. Bedded. Dry.		
3.0	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER

Blows per 100mm

0 2 4 6 8 10



Total Depth = 3 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 16**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

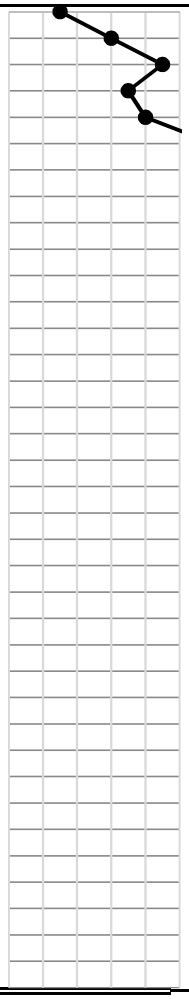
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.		
0.2	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.		
3.7	OUTWASH GRAVEL		Grey, sandy GRAVEL with trace rootlets and cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 200 mm. Medium dense. Bedded. Dry.		NO SEEPAGE

SCALA PENETROMETER

Blows per 100mm

0 2 4 6 8 10



Total Depth = 3.7 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 17**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	19-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	19-Dec-17

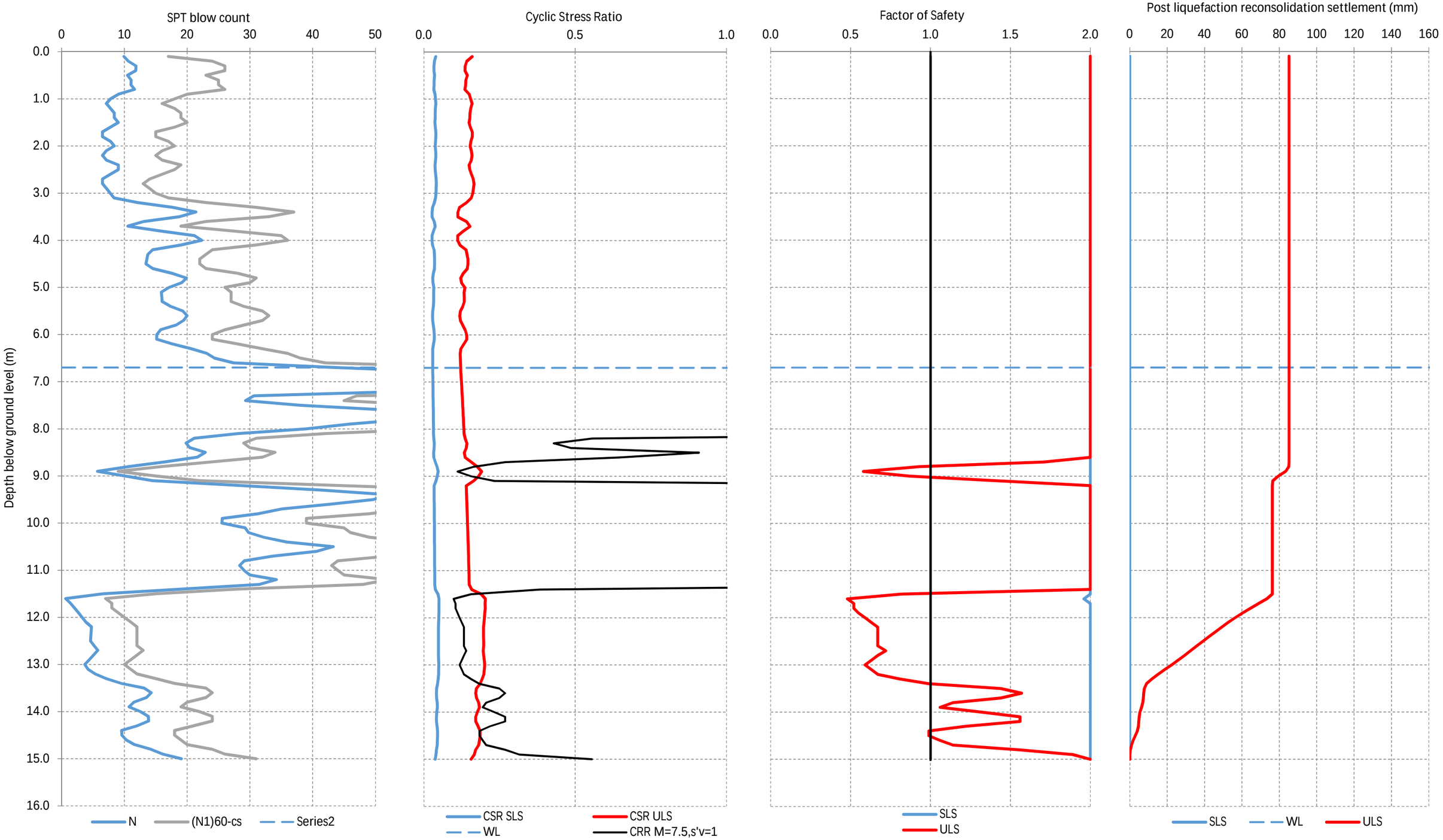
DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.1	TOPSOIL		Brown, organic SILT with rootlets. Silt is non-plastic. Dry.			
0.2	LOESS		Light brown, silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Dry.			
1.9	OUTWASH GRAVEL		Grey, sandy GRAVEL with trace rootlets and cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 200 mm. Medium dense. Bedded. Dry.			
3.5	OUTWASH GRAVEL		Grey/brown, sandy GRAVEL with minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-angular to sub-rounded. Cobbles to 200 mm. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 3.5 m

COMMENT:	Logged By: MDP
	Checked Date:
	Sheet: 1 of 1

Appendix C: Liquefaction Analysis

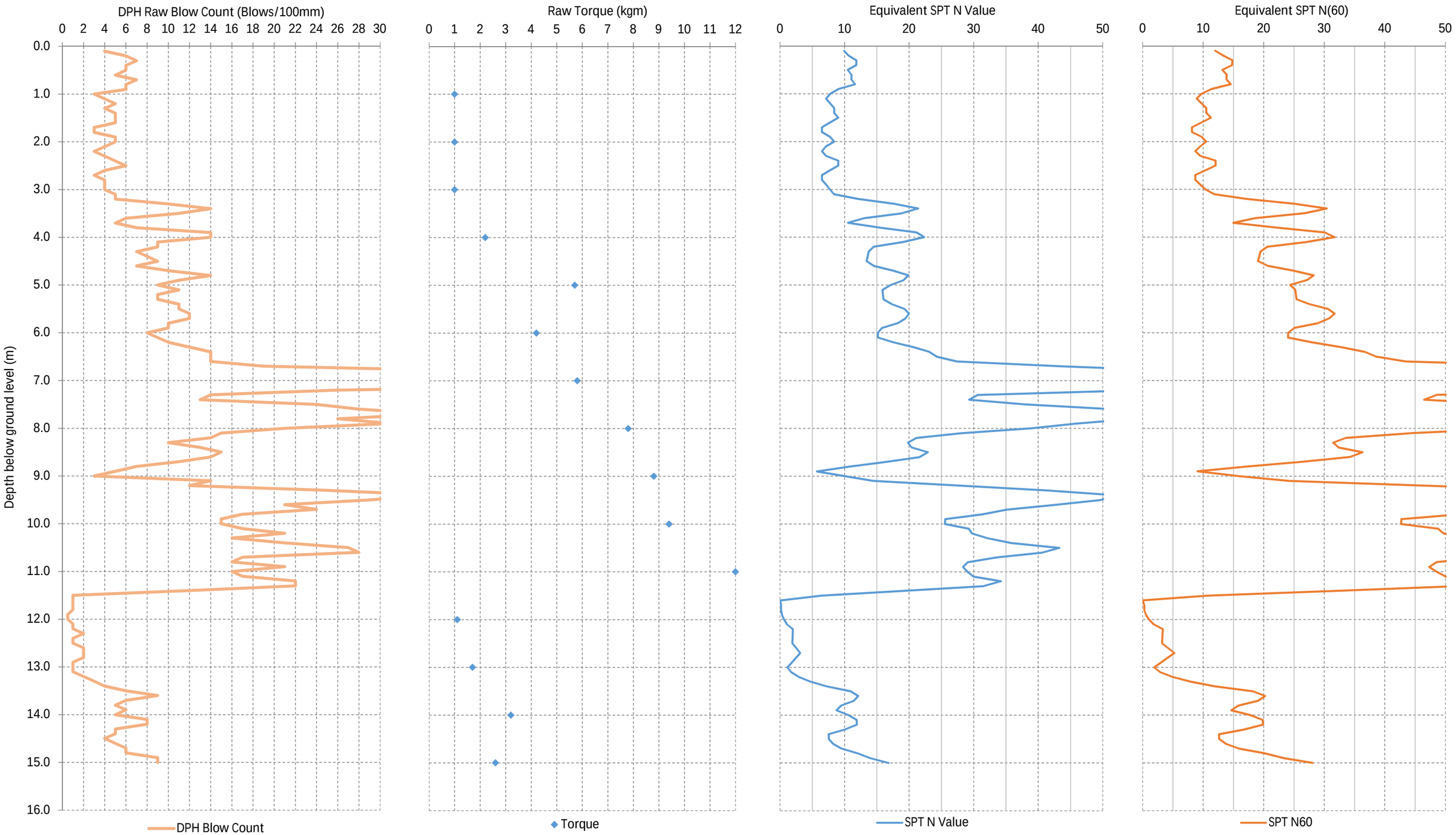
LSN (SLS)	LSN (ULS)	Crust Thickness (SLS)	Crust Thickness (ULS)
0.0	7.1	0.0	8.7



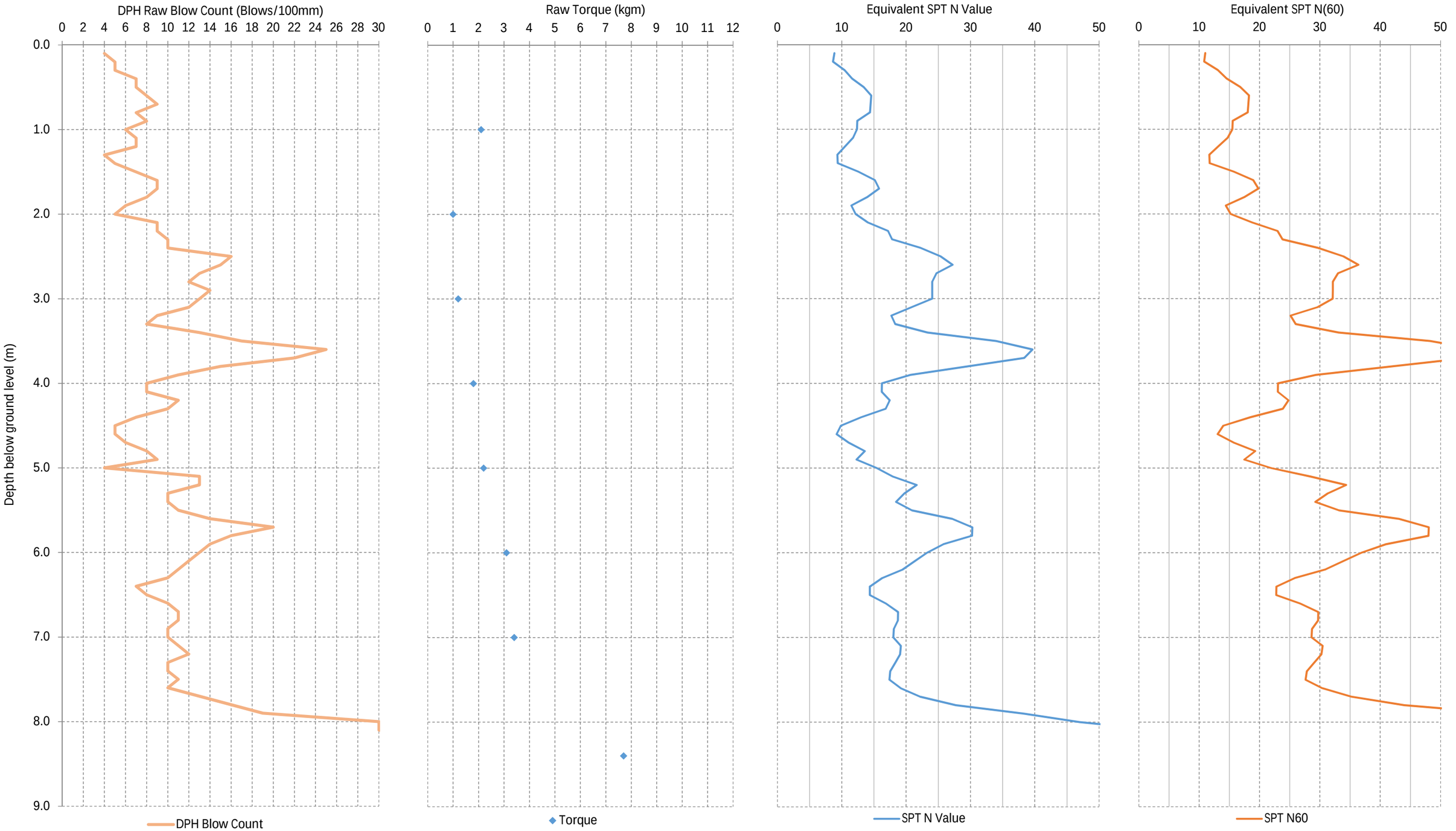
Note: Settlements as per Idriss and Boulanger (2014)

GEOSOLVE

PROJECT	170839 - Mt Iron Junction
DESCRIPTION	Liquefaction Analysis
LOCATION	Wanaka
CLIENT	Mt Iron Junction Limited
TEST NUMBER	DPH1
DATE	17/01/2018
LOGGED BY	RC
ANALYSED BY	MDP
CHECKED BY	FAW



GEOSOLVE	PROJECT	170839 - Mt Iron Junction	CLIENT: Mt Iron Junction Limited
	DESCRIPTION	Liquefaction Analysis	TEST NUMBER: DPH1
	LOCATION	Wanaka	DATE: 17/01/2018
			LOGGED BY: RC
			ANALYSED BY: MDP
			CHECKED BY: FAW



PROJECT	170839 - Mt Iron Junction	CLIENT	Mt Iron Junction Limited
DESCRIPTION	Liquefaction Analysis	TEST NUMBER	DPH2
LOCATION	Wanaka	DATE	17/01/2018
		LOGGED BY	RC
		ANALYSED BY	MDP
		CHECKED BY	FAW

Appendix D: Permeability Testing Results

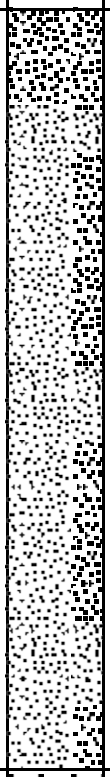
GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: SP 1

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
1.7	UNCONTROLLED FILL		Light grey, SAND with some gravel and silt, trace cobbles and boulders. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Boulders up to 700 mm diameter. Loose to medium dense. Massive. Dry.			
1.8	BURIED TOPSOIL		Brown, organic SILT with minor rubbish. Rubbish includes wire fence. Firm. Massive. Dry.			
2.6	OUTWASH GRAVEL		Grey, sandy GRAVEL with lenses of gravelly SAND and silty SAND. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Medium dense. Bedded. Moist.		NO SEEPAGE	

Total Depth = 2.6 m

COMMENT:	Logged By: JAS/MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **SP 2**

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
1.2	UNCONTROLLED FILL		Light grey, sandy GRAVEL with trace cobbles and organic SILT. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Loose to medium dense. Massive. Dry.			
1.6	BURIED TOPSOIL		Dark brown, sandy organic SILT with minor gravel. Sand is fine. Gravel is fine to coarse. Firm. Massive. Moist.			
2.4	OUTWASH GRAVEL		Grey, sandy GRAVEL with trace cobbles. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded. Medium dense. Bedded. Moist.		NO SEEPAGE	

Total Depth = 2.4 m

COMMENT:

Logged By: JAS/MDP
Checked Date:
Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: SP 3

PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.3	TOPSOIL/LOESS		Brown, organic SILT and silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Massive. Dry.			
1.3	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded to sub-angular. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 1.3 m

COMMENT:	Logged By: JAS/MDP
	Checked Date:
	Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: SP 4

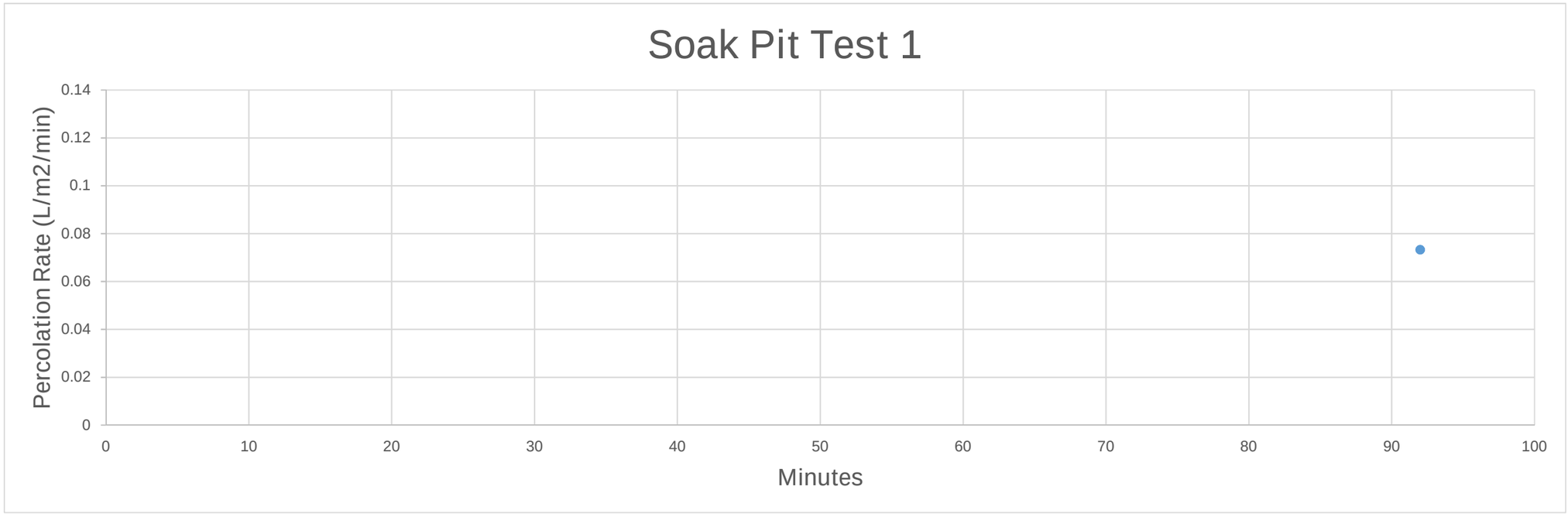
PROJECT:	Mt Iron Junction	JOB NUMBER:	170839

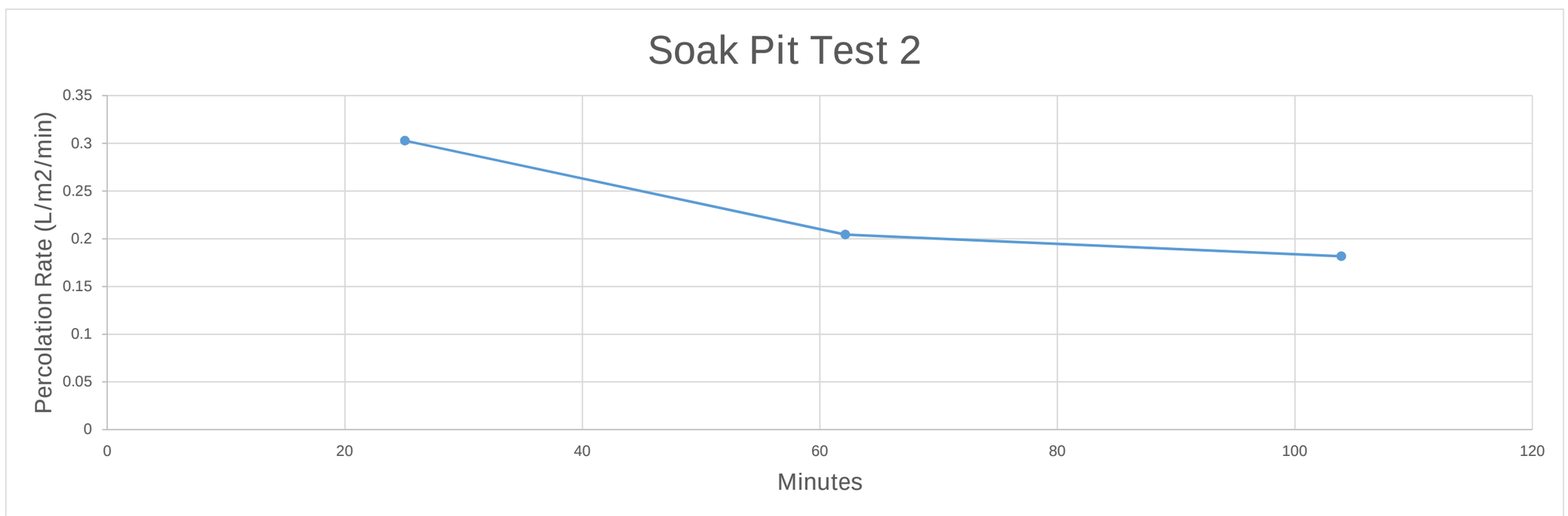
EASTING:		mE	EQUIPMENT:	8 T Excavator	OPERATOR:	Ben
NORTHING:		mN	INFOMAP NO.		COMPANY:	Diverse Works
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	18-Dec-17
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	18-Dec-17

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER
0.3	TOPSOIL/LOESS		Brown, organic SILT and silty SAND with minor rootlets. Sand is fine to medium. Silt is non-plastic. Firm. Massive. Dry.			
1.2	OUTWASH GRAVEL		Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse and sub-rounded to sub-angular. Medium dense. Bedded. Dry.		NO SEEPAGE	

Total Depth = 1.2 m

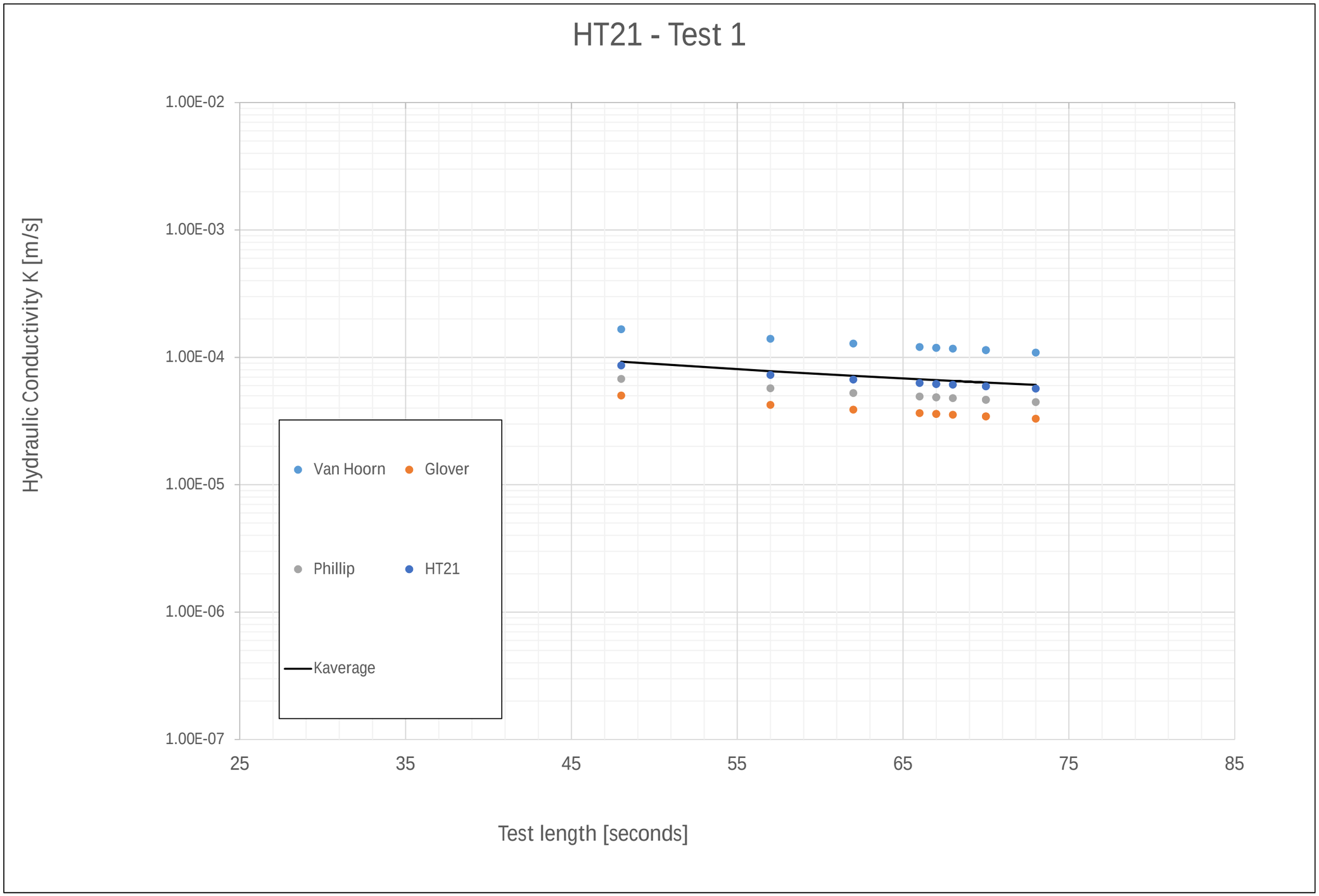
COMMENT:	Logged By: JAS/MDP
	Checked Date:
	Sheet: 1 of 1



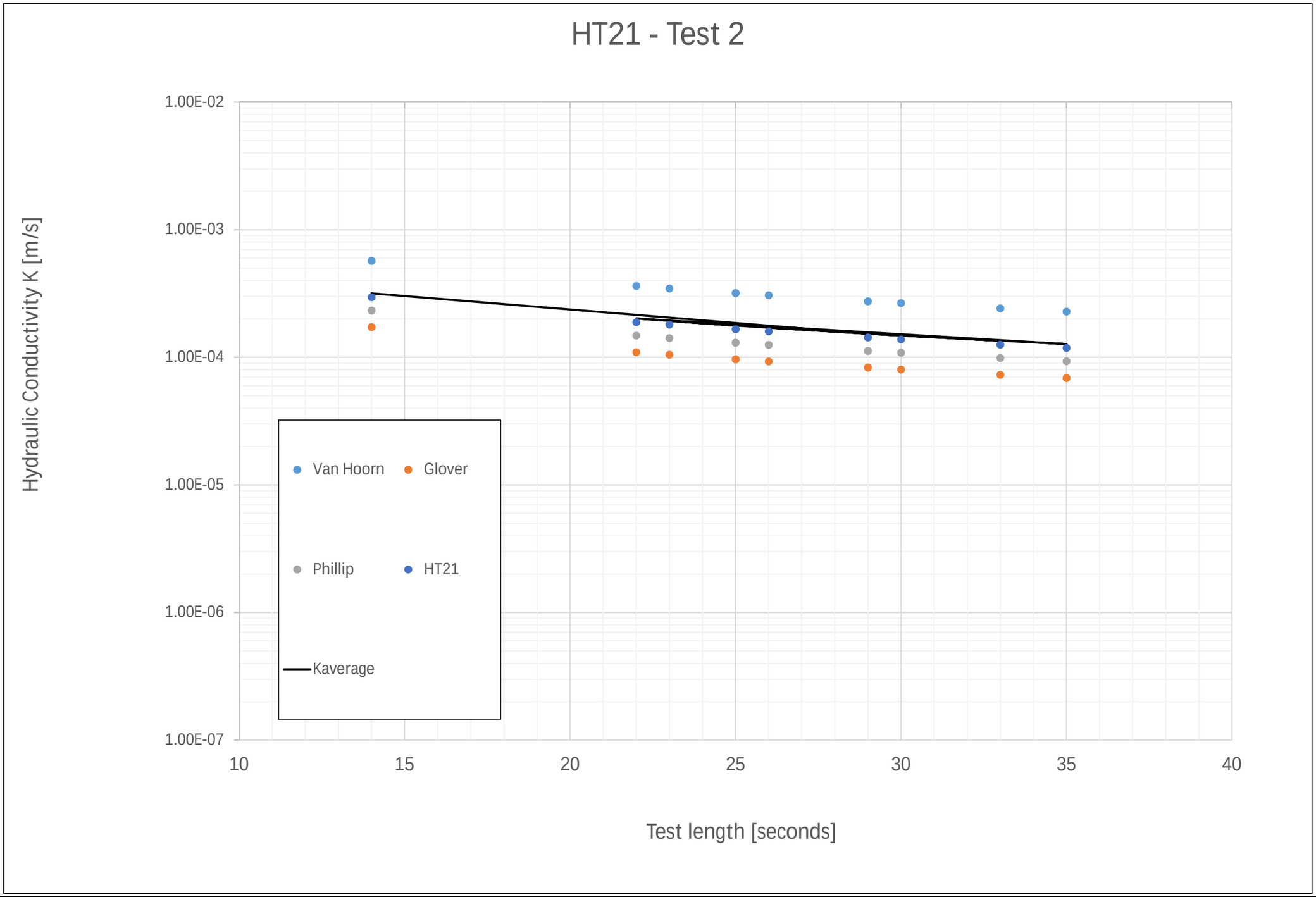


GEOSOLVE

PROJECT	170839 - Mt Iron Junction	CLIENT	Mt Iron Junction Limited
DESCRIPTION	Peremability Testing	TEST NUMBER	SP 1 and 2
LOCATION	Wanaka	DATE	18/12/2017
		LOGGED BY	JAS/MDP
		ANALYSED BY	MDP
		CHECKED BY	FAW



GEOSOLVE	PROJECT	170839 - Mt Iron Junction	CLIENT: Mt Iron Junction Limited
	DESCRIPTION	Peremability Testing	TEST NUMBER: HT21 1
	LOCATION	Wanaka	DATE: 18/12/2017
			LOGGED BY: JAS/MDP
			ANALYSED BY: MDP
			CHECKED BY: FAW



GEOSOLVE	PROJECT	170839 - Mt Iron Junction	CLIENT: Mt Iron Junction Limited
	DESCRIPTION	Peremability Testing	TEST NUMBER: HT21 2
	LOCATION	Wanaka	DATE: 18/12/2017
			LOGGED BY: JAS/MDP
			ANALYSED BY: MDP
			CHECKED BY: FAW

Appendix 3: Aurora – Supply Confirmation Letter

AURORA ENERGY LIMITED
PO Box 5140, Dunedin 9058
PH 0800 22 00 05
WEB www.auroraenergy.co.nz

26 June 2023

Phil Shipton
Paterson Pitts Group

Sent via email only: phil.shipton@ppgroup.co.nz

Dear Phil,

ELECTRICITY SUPPLY AVAILABILITY FOR A PROPOSED SIX LOT SUBDIVISION.
MOUNT IRON JUNCTION, WANAKA. LOTS ONE, TWO AND SIX OF LOT 5 DP 15016.

Thank you for your inquiry outlining the above proposed development.

Subject to technical, legal and commercial requirements, Aurora Energy can make a Point of Supply[1] (PoS) available for this development.

Disclaimer

This letter confirms that a PoS **can** be made available. This letter **does not** imply that a PoS is available now, or that Aurora Energy will make a PoS available at its cost.

Next Steps

To arrange an electricity connection to the Aurora Energy network, a connection application will be required. General and technical requirements for electricity connections are contained in Aurora Energy's Network Connection Standard. Connection application forms and the Network Connection Standard are available from www.auroraenergy.co.nz.

Yours sincerely

Niel Frear
CUSTOMER INITIATED WORKS MANAGER

[1] Point of Supply is defined in section 2(3) of the Electricity Act 1993.

Appendix 4: Chorus – Supply Confirmation Letter

New Property Development Contract

Development location (Site)	237 Wanaka-Luggate Highway , Wanaka, Queenstown-Lakes District, 9382		
Your project reference	McDonalds Wanaka		
Stage of development to which this contract applies	Not staged	Number of connections in the development/stage	1
Chorus reference ID	10494293	Charges (incl GST)	$ 0.00
Included products	Pre-built fibre Commercial fibre network		

DEVELOPER :	
Name	MCDONALD'S RESTAURANTS (NEW ZEALAND) LIMITED
Address	Great South Rd, Greenlane, Auckland, 1051

I confirm that I have read the Terms and Conditions of Chorus' NPD Contract and the related Policies, and that I agree to enter a binding contract with Chorus on those terms, in electronic form.

Agreed for and on behalf of MCDONALD'S RESTAURANTS (NEW ZEALAND) LIMITED by its authorised signatory:

Contact name	Leslie Eckard
Phone number	0272254454
Email address	*leslie@pcsltd.co.nz*

Date of acceptance: **18/07/2023**

Terms and Conditions

This New Property Development Contract ("NPD Contract") comprises of the cover page, these terms and conditions and the Policies and, other than those provisions expressed to survive expiry or termination, will expire 12 months after completion of the Services by Chorus. Terms used but not defined in this NPD Contract will have the meanings contained in the Policies.

Ordering Portal

1. A quote will be generated based on the information you supply in the portal relating to your development ("Development Scope"). You are solely responsible for any errors or omissions relating to the Development Scope. Chorus accepts no liability for any additional activities or services outside of the Development Scope.

2. Chorus will provide a quote based on the Development Scope for all design work, installation work and record updates Chorus will provide to you ("Services").

Quote

3. Any quote will be valid for 90 days from the date it is issued ("Quotation Period"). Upon expiry of the Quotation Period without acceptance by you and payment of the Charges, the quote will expire and be incapable of acceptance.

4. Prior to your acceptance of the quote, Chorus may alter the quote at any time if circumstances change such as where you change the Development Scope or there are technical issues with the portal. If you wish to change the Development Scope after your acceptance of a quote, the amendment process described in clause 8 below will apply.

Acceptance

5. If you wish to accept a quote you must communicate acceptance via the portal and pay the Charges within the Quotation Period. Once you have accepted the quote and paid the Charges within the Quotation Period, Chorus will proceed with your order ("Order"). If you do not pay the Charges within the Quotation Period your NPD Contract may be cancelled by us at our discretion. To restart the process you will need to begin the quotation process and accept the NPD Contract again.

6. Once created an Order can only be terminated in accordance with the terms of this NPD Contract.

7. If you are placing an Order on behalf of another party, you warrant that you are authorised to bind the relevant party to the terms of this NPD Contract and have all necessary authorities, powers and consents to act and contract with Chorus for the Services on behalf of that party.

Amendment to Order

8. Once an Order has been created, if you wish to amend the Order you must submit a written request to Chorus. Chorus will consider your request and respond with any changes to the current Order and may put your current Order on hold. If you accept these changes and pay any required Charges within 30 days, the Order will be amended. If you do not accept the amendment and pay any required Charges within the 30-day period, then the Development Scope will remain unchanged, the amendment may be cancelled by us at our discretion, and/or you may exercise any agreed termination rights under clause 24.

9. Chorus may amend an Order if:

a. You have not started to install the materials within 12 months of acceptance of the quote;

b. There is a change in any plans you provide or the Development Scope or there is a change in legal ownership of the Site;

c. Any additional services or costs are incurred for the relocation of any Chorus network equipment or infrastructure;

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d. There are additional third-party requirements to complete the Services that were not known at the time the Order was processed or there are any other errors in the Order; and/or

e. There are any third-party objections which prevent or hinder the delivery of the Services or the withholding of third-party consents required to deliver the Services, that cannot be resolved within a reasonable time.

Alternatively, where Chorus has a right to exercise its amendment rights under this clause, it may instead terminate this NPD Contract on 30 days' notice provided Chorus is not in breach of this NPD Contract.

Payment of Chorus charges

10. Payment of the Charges set out in a quote (and confirmed in the personalised cover page of your NPD Contract) in full is required before Chorus commences the Services.

11. All Charges are exclusive of GST and any other tax or levies unless otherwise stated.

Policies

12. You will comply with all procedures and requirements contained in https://www.chorus.co.nz/develop-with-chorus/docs/npd-policy ("Policies"). The Policies protect Chorus' legitimate business interests and are a material term of this NPD Contract which you must follow. The Policies may be updated by Chorus from time to time, as follows:

a. without further notice to you where Chorus considers, acting reasonably, the update(s) not to be to your detriment; and/or

b. on at least 30 days' written notice to you where Chorus considers the update(s) to be to your detriment, unless an update to the Policies without such notice is reasonably necessary in order to protect Chorus' legitimate interests.

Initial Activities

13. You agree to provide us with any plans and documents prescribed in the Policies prior to commencement of the Services.

14. After you have accepted the terms and Chorus has received both full payment of the Charges and the plans we require from you, Chorus will provide confirmation as to whether you will be required to install any infrastructure at the Site.

15. Where the Policies require you to undertake certain work and activities you warrant that you will attend to these promptly. You acknowledge that Chorus will be relieved of its obligations to provide the Services to the extent Chorus is reliant on you carrying out work and activities that you have not done.

16. You must let Chorus know immediately if you become aware of something which might give rise to a change in any of your plans and/or the Development Scope (such as changes in the number of Connections, changes to boundaries or changes to road layouts) or any potential non-compliance with the Network Specifications or any other procedures or requirements contained in the Policies.

Materials

17. Chorus will supply some of the materials that are required for you to install related to any communal infrastructure. Chorus supplied materials ("Materials") are as itemised and defined in the Policies. You will be responsible for supplying any additional materials not itemised in the Policies.

18. You will be responsible for any loss or damage to any Materials while they are in your possession including when the Materials are at the Site. Title in the Materials will remain with Chorus at all times and you will ensure all Materials are clearly identified as Chorus property. You authorise us to enter onto any premises where the Materials are stored and collect any Materials that have not been installed.

Installation

19. Other than specific installation services included in your Order, you are responsible for installing the Materials in accordance with the Policies. You will promptly remedy any non-compliant or defective installations in accordance with the Policies or the defects may be remedied by us in accordance with the Policies and paid for by you. Where you or your agent carry out the installation works, you warrant you will carry out the installation using the degree of skill expected of a competent installer of telecommunications networks. Installation in line with the Policies and Network Specifications will meet this standard.

20. Chorus will:

a. Build the network to the exterior boundary of the Site; and

b. Undertake any additional works so that the Site can be linked to the Chorus network including jointing, testing, and commissioning works as prescribed in the Policies; and

c. As part of Pre-Built Fibre, Chorus will also install relevant End User Infrastructure to the relevant premises as defined in the Policies. You agree to grant to Chorus all access rights to the Site and the relevant premises that we require in order to install and maintain any End User Infrastructure.

21. If you have ordered specific installation services from us then you will complete the “pre-installation work” detailed in the Policies before we perform those installation services.

22. Chorus will issue a clearance letter and link the Site to our network when all the pre-requisites stated in the Policies have been met. Chorus may rescind any clearance letter if it becomes aware that your installation does not meet the Policies, applicable law or regulation and Chorus reserves the right to advise the relevant authority of any revocation or rescission of the clearance letter.

Termination

23. Either party may on written notice terminate this NPD Contract if the other party:

a. Has materially breached its obligations under this NPD Contract and if capable of remedy, has not remedied the breach within 30 days of being notified of the breach;

b. Purports to assign or otherwise goes into liquidation, has a receiver, administrator, statutory manager, or similar officer appointed; or

c. Becomes insolvent, ceases to carry on their business, makes any composition or arrangement with its creditors, or is deemed or perceived unable to pay its debts when they fall due.

24. You may terminate this NPD Contract at any time for any reason (including under clause 8) on 30 days’ notice and you must return any Materials in your possession that have not been installed at the date of termination.

25. If this NPD Contract is terminated by Chorus under clauses 9 or 23, or by you under clause 24, we will retain a proportion of the Charges paid by you in order to reimburse Chorus for the following costs it incurs up to the date of termination **(**“Termination Costs”**)**:

a. Any costs paid or payable to third parties;

b. A fixed cost to recover Chorus’ internal costs. The fixed costs will be calculated as follows:

i. $250 if termination occurs prior to completion of the design plan (as defined in the Policies);

ii. $350 if termination occurs after completion of the design plan but before commencement of any Chorus build work; or

iii. $600 if termination occurs after commencement of any Chorus build work; and

c. The costs of any Materials that have not been installed at the date of termination and that are not returned to Chorus within 10 days of termination or are returned in a condition which does not allow for the Materials to be reused by Chorus.

26. Termination Costs will not exceed the Charges payable under this NPD Contract but are without prejudice to Chorus' right to recover from you any other amounts you may owe us under this NPD Contract.

Liability

27. Other than liability arising under clause 30, each party's liability for any loss of income, profits, revenue or savings (whether direct or indirect), or any indirect or consequential loss or damages, is excluded.

28. Subject to clause 29, each party's total liability for all losses or damages arising out of or in connection with this NPD Contract, whether in contract, tort (including negligence), equity, or otherwise, will be limited to the greater of $100,000 or the Charges paid under this NPD Contract.

29. The limitations in clause 28 will not apply to any liability of a party arising out of:

a. a breach of confidentiality or a party's health and safety obligations;

a. the fraud or wilful breach of this NPD Contract by a party;

c. your indemnification obligations under clause 30; or

d. a failure to pay any amount due and owing under this NPD Contract.

30. You will indemnify and hold harmless Chorus from any loss arising in relation to your failure to comply with clause 19 or 21 of this NPD Contract or any damage you cause to our network. We may put your Order on hold until payment is received for any network damage you cause and/or terminate this NPD Contract under clause 23 in the event of non-payment by you.

Force Majeure

31. Non-performance by either party of its obligations due to an event beyond that party's reasonable control will be excused to the extent that performance is delayed or prevented by that force majeure event. If a force majeure event lasts for more than 60 days Chorus may terminate this NPD Contract.

Insurance

32. You will maintain during the term of this NPD Contract public liability insurance for an amount of not less than $1,000,000 and Chorus will maintain public liability insurance for an amount of not less than $10,000,000.

Confidentiality

33. Each party will keep confidential, secure, and not misuse any information received from the other in connection with this NPD Contract (including the contract itself). The disclosure and use of confidential information by either of us is permitted to the extent required by law or to comply with a party's obligations under this NPD Contract. Where required to disclose a party will where practical give prior written notice before disclosure. No written notice is required where confidential information is being disclosed by you to any contractor installing the Materials on your behalf, to any councils or other utilities companies solely for the purposes of consents and planning utilities corridors or by Chorus to our service companies.

Disputes

34. Any dispute or difference arising out of or in connection with this contract, or the subject matter of this contract, including any question about its existence, validity, or termination, shall be referred to mediation in the first instance and if not resolved, referred to arbitration in accordance with the Arbitration Act 1996. This will not prevent either party from seeking urgent interlocutory or injunctive relief from a Court.

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Assignment

35. You may not assign or novate any of your rights or obligations under this NPD Contract without Chorus' prior written consent (not being unreasonably withheld).

Precedence

36. In the event of conflict or inconsistency between any plans you prepare and provide us and the Chorus Design Plan (as defined in the Policies), the Chorus Design Plan will take precedence. In the event of any conflict or inconsistency between this NPD Contract and the Policies, this NPD Contract will take precedence.

General

37. Each notice or other communication will be made in writing and brought to the attention of the other party. No notice or communication will be effective until received.

38. In the event that any personal information (as that term is defined in the Privacy Act 2020) about you is disclosed to Chorus under or in relation to this NPD Contract, the use, disclosure and security of, and your access to, that information, will be as set out in our Privacy Policy, which can be found at https://www.chorus.co.nz/terms-and-conditions/our-privacy-policy.

39. You warrant you are acquiring the Services as a business in the course of trade and represent you are not a consumer.

40. Other than updates to the Policies as per clause 12 above, any amendment to this NPD Contract must be agreed by both parties and recorded in writing.

41. Clauses 7, 12, 18, 19, 22, 25 to 33 and 45 and the NPD Policies will survive termination or expiry of this NPD Contract.

42. No term or condition of the NPD Contract will be deemed to have been waived in part or in full and no delay, breach or default will be deemed to have been excused in part or in full unless the waiver or excuse is in writing and signed by an authorised representative of the relevant party.

43. Unless you have entered into a separate developer partnership agreement which refers to and incorporates the terms of this NPD Contract, this NPD Contract represents the entire agreement between the parties for the Services and supersedes all prior negotiations, representations, and agreements whether written or oral.

44. Each term in this NPD Contract is separately binding. If for any reason either of us cannot rely on any term then all the other terms remain binding.

45. This NPD Contract is governed by the laws of New Zealand. We both submit to the non-exclusive jurisdiction of the Courts of New Zealand.