APPLICATION AS NOTIFIED

Queenstown Lakes District Council
(RM210477)

Submissions Close 14 October 2021

FORM 19

File Number RM210477

QUEENSTOWN LAKES DISTRICT COUNCIL

PUBLIC NOTIFICATION

Notification of Requirement for an alteration to a designation under 181 of the Resource Management Act 1991.

Queenstown Lakes District Council gives notice of its requirement for an alteration to a designation

The requirement is for:

To alter existing "Designation No 44 Water Storage Tanks" in the Operative Queenstown Lakes District Plan (ODP) and Proposed Queenstown Lakes District Plan (PDP) by the addition of a parcel of land of approximately 1,000m^2. Works on the site include the erection of two new water tanks and the removal of four existing water tanks.

The site to which the requirement applies is as follows:

The site is located on the on the north-western escarpment of "Bible Face", Glenorchy and the alteration relates to existing Designation No. 44: Water Storage Tanks. The legal description of the subject land is as follows: Lot 4 DP 394250 (Identifier 377050) and Lot 202 DP 544220 (Identifier 946649).

This file can also be viewed at our public computers at these Council offices:

- **74 Shotover Street, Queenstown;**
- **Gorge Road, Queenstown;**
- **33-35 Reece Crescent, Wanaka;**
- **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:

https://www.qldc.govt.nz/services/resource-consents/notified-resource-consents#public-rc

The Council planner processing this application on behalf of the Council is Mary McConnell, who may be contacted by phone at 021 721 623 or e-mail at mary.mcconnell@qldc.govt.nz

Any person may make a submission on the application, but a person who is a trade competitor of the applicant may do so only if that person is directly affected by an effect of the activity to which the application relates that –

a) adversely affects the environment; and
b) does not relate to trade competition or the effects of trade competition..

You may make a submission by sending a written or electronic submission to Council (details below). The submission should be in the format of Form 21. Copies of this form are available Council website:

https://www.qldc.govt.nz/services/resource-consents/application-forms-and-fees#other_forms

Submissions close on: Thursday 14 October 2021

You must serve a copy of your submission to the applicant (Queenstown Lakes District Council) as soon as reasonably practicable after serving your submission to Council:

C/- Beca Ltd
PO Box 13960
Christchurch 8141
Telephone No: 03 374 3180
Attention: Paul Whyte
paul.whyte@beca.com

QUEENSTOWN LAKES DISTRICT COUNCIL

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

Date of Notification: Thursday 16 September 2021

Address for Service for Consent Authority:

Queenstown Lakes District Council	**Phone**	**03 441 0499**
Private Bag 50072, Queenstown 9348	**Email**	**rcsubmission@qldc.govt.nz**
Gorge Road, Queenstown 9300	**Website**	**www.qldc.govt.nz**

ANZ Centre, 267 High Street,
PO Box 13960, Christchurch,
8141, New Zealand
T: +64 3 366 3521 // **F:** +64 3 366 3188
E: info@beca.com // www.beca.com

Queenstown Lakes District Council
Private Bag 50072
Queenstown 9348

28 May 2021

Attention: Richard Campion

Dear Richard

Glenorchy Water Reservoir – Alteration of Designation No.44

Queenstown Lakes District Council (QLDC) is undertaking a project to upgrade the Glenorchy water storage to meet future town water supply and firefighting demands, on a site located at Bible Face, Glenorchy.

To facilitate the upgrade QLDC is applying to alter existing “Designation No 44 Water Storage Tanks” in the Operative Queenstown Lakes District Plan (ODP) and Proposed Queenstown Lakes District Plan (PDP) pursuant to section 181(1) and (4) of the Resource Management Act (RMA), by increasing the area of the existing designated site. The application also incudes proposed works to erect two new water tanks and demolish four existing water tanks.

An application (RM200984) to alter the designation under section 181(3) of the RMA was submitted to QLDC Regulatory on 27 November 2020 (RM200984). QLDC Regulatory considered the application did not meet the requirements of section 181(3) and accordingly the application has been amended to address the matters under section181(2). The amended application and accompanying Assessment of Environmental Effects is attached to this application.

QLDC accepts that this alteration of the designation will be publicly notified.

Please invoice QLDC’s Property and Infrastructure Department directly for processing fees. We will forward a purchase order code as soon as one becomes available.

Please do not hesitate to contact the undersigned if you require any additional information or wish to discuss any aspect of the application.

Yours sincerely

Paul Whyte
Senior Associate - Planning

on behalf of

Beca Limited
Phone Number: +64 3 374 3180
Email: paul.whyte@beca.com

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) Queenstown Lakes District council

All trustee names (if applicable):

*Contact name for company or trust: Belinda Evert | Programme Manager | Property & Infrastructure

*Postal Address: Private Bag 50072 Queenstown 9348

*Post code: 9348

*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: belinda.evert@qldc.govt.nz

*Phone Numbers: Day +64 3 441 3677

Mobile: +64 27 255 7973

*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: Beca Ltd

*Phone Numbers: Day 03 374 3180

Mobile: 0274723675

*Email Address: paul.whyte@beca.com

*Postal Address: PO Box 13960
Christchurch 8141

*Postcode: 8141

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: [ ]
- Agent: [ ]
- Other - Please specify: RCP-Project Managers
- Email: [x]
- Post: [ ]

*Attention: Julia Lovrich

*Postal Address: PO Box 1061 Queenstown, 9300

*Post code: 9300

*Please provide an email AND full postal address.

*Email: jlovrich@rcp.co.nz

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

Owner Name:

Owner Address:

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: Julia Lovrich

*Email: jlovrich@rcp.co.nz

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:

Bible Terrace Rise, Bible Terrace, Glenorchy

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

Lot 202 DP 544220

District Plan Zone(s): Rural

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 ☐

The operational water reservoirs are fenced off. It is recommended to park at the bottom of the access and walk up due to the condition of the existing access.There are also buried services and an open excavation .

Document Set ID: 6891044
Version: 1, Version Date: 03/06/2021

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:

CONSENT(S) APPLIED FOR // * Identify all consents sought

☐ Land use consent

☐ Subdivision consent

☐ Change/cancellation of consent or consent notice conditions

☐ Certificate of compliance

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

☐ 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:

Queenstown Lakes District Council (QLDC) is undertaking a project to upgrade the Glenorchy water storage to meet future town water supply and firefighting demands, on a site located at Bible Face, Glenorchy.

To facilitate the upgrade QLDC is applying to alter existing "Designation No 44 Water Storage Tanks" in the Operative Queenstown Lakes District Plan (ODP) and Proposed Queenstown Lakes District Plan (PDP) pursuant to section 181(1) and (4) of the Resource Management Act (RMA), by increasing the area of the existing designated site. The application also incudes proposed works to erect two new water tanks and demolish four existing water tanks.

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

Are any additional consent(s) required that have been applied for separately?

- Otago Regional Council

Consents required from the Regional Council (note if have/have not been applied for):

☐ Yes ☑ N/A

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 Applicant is 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 if this application 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)

☐ Manual Payment (can only be accepted once application has been lodged and acknowledgement email received with your unique RM reference number)

*Reference	PO 037605
*Amount Paid:	Landuse and Subdivision Resource Consent fees - please select from drop down list below (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 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 Paul Whyte

Firm/Company Beca Ltd

Dated 3 June 2021

**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.

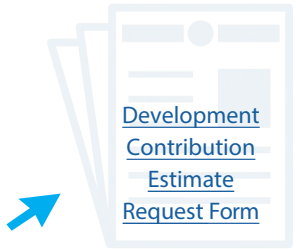
A3 APPENDIX 3 // Development Contributions

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

Form 20

Notice of Requirement by Local Authority for designation or alteration of existing designation

Sections 168A and 181(4) of the Resource Management Act 1991

To: Queenstown Lakes District Council
Private Bag 50072
Queenstown 9348

From: Queenstown Lakes District Council
Private Bag 50072
Queenstown 9348

Queenstown Lakes District Council gives notice of an alteration of an existing designation for a public work

1. **The site to which the notice of alteration of the designation applies is as follows:**

The site is located on the on the north-western escarpment of "Bible Face", Glenorchy and the alteration relates to existing Designation No 44 Water Storage Tanks.

The legal description of the subject land is as follows:

Lot 4 DP 394250 (Identifier 377050) and Lot 202 DP 544220 (Identifier 946649)

Refer to Section 3 in the attached report *"Glenorchy Water Storage Tanks –Notice of Requirement for Alteration to Designation No 44"*

2. **The nature of the proposed public work is:**

To alter existing "Designation No 44 Water Storage Tanks" in the Operative Queenstown Lakes District Plan (ODP) and Proposed Queenstown Lakes District Plan (PDP) by the addition of a parcel of land of approximately 1,000m^2.

The nature of the work on the site is set out in Section 3 of the attached report *"Glenorchy Water Storage Tanks –Notice of Requirement for Alteration to Designation No 44"*

In summary, the work includes the following:

- Installation of two 250 m3 proprietary steel tanks (total capacity 500 m3), including earthworks for foundations and to create a platform for the tanks; and the eventual replacement of the existing tanks with another two 250 m3 tanks (total future site capacity 1,000 m3)

- Earthworks limited to a small quantity of surface scraping to establish the tank platforms and foundations and a cut to accommodate a 2.3 m high (maximum) high timber retaining wall

- Kerb and channelling on the site to direct stormwater

- Installation of water and overflow pipes and communications on the site.

- Installation of the timber retaining wall behind the new tanks and a 1.9 m high security wire mesh fence located around the perimeter of the site

- Installation of a single-phase power supply

- Removal of the existing four pre-cast concrete tanks after completion of the new tanks

3. **The nature of the proposed conditions that would apply:**

   Retention of the existing condition as follows:

   C.31 Designation # 44 - Glenorchy Water Storage Tanks

   No activity or work may be undertaken within the designated area which could adversely affect the Council water storage tanks, without the consent of the Queenstown Lakes District Council. The purpose of this restriction is to ensure that no damage occurs to Council's water storage tanks.

4. **The effects that the public work will have on the environment and the ways in which any adverse effects will be mitigated are:**

   An assessment of the effects that the proposed work will have on the environment is provided in Section 5 of the attached report *"Glenorchy Water Storage Tanks –Notice of Requirement for Alteration to Designation No 44".*

5. **Alternative sites, routes and methods that have been considered to determine the most appropriate means for addressing the project's objectives**

   Alternatives are discussed in Section 6 of the attached report *"Glenorchy Water Storage Tanks –Notice of Requirement for Alteration to Designation No 44".*

6. **The public work and alteration to the designation are considered reasonably necessary for achieving the objectives of the requiring authority because:**

   The reasons are described in Section 7 of the attached report *"Glenorchy Water Storage Tanks –Notice of Requirement for Alteration to Designation No 44".*

7. **The following resource consents are needed for the proposed activity and have been applied for:**

   Refer to Section 1.2 of the attached report *"Glenorchy Water Storage Tanks –Notice of Requirement for Alteration to Designation No 44".*

8. **The following consultation has been carried out with parties that are likely to be affected by the proposal:**

   Refer to Section 10 of the attached report *"Glenorchy Water Storage Tanks –Notice of Requirement for Alteration to Designation No 44".*

9. **The Queenstown Lakes District Council District Council attaches the following information required to be included in this Notice by the District Plan, a regional plan or any regulations made under the Resource Management Act 1991:**

   A report entitled *"Glenorchy Water Storage Tanks –Notice of Requirement for Alteration to Designation No 44"* is attached.

Signature on behalf of Queenstown Lakes District Council

Date 9 September 2021

Address for service of applicant:

Beca Ltd
PO Box 13960
Christchurch 8141
Telephone No: 03 374 3180
Attention: Paul Whyte
paul.whyte@beca.com

Glenorchy Water Storage Tanks – Notice of Requirement for Alteration to Designation No 44

Assessment of Environmental Effects Prepared by Beca Limited

18 August 2021

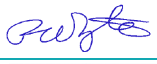
Prepared for Queenstown Lakes District Council

Creative people together transforming our world

Revision History

Revision Nº	Prepared By	Description	Date
1	Adam Mercieca	Draft for Review	15/04/2021
2	Paul Whyte	Final for Issue	05/05/2021
3	Paul Whyte	Updated for Submission	03/06/2021
4	Paul Whyte	Updated for Notification	09/08/2021

Document Acceptance

Action	Name	Signed	Date
Prepared by	Adam Mercieca		15/04/2021
Reviewed by	Paul Whyte		18/08/2021
Approved by	Jim Dabkowski		18/08/2021
on behalf of	Beca Limited		

Contents

Appendices

1 Introduction

1.1 Overview

Queenstown Lakes District Council (QLDC) is undertaking a project to upgrade the Glenorchy water storage to meet future town water supply and firefighting demands. The project includes the demolition of four existing water tanks and their replacement with two new water tanks on a site located at Bible Face, Glenorchy.

To facilitate the upgrade QLDC is applying to alter existing "Designation No 44 Water Storage Tanks" in the Operative Queenstown Lakes District Plan (ODP) and Proposed Queenstown Lakes District Plan (PDP) pursuant to section 181(1) of the Resource Management Act (RMA) by increasing the area of the designation from 585 m^2 to 1602 m^2 .A Notice of Requirement (RM200984) (NOR) was submitted to QLDC Regulatory on 27 November 2020 and sought that QLDC alter the designation under section 181(3) of the RMA. On the understanding that the NOR will instead be processed under section 181(1), this Assessment of Effects on the Environment (AEE) addresses each of the relevant matters under sections 181 and 168A of the RMA.

The details of the project required in an Outline Plan under section 176A of the RMA are incorporated into this AEE in accordance with section 176A(2)(b) of the RMA. Essentially, the proposed works include:

- Erection of two new water tanks to be located on a site that is to be added to the existing designation site
- Demolition of four existing water tanks on the existing designation site. The existing designation site will be utilised for future water storage purposes.

1.2 Other Approvals

In addition to the alteration of the designation application, the following approvals are also relevant:

- A resource Consent (RM20.262) for the discharge of contaminants to land where it may enter water for was granted by the Otago Regional Council in 2020. The consent relates to the discharge of reservoir water as part of the operation of the Glenorchy Water Supply.
- A concurrent resource consent application (RM200917) has been lodged with QLDC for earthworks associated with:
  - Upgrading the existing access track on Bible Face which provides access to the site
  - The trenching for the installation of utility pipes and communications on the western slope of Bible Face running west towards Oban Street for connection of the site to the wider network
  - Relocation of an existing earth bund on the site
- Easement (78474-OTH) has been obtained from the Department of Conservation for the right to drain water for the purpose of draining community supply drinking water into the Buckler Burn River.

1.3 Document Purpose and Structure

This document comprises the Assessment of Effects on the Environment (AEE) to support the alteration to designation and contains the following information:

- Describes the existing environment
- Describes the proposed works
- Details the reasons for the application
- Assesses the effects associated with the construction and operation of water supply tanks on the site
- Identifies measures to avoid, remedy or mitigate adverse effects on the environment
- Sets out the statutory framework

2 Description of Existing Environment

2.1 The Site

2.1.1 Location and Description

The existing designated site is located on the north-western escarpment of “Bible Face”, a distinctive landform located to the south of Glenorchy Township. This is shown in Figure 1, in which the existing designation and the proposed extension to the designation are defined. The area of the existing designation, which is 585 m2, will be increased to 1602 m^2, a net increase of 1017 m^2.

The existing site largely occupies a 20 m wide terrace bench close to the top of the face and comprises approximately 585 m^2 in area. The bench appears to have been cut into the side of the plateau (i.e. manmade, with the excavated material cast to the downhill side. The slopes above and below the site are approximately 1.5 Horizontal to 1 Vertical (1.5H:1V). The existing designated site is currently occupied by four existing precast concrete water reservoirs with a combined water storage capacity of 90 m^3. These reservoirs provide water supply and firefighting resources for the Glenorchy township but are showing signs of age with cracks and leaks (refer Figure 2).

The site currently has an earth bund along the front of the site which was constructed by another party as part of the Shiel Street subdivision (discussed below) and consented separately as part of the subdivision consent (RM171428). The purpose of the earth bund is to divert stormwater from the Bible Face away from the subdivision. It has become apparent that the earth bund will impede vehicular access to the proposed tanks and is required to be relocated approximately 2 m to the north closer to the edge of the terrace. The earthworks required for the relocation of the bund are being sought as part of RM200917 (refer Section 1.2 of AEE).

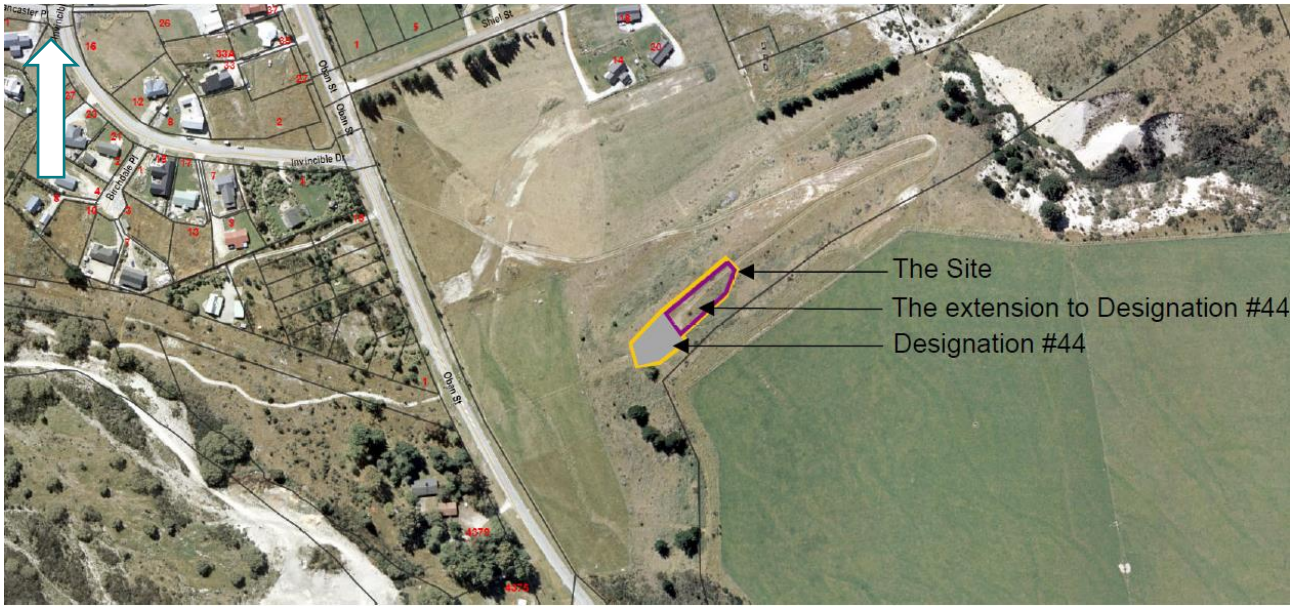


Figure 1: The location of the Designation #44 (grey hatched area containing the four existing reservoirs), the proposed extension (highlighted in purple) and the site (highlighted in yellow, not to scale).

2.1.2 Legal Description

The existing designation and proposed altered designated site are legally contained within the following certificates of title- Lot 4 DP 394250, Identifier 377050 and Lot 202 DP 544220, Identifier 946649 (refer to **Appendix A)**.Both of the titles are owned by QLDC, in which Lot 4 comprising 585 m^2 is commensurate with the existing designation, and the proposed additional designation area is contained in Lot 202. Lot 202 comprises 4.3 ha in total and encompasses a large part of the Bible Face terrace. The lot was part of a larger lot (Lot 1 DP 430468) in which the lower part has been developed for the Shiel Street residential subdivision (RM171428) and which ultimately will comprise approximately 60 lots.

Figure 2: Existing Reservoir Tanks

2.1.3 Access

Access to the existing designated land parcel was provided via a right-of-way from Oban Street and up the face. As part of the Shiel Street subdivision development access to the site will now be provided from “Road 4” of the new subdivision rather than Oban Street and includes upgrading of the access up the face (see Figure 3). The alterations to the access are part of RM200917 and does not constitute part of this application.

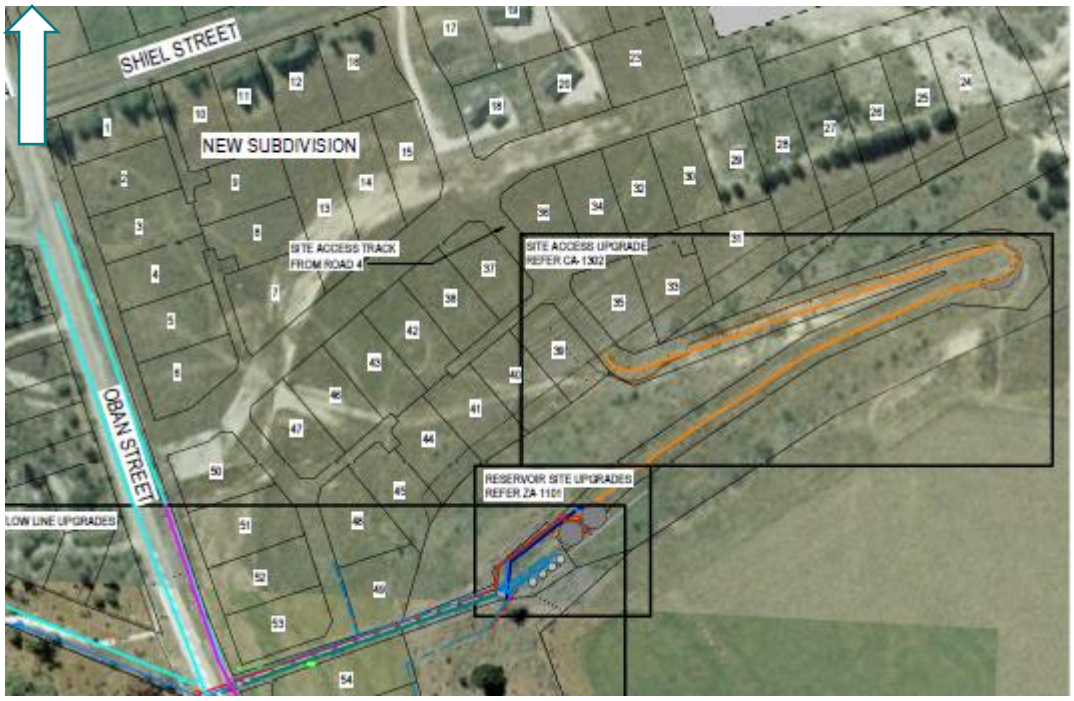


Figure 3: New access to the site shown by orange line (Taken from Drawing No.ZA-10001 in Appendix F, not to scale)

2.1.4 The Bible Face

Neither the ODP nor the PDP appear to specifically define the features or characteristics of the Bible Face. However, the landscape assessment report "Glenorchy Reservoirs - Landscape and Visual Effects Assessment Report" (Beca, 2021) prepared for this application (refer **Appendix C**) refers to the origin of the Bible Face under Section 4.1.1 on page 8 as follows:

> *"A proposal to relocate #designation 44 was applied for in 2009 by way of Resource Consent Application RM090008. As part of this application, Dr Michael Steven of Vivian+Espie Ltd produced a Landscape and Visual Effects Assessment of the proposal (Dr Steven's Report). The site description in his report was and is still relevant to this proposal.*
>
> > *The landscape context of the proposed designation is the north-west facing escarpment of a feature known locally as the Bible Terrace. The name Bible Terrace is apparently a name of local origin and refers to the appearance of the terrace as being like the leaves of an open Bible. The terrace landform is a wave cut formation formed during a period when Lake Wakatipu was some 50m higher than current lake level. The escarpment features a narrow intermediate terrace on the north-west facing escarpment upon which the Glenorchy water reservoir tanks (4) are currently located…"* .

The Beca landscape report refers further to the following passages from the Steven Report on page 8 as follows:

> > *"Terrace landforms are not an uncommon feature of the wider Wakatipu Basin, but Bible Terrace and in particular the prominent escarpments facing the village, are well-defined and could be regarded as an exemplar of its landform type. …*
> >
> > *The nature of the association between the local community and the landform is perhaps not of a strictly historical nature, in that the terrace is not associated with an historical event, as such. Rather, the association of more of a cultural link, given that the name was probably ascribed to the landscape feature by members of the local community and has been maintained in the community consciousness through popular use. The landform name is recognised in the New Zealand Geographic Place Names Database and is also identified as Bible Terrace on Topographic Map 260-E41 Queenstown."*

The Steven Report referred to the vegetation as follows:

> *Vegetation is predominantly rough pasture grasses, with some indigenous grey scrub and woody weeds. The location of the current designation features several large wilding conifers on the steep slope above the Glenorchy—Queenstown Road. Overall, the natural vegetation cover of the terrace and terrace escarpment is highly modified, but still displays a moderate degree of naturalness.* (page 9 of Beca report).

RM090008 corrected a mapping discrepancy in which the site designated for Water Storage Purposes was located 70 to 80 m to the north of the actual site containing the existing water storage tanks. RM090008 therefore altered the designation to show the correct site (and which is the subject of the current application to alter the designation).

The Beca landscape report on page 8 goes onto state:

> *At the time of the May 2019 site visit it is worthwhile adding that the vegetation on Bible Face had matured over a decade and was predominantly covered in woody weed species and wilding conifers with an incremental amount of indigenous grey scrub coming through. (**Appendix 2 – Photographs 1 – 4**)*
>
> *However, since this site visit the vegetation has been altered and is more representative of Dr Michael Stevens description above, rough pasture grasses, low height grey scrub with some woody species. This alteration has removed some of the natural screening provided by these species, observed during the May 2018 site visit.*

The Beca landscape report on page 8 goes onto state

> *"Overall, the bible face landform remains legible, and the landscape continues to display a moderate degree of naturalness".*

2.1.5 Surrounding Environment

The surrounding environment includes the Shiel Street subdivision immediately to the to the north of the site and the Glenorchy township beyond this. Productive grazing is undertaken on land to the south and east. To the west on the opposite side of the Queenstown - Glenorchy Road is the delta associated with the Buckler Burn River which discharges into Lake Wakatipu. The surrounding environment is discussed further in Section 4.1.2 of the Beca landscape report.

2.1.6 Geotechnical

Beca undertook geotechnical investigations which are reported in Glenorchy Reservoirs Upgrade-Geotechnical Assessment Report (2019) attached as **Appendix D**.

The geological map of the Wakatipu area (Turnbull, 2000) is shown in Figure 4 below. The site is mapped as Quaternary-aged alluvial fan material comprising loose, commonly angular, boulders, gravel, sand, and silt forming alluvial fans. This is expected to be underlain by Caples Group semi-schist at depth. The investigations confirmed the mapped geology of Quaternary-aged alluvial fan materials comprising dense to very dense sands.

The existing slopes above and below the reservoir site are approximately 1.5H:1V, with no evidence of deep instability observed from a site inspection and review of aerial photography.

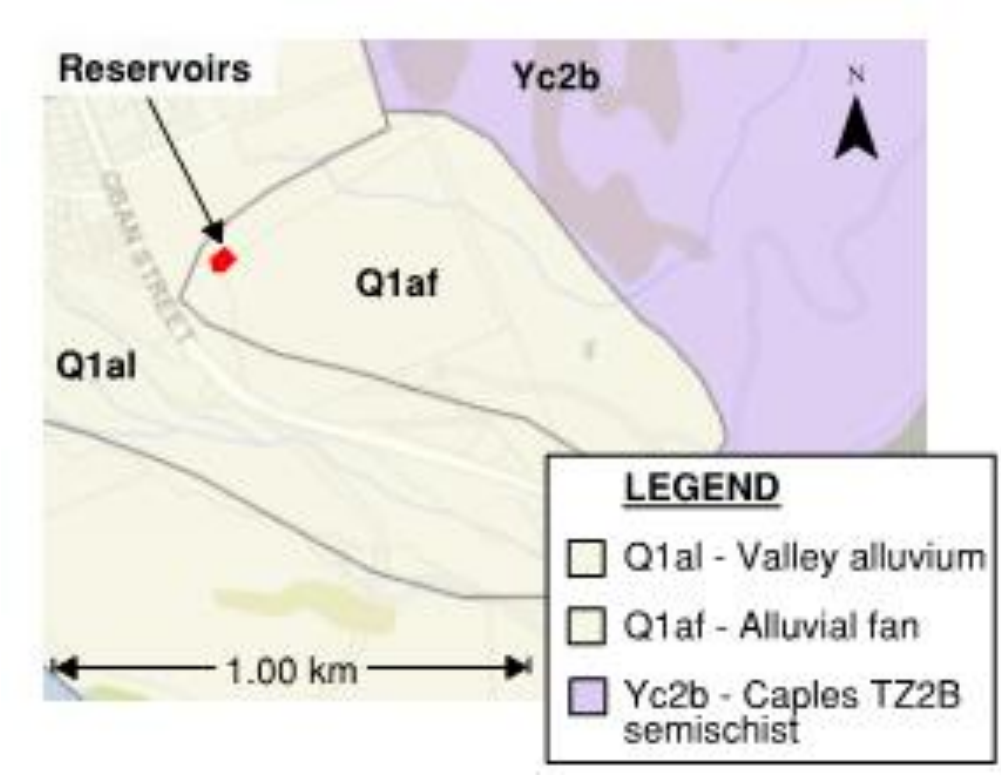


Figure 4: Geology of the Site (Turnbull, 2000)

The liquefaction potential has been assessed using liquefaction assessment methodology developed by Idriss and Boulanger (2014) by evaluating the SPT data collected. The report notes that results of this assessment indicate that liquefaction is not expected to occur under a SLS or ULS seismic events. The upper soil layers are also predominantly dense enough that they are not considered susceptible to liquefaction or lateral spreading.

2.1.7 Archaeological Assessment

An archaeological assessment was undertaken by Origin Consultants to identify potential archaeological considerations for the site works. The archaeological assessment identifies that Māori used the Dart Valley as a route to the West Coast and the wider Glenorchy area was frequently used as a meeting and resting place on these journeys. The assessment also provides insight into the strong traditional association Ngai Tahu have with Pikirakatahi (Mt Earnslaw).

Additionally, an account of the early European mining activities in Otago and at the head of Lake Wakatipu is given, highlighting the role of the Otago gold rushes in the development of the region. As a result of these gold rushes, service industry supporting these activities developed and eventually helped give rise to the Glenorchy township. The assessment also notes the existence of historical sawmilling and farming activities around the Glenorchy and Kinloch areas.

Notwithstanding the identified historical use of the Glenorchy/Kinloch area, there is no documented evidence of pre-1900 activity at or near the subject site. An investigation of previous archaeological work in the vicinity identified sites used by Māori for cooking and shelter around the township but significant damage has occurred to these sites as a result of cultivation/ploughing.

Recorded sites of European activities are clustered around Bucker Burn to the south of the terrace, where the gold mining activities were concentrated. The archaeological assessment notes that during an on-site walkover survey of Bible Face, there were no observed features on the terrace face or the overall site. The survey also identified the geological feature, the Bible Face, appears almost completely unmodified with the exception of fence lines and the existing four water tanks.

In summarising, the assessment notes there is no documented evidence of clear pre-1900 activity at or near the subject site and no features or material is known or were identified during the site survey. For this reason, a detailed assessment of archaeological values or effects has not been undertaken as none could be identified.

It was concluded that the proposed reservoir upgrade works will not impact the archaeological values and suggested that no archaeological authority is required for site works as historic material is very unlikely to be encountered. If any material of significant heritage value is encountered during site works, all work should cease, and standard procedures are to be followed as outlined in the Origin Consultants' report.

Following the issue of the first archaeological assessment dated January 2019 the report has been updated following receipt of iwi comments received from Te Ao Mārama Inc and Aukaha. The updated report is provided in **Appendix E** and further comment made in Section 5.2.3 of the AEE.

2.1.8 HAIL Activities

The site is included on the ORC HAIL (Hazardous Activities and Industries List) database as "Glenorchy Closed Landfill Adjacent" (refer Figure 5). This reference is to the former Glenorchy landfill which it is understood was located on flat land approximately 25 m below the applicant's site. Given the separation distance, it is considered a HAIL activity is more than likely not to have taken place on the site. It is also noted that extensive earthworks have occurred on the former landfill site as a result of the Shiel Street subdivision in which it is assumed that the issue of remediation would have been addressed.

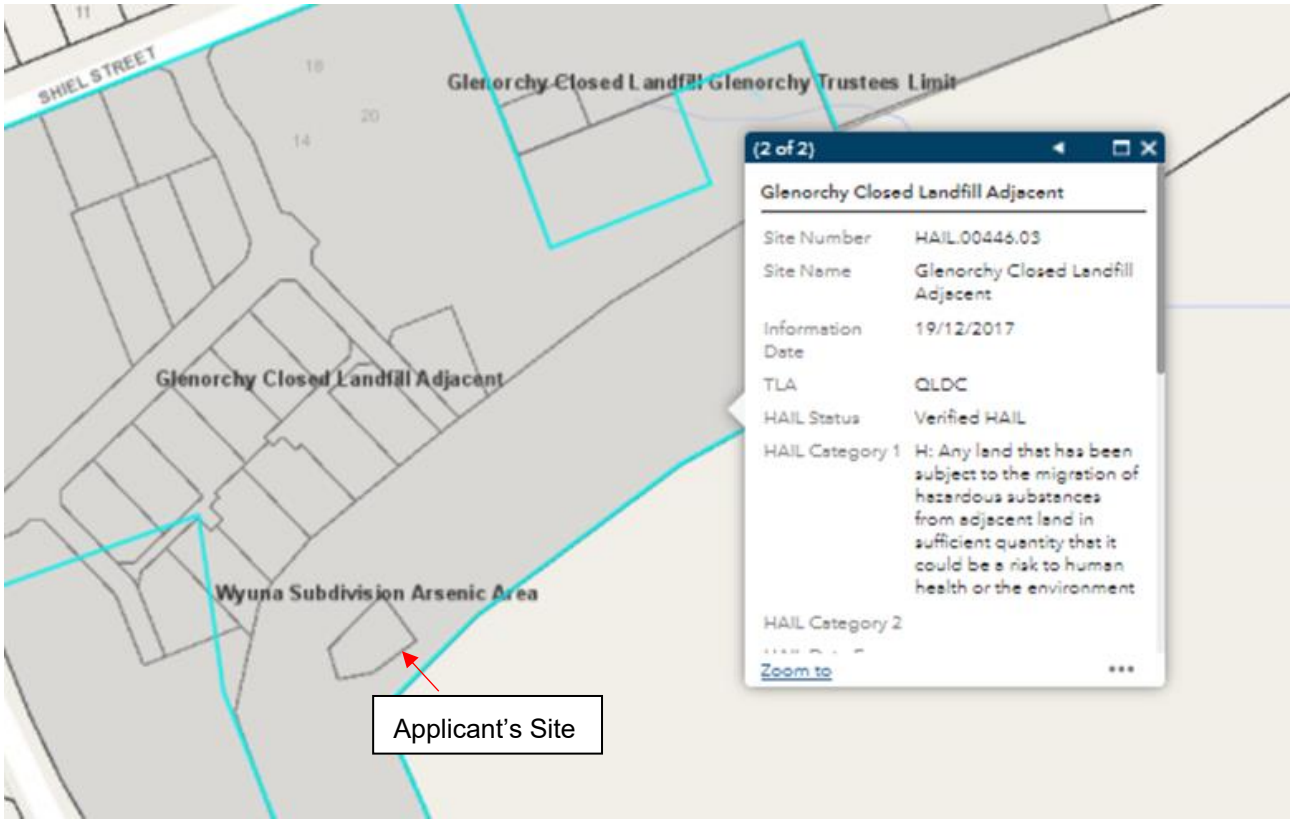


Figure 5: Site and ORC HAIL database

2.2 District Plan Provisions

The site is subject to both the ODP and PDP although it is understood that were no submissions to the designated site when it was "rolled over" from the ODP to the PDP.

2.2.1 Operative Queenstown Lakes District Plan Provisions

In the ODP the existing designated site is identified in Appendix 1 – Designations as follows:

New Ref No	Map Ref	Authority Responsible	Purpose	Site/Legal Description and Conditions
44	25	Queenstown-Lakes District Council	Water Storage Tanks	Queenstown- Glenorchy Road, Glenorchy part Section 2, Block XIX, Glenorchy Town. For conditions refer to C below.

(It is noted that the current legal description of the site, Lot 4 DP394250 is not referred to in this Appendix)

The condition referred to is as follows:

C.31 Designation # 44 - Glenorchy Water Storage Tanks

No activity or work may be undertaken within the designated area which could adversely effect the Council water storage tanks, without the consent of the Queenstown Lakes District Council. The purpose of this restriction is to ensure that no damage occurs to Council's water storage tanks.

The underlying zoning is Rural G.

The Bible Face which includes the designated site is identified in Appendix 3 - Inventory of Protected Features as follows:

Ref No	Map Ref	Description	Legal Description	NZHPT Ref	Valuation Reference	NZHPT Category	QLDC Category
8	25	Bible Face, Glenorchy. Vicinity Depot and Gravel Pit Queenstown-Glenorchy Road, Glenorchy. Exact location shown by the building line restriction.	Part Section 2, Block XIX, Town of Glenorchy		2911120100		3

The current legal description of the designated site, Lot 4 DP394250 is not referred to in this Appendix as it appears the title was issued after the plan was made operative.

The site is also within a district wide Outstanding Natural Landscape overlay.

These features are shown in Figure 6 which is part of Planning Map 25B.

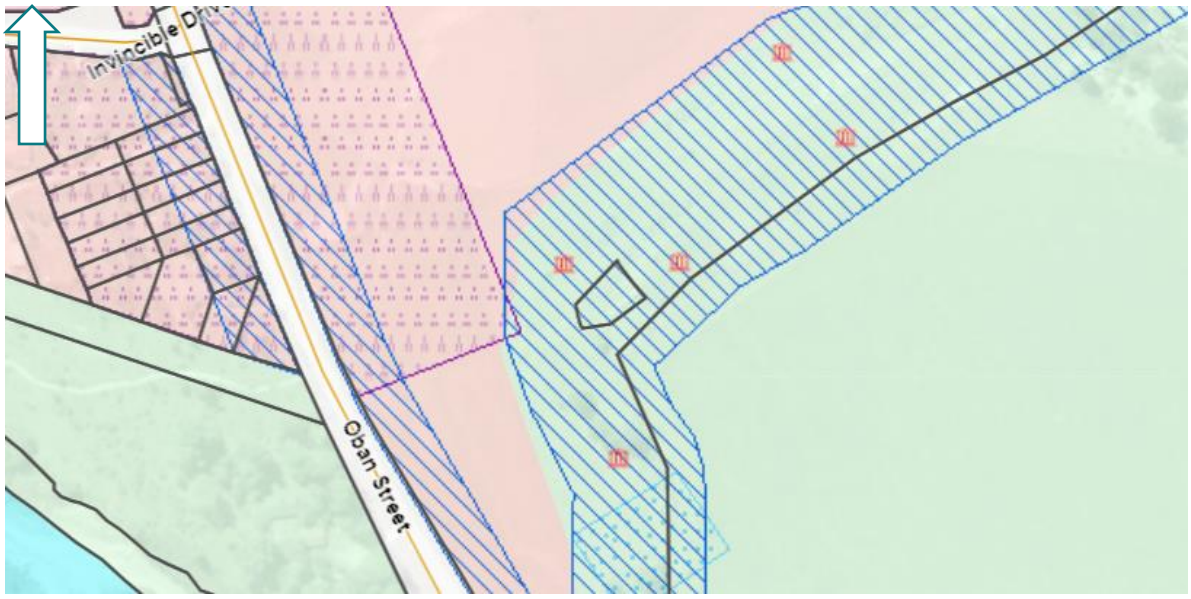


Figure 6: Operative District Plan zoning showing building line restriction, heritage feature and zoning (not to scale)

2.2.2 Proposed Queenstown Lakes District Plan (PDP) Provisions

In the PDP (Consolidated Decisions Chapter) the existing designated site is identified in Chapter 37 as follows:

PART 5 DESIGNATIONS 37

No.	Authority Responsible	Purpose	Site/Legal Description and Conditions
44	Queenstown Lakes District Council	Water Storage Tanks	Queenstown- Glenorchy Road,Lot 4 DP 394250. For conditions refer to C below.

The condition referred to is as follows (same as the ODP):

C.31 Designation # 44 - Glenorchy Water Storage Tanks

No activity or work may be undertaken within the designated area which could adversely affect the Council water storage tanks, without the consent of the Queenstown Lakes District Council. The purpose of this restriction is to ensure that no damage occurs to Council's water storage tanks.

The underlying zoning is Rural.

The Bible Face which includes the designated site (although the legal description of the site is not included) is identified as follows in Appendix 3 - Inventory of Protected Features as follows:

PART 5 HISTORIC HERITAGE 26 Listed Inventory of Listed Heritage Features

Ref No	Description	Legal Description (Valuation Reference)	HNZ Cat / No.	QLDC Cat
8	Bible Face, Glenorchy. Vicinity Depot and Gravel Pit, Queenstown-Glenorchy Road, Glenorchy. Exact location shown by the building line restriction.	Part Section 2, Block XIX, Town of Glenorchy (2911120100)		3

The current legal description of the designated site, Lot 4 DP394250 is not referred to in this Appendix although the site is included on the planning maps, see Figure 7.

Category 3 is identified in Clause 26.2.2 the ODP as:

> *Category 3*
>
> *Category 3 Heritage Features are significant to the District and/or locally and their retention is warranted. The Council will be more flexible regarding significant alterations to heritage features in this Category. Category 3 shall include all other places of special historical or cultural value.*

It appears that new buildings and earthworks are a restricted discretionary activity in the heritage feature in accordance with Rule 26.5.9. The site is also within a district wide Outstanding Natural Landscape overlay and is included in a wāhi tupuna area (No.14Tāhuna (Glenorchy and surrounds) in Schedule 39.6).

These features are shown in Figure 7 which is part of Planning Map 25B.

Figure 7: Proposed District Plan with corresponding zoning and overlays (not to scale)

3 Description of Project

3.1 Alteration of Designation

The site of existing Designation #44 is legally described as Lot 4 DP 394250 and comprises 585 m^2. We propose to alter this designation by slightly extending the northern and western boundaries and adding an area of immediately to the east of the designation (these additional areas are contained in Lot 202 DP 544220). The overall additional area is 1017 m^2 and accordingly the designated site will increase from 585 m^2 to 1602 m^2. This alteration is shown on Figure 1 and on the Land Requirement Plan attached in **Appendix B**.

As a consequence of the above:

- District Planning Map 25b in the PDP is amended in accordance with the Land Requirement Plan (it is suggested that the existing and altered designated area are shown as one parcel of land in the PDP)
- The reference to the designated site in the PDP in Chapter 35 is amended as follows (strikethroughs and underlining)

Ref No.	Authority Responsible	Purpose	Site/ Legal Description and Conditions
44	Queenstown Lakes District Council	Water Storage Tanks	Queenstown- Glenorchy Road, Lot 4 DP 394250 and Lot 202 DP 544220. For conditions refer to C below.

The condition in 'C' remains unchanged.

Changes to the ODP in respect of the designation are not considered technically necessary as it is understood there were no appeals to the designation.

The enlarged site will enable the works described below in Section 3.3. Accordingly, the details of the project required in an Outline Plan under section 176A of the RMA are incorporated into this alteration to the designation in accordance with section 176A(2)(b) of the RMA.

3.2 Project Need

QLDC, as the primary water supplier to the district, is required to provide a supply of water to homes and businesses that is safe for human consumption.[1]

The Glenorchy water supply upgrade is an essential component of QLDC's planned water supply upgrades to improve security and resilience of water supply in Glenorchy. The existing tanks are showing signs of distress with visible cracking and water leaking while not containing enough capacity for firefighting requirements.

QLDC also wants to ensure enough water storage for water supply and firefighting can be provided for the future growth of Glenorchy.

[1] https://www.qldc.govt.nz/services/water-services/water-supply/supply-and-treatment

A Better Business Case prepared in June 2018 for the Glenorchy township water supply noted that the current supply of 90 m^3 does not meet the current level of service requirements for the township. The network has inadequate storage for Average Daily Demand (ADD), Peak Daily Demand PDD and Firefighting requirements and does not currently meet QLDC Level of Service requirements (specifically a minimum of 200 kPa at property boundary 98% of the time and the greater of 12 hours storage at PDD or 24 hours at ADD). The Business case indicated 500 m^3 storage is required now and that based on the future growth of Glenorchy it is likely that two additional 250 m^2 reservoirs (i.e. the third and fourth new tanks) will be required within 5 to 10 years with construction estimated to begin in 2028/29. The altered designated area will enable the provision of tanks required for Glenorchy's existing needs and future growth.

3.3 Proposed Works

The works for this project comprise the following:

- Installation of two 250 m^3 proprietary steel tanks (total capacity 500 m^3), including earthworks for foundations and to create a platform for the tanks; and the eventual replacement of the existing tanks with another two 250 m^3 tanks (total future site capacity 1,000 m^3)
- Earthworks limited to a small quantity of surface scraping to establish the tank platforms and foundations and a cut to accommodate a 2.3 m high (maximum) high timber retaining wall
- Kerb and channelling on the site to direct stormwater
- Installation of water and overflow pipes and communications on the site. (the connection of these services to the wider network will be installed on the western slope of Bible Face running west towards Oban Street and the consent requirements for this installation is dealt with under RM RM200917 [see Section 1.2 of AEE])
- Kerb and channelling to direct stormwater on site
- Installation of the timber retaining wall behind the new tanks and a 1.9 m high security wire mesh fence located around the perimeter of the site
- Installation of a single-phase power supply
- Removal of the existing four pre-cast concrete tanks after completion of the new tanks

For further information on the extent of works refer to the design drawings in **Appendix F** and the overall concept in Figure 8. As indicated below the details of the project required in an Outline Plan under section 176A of the RMA are referred to here.

In particular, the proposed alteration to designation will allow for the construction and operation of the two new water tanks on the additional designated area. Once these tanks are operational, the four existing pre-cast concrete reservoirs will be able to be removed from the existing designated area, which will then be available for future tanks.

The existing ground will be excavated between 0.2 m and 0.7 m depth to create the level platform for construction of the tanks. Immediately below the tanks, a leak detection pit will be excavated to a depth of 1.8 m and backfilled with AP65. The concrete foundation for the tank will sit upon the AP65 which supports the tank, with an overall height of each tank of 7.1 m, measured from the bottom of the tank floor level to the top of the pitched roof. Each tank will have a safety rail (approximately 1 m in height) around the top of the tank and a ladder at the rear for access.

The tanks will be 8.25 m in diameter, constructed of steel and finished in a grey olive colour (RAL 6006) with a Light Reflectivity Value of 7.4% and orientated to ensure infrastructure such as the ladders are facing south into the slope. The new water tanks will connect into the existing water pipe infrastructure at the site including for scour and overflow purposes. Refer to Figures 8-10.

A 2.3 m high (maximum) timber retaining wall will be located behind the reservoirs, and a 1.9 m high security wire mesh fence located around the perimeter of the site compound for health and safety reasons.

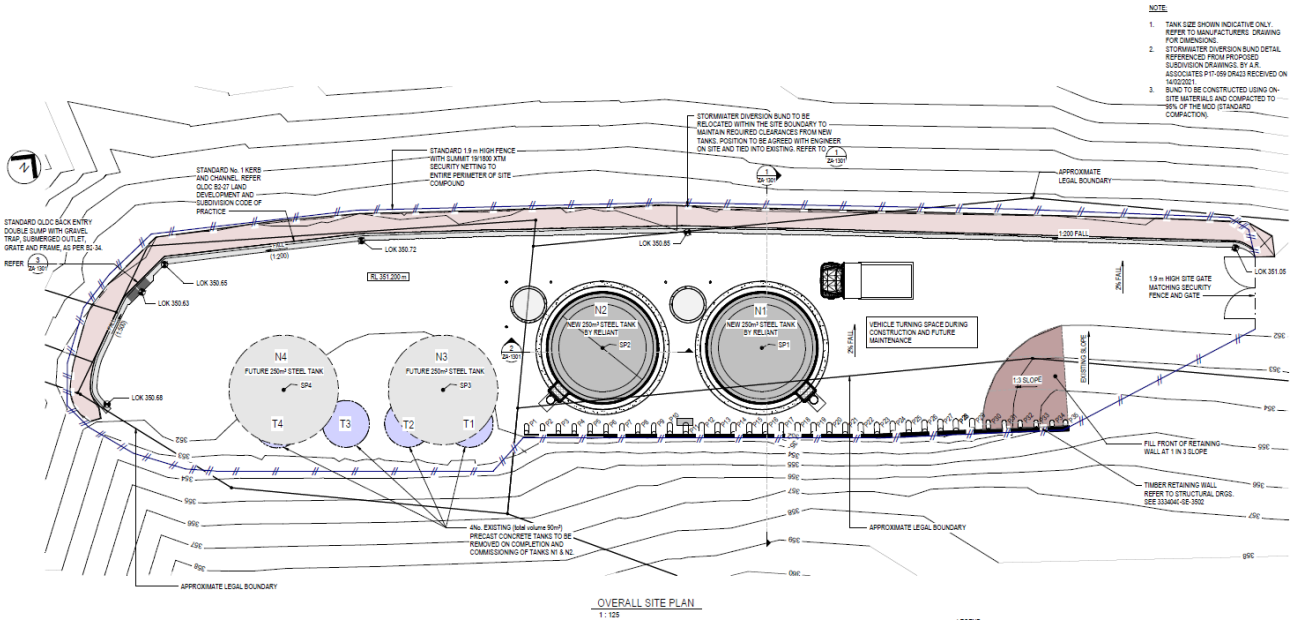


Figure 8: A site layout plan illustrating the location of the four existing reservoirs (T1 – T4), the two proposed reservoirs (N1 and N2) and the two future reservoirs (N3 and N4)

Figure 9: An example of the overall shape of the proposed tanks.

Within the proposed designated area an approximately 4 m wide access track is proposed adjacent to proposed water reservoirs to allow for maintenance vehicles. (As discussed in Section 2.1.1 of the AEE the existing earth bund at the front of the site will be relocated outwards to the site boundary to provide the necessary clearance for vehicles, although it does not form part of this application. Its original dimensions will be retained and hydroseeded when complete).

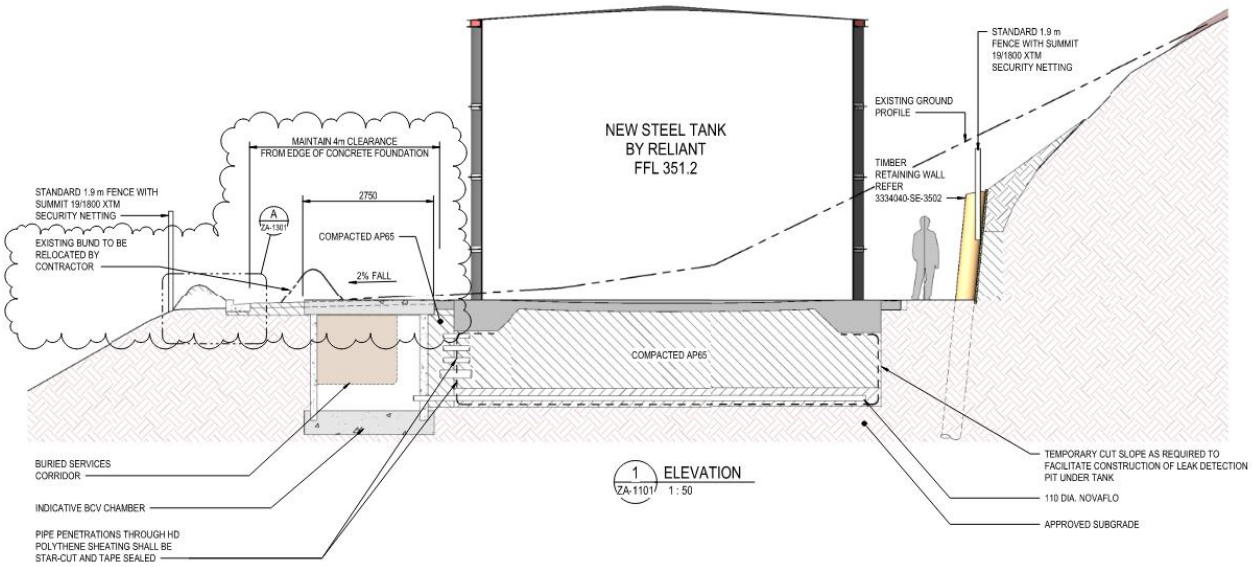


Figure 10: A cross section through reservoir 2 illustrating the reservoirs' height, the changes in topography, gabion baskets, farm fences and the proposal's overall relationship with the escarpment face

When future demand requires, two more tanks like the two proposed in this application will be constructed in the location of the existing four tanks (which will have been removed) on the existing designated land. As these future tanks will be within the existing designation's footprint and will fit within the existing designation's purpose, no change to the designation is required in order to accommodate them. They will be subject to the Outline Plan process in due course.

4 Reason for Application

4.1 Overview

This section sets out the relevant alteration to designation provisions of the RMA.

4.2 Alteration to Designation

QLDC is applying to alter existing Designation #44 Water Storage Tanks in the proposed Queenstown Lakes District Plan (PDP) pursuant to section 181(1) of the Resource Management Act (RMA). A Notice of Requirement (RM200984) (NOR) was submitted to QLDC Regulatory on 27 November 2020 and sought that QLDC alter the designation under section 181(3) of the RMA. On the understanding that the NOR will instead be processed under section 181(1), this Assessment of Effects on the Environment (AEE) addresses each of the relevant matters under sections 181 and 168A of the RMA

Section 181(1) states:

> *A requiring authority that is responsible for a designation may at any time give notice to the territorial authority of its requirement to alter the designation.*

Section 181 (4) states:

This section shall apply, with all necessary modifications, to a requirement by a territorial authority to alter its own designation or requirement within its own district.

In this respect, QLDC, the designating authority, proposes to alter existing Designation No.44.

Section 181(2) (2 states:

> *Subject to subsection (3), sections 168 to 179 and 198AA to 198AD shall, with all necessary modifications, apply to a requirement referred to in subsection (1) as if it were a requirement for a new designation.*

In this respect, it is considered that section 168A is the most relevant section in consideration of this application.

Section 168A(1) provides for a territorial authority (in this case QLDDC), to issue a notice of requirement for a designation provided that the public work is located within its district and it has financial responsibility for the work, or a restriction is necessary for the safe and efficient functioning or operation of a public work. In this instance, QLDC will have financial responsibility for the project and the project is located entirely within Council's jurisdiction.

Section 168A(3) states that when considering a NOR, a territorial authority must, subject to Part 2, consider the effects on the environment, having particular regard to the following:

> *"(a) any relevant provisions of-*
>
> *(i)A national policy statement:*
>
> *(ii)A New Zealand coastal policy statement:*
>
> *(iii)A regional policy statement or proposed regional policy statement:*
>
> *(iv)A plan or proposed plan; and*
>
> *(b) whether adequate consideration has been given to alternative sites, routes or methods of undertaking the work if –*
>
> *(i) the requiring authority does not have an interest in the land sufficient for undertaking the work: or*

(ii) It is likely that the work will have significant adverse effects on the environment; and

(c) whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought: and

(d) any other matter the territorial authority considers reasonably necessary in order to make a decision on the requirement."

In terms of decision making, under section 168A (4), the territorial authority may decide to confirm the requirement, modify the requirement; impose conditions; or withdraw the requirement. These matters are addressed in the subsequent sections of the AEE.

4.3 Outline Plan

The details of the project required in an Outline Plan under section 176A of the RMA are incorporated into this alteration to the designation in accordance with section 176A(2)(b) of the RMA.

5 Assessment of Effects

5.1 Introduction

In accordance with section 168A (3) of the RMA, when considering an application for a NOR, the Consent Authority must consider the effects on the environment of allowing the alteration. There are positive and adverse effects on the environment because of both construction and operation of the project and which are described below.

Given this application is for an alteration to a designation there is no “permitted baseline” test as there is with a resource consent application. However, the existing designated area (Lot 4) does form a “quasi permitted baseline test” in that structures can be erected on this site subject to the provision of an Outline Plan. Accordingly, the site has been determined to be appropriate for water storage purposes and there is a reasonable expectation that some kind of structure will be located on this site for water storage.

5.2 Positive Effects

This alteration to designation will have several positive effects on the Glenorchy’s community health and economic well-being including:

- Enabling the construction of new water reservoirs to replace the existing reservoirs that have visible cracks and are leaking water, and which will significantly improve earthquake resilience of key infrastructure
- Meeting QLDC levels of service relating to firefighting and water pressure requirements
- Providing for future water supply infrastructure to meet projected demand and growth in Glenorchy

5.3 Construction Effects

Construction effects include those related to earthworks, stability, heritage and cultural, noise and vehicle movements. The construction period is anticipated to be approximately 26 weeks.

5.3.1 Earthworks

The new water tanks are to be constructed on the north western escarpment of Bible Face as described earlier. As this terrace is already flat, minimal earthworks will be required to establish a stable building platform.

The earthworks proposed will be limited to a small quantity of surface scraping to establish reservoir foundations and an upslope cut to accommodate the proposed timber retaining wall.

The actual and potential adverse effects associated with earthworks such as sedimentation and dust will be managed through standard sediment and erosion control techniques. These will be a requirement of the contactor commissioned to construct the water tanks. The proposed retaining wall will stabilise the upslope cut protecting the tanks and land below from any slippage. Consequently, the adverse effects associated with the establishment of a building platform will appropriately be managed such that any effects will be less than minor.

5.3.2 Stability Effects

The Beca geotechnical report confirmed that the site does not have any significant instability issues and the risk of liquefaction and lateral spread is low. The new water tanks, including foundation design, will be in accordance with relevant standards and overall, any stability effects will be less than minor.

5.3.3 Heritage/Cultural Effects

As discussed in Section 2.1.8 of AEE an archaeological assessment has been prepared by Origin Consultants (refer **Appendix E**).

The assessment notes there is no documented evidence of clear pre-1900 activity at or near the subject site and no features or material is known or were identified during the site survey. For this reason, a detailed assessment of archaeological values or effects was not undertaken, and the report concluded that the proposed upgrade works will not impact the heritage values.

The assessment recommends that if pre-European material is discovered, Heritage New Zealand should be consulted. This recommendation has been adopted in that accidental discovery protocols will be highlighted to the contractor commissioned to install the new water tanks.

In addition, written approvals have been received from Te Ao Mārama Inc and Aukaha (**refer to Appendix G**), the relevant iwi authorities.

Taking into account the above, the minor degree of works proposed, and mitigation offered, the adverse effects on heritage and cultural values is considered to be less than minor.

5.3.4 Noise

With regard to actual and potential adverse effects associated with construction noise, all construction works on the land subject of this alteration to designation will be undertaken in accordance with New Zealand Standard 6803: 1999 Acoustics - Construction Noise (NZS6803). Construction activity to install the new water tanks involves minor earthworks to create the building platform and retaining wall (as described above), while the tanks themselves are designed and built off site, packaged into pieces which are then assembled on the site. The construction activities will not be dissimilar to construction of a residential or commercial building.

Further the site of the proposed tanks is located some distance south from the nearest dwelling located in the Shiel Street subdivision. Days and hours for construction activity are proposed to be between Monday to Friday 7am to 6pm and Saturday 8am to 5pm. Therefore, the potential adverse construction noise effects related to construction will be less than minor.

5.3.5 Vehicle Movements

Earthworks and construction of the new reservoirs and removal of the existing reservoirs will create a short-term increase in vehicle movements to and from the site. The size and scale of the proposed construction works (as described earlier) is considered to be not dissimilar to that required for residential or commercial development.

Given the site has an established access and the increase in vehicle movements will be short term, the adverse effects on the transport network and amenities are considered to be less than minor.

5.3.6 Summary

Overall, the use of the land subject of this alteration during construction will be short term limited to the time to construct the new tanks and remove the old ones. Any adverse effects arising from this short-term activity are considered to be less than minor.

5.4 Operational Effects

There is potential for adverse effects associated with this alteration to designation to occur during the operation of the reservoirs. These effects relate to landscape and visual amenity, stormwater, and vehicle movements, and are discussed below.

5.4.1 Landscape and Visual Effects

In terms of landscape and visual effects, and as indicated above, Beca Ltd prepared a landscape assessment report - "Glenorchy Reservoirs - Landscape and Visual Effects Assessment Report" (Beca, 2021) - for this application (**refer Appendix C**) and this report is relied upon for the discussion of effects below.

(i) Methodology

The report on page 4 notes that it uses accepted methodology to determine "landscape sensitivity" (low, moderate or high) and the "degree of effect" in terms of landscape and visual effects (very low to very high).

(ii) Existing Environment

On page 8 the report notes that "Overall, the bible face landform remains legible, and the landscape continues to display a moderate degree of naturalness".

In terms of "visual catchment" the Beca report under Section 4.1.2 on page 8 refers to the description of the Steven report which states that:

> *"…the site of the proposed designation is highly visible from many areas within Glenorchy township, but particularly areas immediately north of the terrace escarpment, such as Sheil Street and Coll Street. The site is also visible when approaching the town travelling south on the Glenorchy—Paradise Road, and when leaving the town on the Glenorchy— Queenstown Road. That said, the existing water storage tanks have been part of the view for a very long time."*

The Beca report notes on page 8 the visual catchment includes the public and private places within Glenorchy that currently have views of the four existing water tanks, including:

- Oban and Sheil Street intersection
- Coll Street and Old Dairy Close intersection
- Mull Street
- Glenorchy-Paradise Road

These four viewpoints are used in the assessment of effects.

The Beca landscape report goes onto say under Section 4.1.3 on page 9:

> *The site has a moderate degree of sensitivity and the ability to absorb the proposed reservoirs. This is due to the relevant policy provisions, escarpment's moderate degree of naturalness, the existing water storage tanks being present for a number of decades and forming part of the view where the legibility of the landform remains.*

(iii) Landscape Effects[2]

In terms of landscape effects, the Beca landscape report on page 10 concludes that:

> *Overall, because the level of physical change to Bible Face is minimal because water storage infrastructure is already part of the fabric of Bible Face, the amended designation and resulting reservoir development will result in a **low-moderate** degree of effect on landscape character.*

The reasons for this are as follows:

- The extent of excavation and landform modification will be low because the terrace is flat and there is no notable vegetation on the site so negative impacts on land cover will be negligible

[2] Refer to 5.1.1 of report on page 9 for context of landscape character

- The proposal will not result in the spread of development beyond a discrete area. Overall, the proposal will be of a tidier and more utilitarian appearance than currently exists, due to the dilapidated state of the existing reservoirs.
- The cumulative effects of the proposal will not compromise the heritage value and physical integrity of Bible Face due to the levels of landform modification proposed compared to the expansive area of the Bible Face terrace landform. Cumulative effects of the proposal will be **low**.

(iv) Visual Effects

In terms of visual effects,[3] the Beca landscape report on page 11 concludes that:

> *Overall, visual effects of the proposal will be of a **low – moderate** degree and while the larger scale of the reservoirs will increase visual prominence compared to the existing storage tanks, they remain consistent with existing typology (i.e. water storage) and for this reason the proposal will maintain the existing visual amenity values and specific views from Glenorchy Township and surrounding public places. The proposal is consistent with the relevant landscape-related objectives, policies and assessment matters of the Operative and Proposed District Plans.*

The assessment is based on four viewpoints (Viewpoints 1-4) which vary according to distance and direction and the reasons for the degree of visual effects includes:

- Recent subdivision development in the foreground of the site reduces the visual prominence of the water tanks
- The overall height of the water tanks will not break the skyline or the form of the terrace edge.
- The distance from some viewpoints (e.g. Up to 1.35 km away) and the dominance of other natural features (e.g. Tooth Peaks mountain range).
- Recessive colours of the water tanks will blend the infrastructure with the vegetated backdrop.
- Screening of the bottom 1-2 m of the water tanks by the stormwater bund

(v) Mitigation Measures

The report on page 12 notes mitigation measures include setting back the tanks as far as possible into the escarpment to reduce their prominence; selecting recessive colours; locating the access ladder to the rear of the tanks; and the relocation of the stormwater bund.

The introduction of vegetation to reduce the prominence or screen the reservoir tanks has been considered as part of the assessment and which would provide a high degree of visual screening for the reservoir tanks and associated development. However, the report states that this mitigation is at the cost of the legibility of the Bible Face landform, which is a significant reason for the identification of this feature.

(vi) Summary

The report concludes on page 13 that in terms of landscape effects the result proposal will result in a low-moderate degree of adverse effect on landscape character and in terms of visual effects there will also be a low-moderate degree of adverse visual effect when seen from surrounding places.

[3] Refer to 5.1.2 of report on page 9 for context of visual amenity.

On page 4 of the report the following is stated:

> *For the purpose of assisting project planners and decision makers in understanding the degree of landscape and visual effects of the proposal … those effects that are assessed as 'low moderate' are 'minor' in planning evaluation terms. Effects that are at the 'very low' end of the scale are negligible and those effects that are 'high to very high' are significant.*

Given the adverse effects on the landscape scale are low moderate it is considered the visual and landscape effects of the proposal can be considered minor in RMA terms.

5.4.2 Stormwater

Stormwater from the additional surface area of the tanks will be discharged to a double sump at western end of the site and then to ground. Given the relatively small areas of collection, any potential adverse effects are anticipated to be less than minor.

5.4.3 Vehicle Movements

Once the new reservoirs are commissioned, vehicle movements to and from the site associated with maintenance are anticipated to be in the order of two per week which are of a scale that is unlikely to create any adverse effect on amenity.

5.4.4 Noise

Any noise generated on the site from water storage equipment is expected to be minimal and will comply with the relevant noise provisions in the PDP.

5.5 Summary

Overall, the proposal will result in positive effects and adverse effects, both construction and operation related. The landscape and visual effects, which are potentially the most significant effects, are considered to be minor. having particular regard to the presence of the existing water storage infrastructure and the existing bench, the relatively small area of development in relation to the total Bible face feature and the proposed mitigation measures. The other identified potential adverse effects, both construction and operational, are considered to be less than minor.

6 Consideration of Alternatives

Section 168A(3) of the RMA also states that regard must be had to whether adequate consideration has been given to alternative sites or methods of undertaking the work, if:

i. the requiring authority does not have an interest in the land sufficient for the undertaking; or

ii. it is likely that the work will have a significant adverse effect on the environment.

In this respect QLDC owns all of the land subject to the NOR and as outlined above it is not considered likely that there will be significant adverse effects. Accordingly, section 168A(3) is not considered relevant. However, notwithstanding this, alternative sites were considered by the applicant as part of its Business Case planning, and for completeness these are summarised below.

We note that in terms of operational requirements for water supply tanks, QLDC Levels of Service (LOS) must be met in terms of adequate water pressure (a minimum of 200 kPa at property boundary 98% of the time) and storage (the greater of 12 hours storage at Peak Daily Demand or 24 hours at Average Daily Demand.

Three alternative sites were considered suitable in terms of the QLDC LOS, particularly in relation to LOS pressures. The advantages and disadvantages of each site, all of which are in proximity to the Bible Face are discussed below and shown on Figure 11.

At present the middle terrace provides minimum acceptable water pressures to the subdivision area. Lowering the tanks in the order of several meters below the middle terrace would likely reduce the operating pressure of water supply to township to below the minimum LOS for the Sheil Street subdivision.

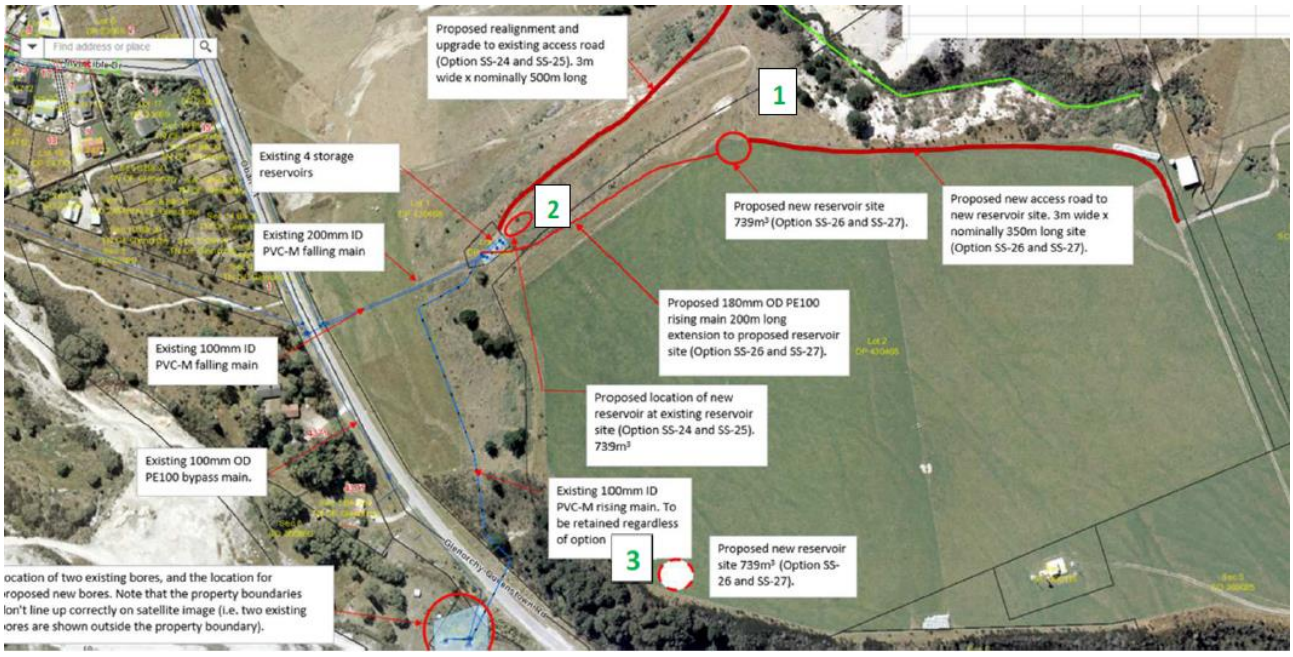


Figure 11: Alternative Sites

Site	Advantages	Disadvantages
1	• Suitable elevation for minimum and maximum LOS pressures • Site unconstrained by area	• QLDC do not own any of the land. The business case recommended investigating the feasibility of purchasing this land. The purchase of the land was investigated however the Council was unsuccessful in obtaining an agreement with the landowner. • New access required through private land • Potential for visual impacts • New pipework required down/up Bible Face (falling main and rising main) Significant distance from existing supply network • New pipework likely difficult to construct due to terrain • More expensive than Option 2 due to extent of new pipework and power supply
2	• QLDC own most of the land required (existing WS storage site) • Existing access track to site • Existing rising main to site • Existing falling mains from site • Existing scour pipe from site • Existing tanks visible on site – new tanks, although bigger, may not be considered a 'new' visual impact	• Potential for visual impacts • Site would require extension onto land not owned by QLDC. However, the business case recommended that the Council commission a geotechnical investigation to confirm the suitability of the site and investigate the feasibility of purchasing the additional land. The Geotechnical investigation confirmed the suitability of the land and an agreement was reached with the landowner for the purchase of the land therefore this option was progressed. • Existing site is constrained – retaining structures likely required to support bank behind.
3	• Suitable elevation for minimum and maximum LOS pressures. • Site unconstrained by area	• QLDC do not own any of the land. The business case recommended investigating the feasibility of purchasing this land. The purchase of the land was investigated however the Council was unsuccessful in obtaining an agreement with the landowner. • New access required through private land • Potential for visual impacts • Significant new pipework required down Bible Face and along Bible Terrace – Significant distance from existing supply network • site is far removed from existing supply network. • New pipework likely difficult to construct due to terrain • More expensive than Options 1 and 2 due to extent of new pipework and power supply

The disadvantages of alternative Sites 1 and 3, coupled with the location of the existing tanks on the proposed site (Site 2), are considered to more than justify selection of the proposed location.

In addition to considering alternative sites, consideration was given to the following design and landscape alternatives:

(a) Reducing tank size and height

Reducing the overall tank size does not meet the level of service capacity required for existing demand and firefighting storage. While the height could be reduced and the bulk of the tank made larger, the width of the terrace constrains this option in terms of access, and as such would require further excavation into the upper slope, thereby further altering the Bible Face itself.

(b) The installation of a larger number of smaller tanks

This would require excavation of the upper slope to retain access and also result in further alteration to the Bible Face.

(c) Relocating the tanks further into the terrace.

While this would potentially reduce the vertical profile in terms of the skyline, it would be similar to options (a) and (b), requiring greater earthworks to the Bible Face.

(d) Sinking the tanks vertically into the site:

While this would also potentially reduce the vertical profile in terms of the skyline lowering the tanks reduces the operating pressure of water supply to the township below the minimum Level of Service for the Shiel Street subdivision. It would also require significant bulk earthworks to lower the full width of terrace, due to its narrow width, and possibly the construction of a new retaining wall at the southern edge of the terrace. The existing retaining wall behind the tanks would also increase in height and potentially require anchors. Overall, this option would add significant engineering work and therefore cost and represent a more significant and permanent change to the landscape of Bible Face.

(e) Localised planting to screen the tanks

As indicated in section 5.4.1 of the AEE, the Beca landscape report considered the potential for localised

screening of the proposed tanks but was rejected because of the effect on the legibility of the Bible Face.

(e) Comprehensive restoration planting across the escarpment slope.

We understand that QLDC has engaged in community consultation on the potential for regenerative planting along the Bible Face. While the applicant does not necessarily oppose such planting and is prepared to consider such a proposal, the concern on the effects of the Bible Face legibility is noted above.

Given the above, the applicant has given consideration to a number of alternatives in terms of sites, design of the tanks and landscaping.

Having had regard to the alternative planning tools available, being resource consent and plan change, QLDC also considers designation to be the most suitable for the following reasons as it will:

- Enable the project or work to be undertaken in a comprehensive and integrated manner, including retaining use of the existing tanks while the new tanks are constructed
- Allow the QLDC to undertake the project or work in accordance with the designation, notwithstanding anything to the contrary in the District Plan

- Allow land required for the project to be identified in the District Plan which gives the community a clear indication of the intended use of the land and the location of the proposed facilities
- Protect the site from future development which could preclude the construction of the project or works
- Provide land use certainty for a capital works project, and an essential future community infrastructure
- Provide flexibility in the overall development of the site
- Provide flexibility for the ongoing operational performance o as the characteristics of the catchment and desires of the community change
- Be consistent with the planning mechanism utilised for other existing utilities in Queenstown Lakes District. In particular part of the existing water storage tanks is designated in a similar manner.

As such, QLDC considers that the alteration to designation is the most appropriate method of securing the future establishment and on-going operation of the water supply for Glenorchy.

7 Necessity of Achieving Objectives of Requiring Authority

Section 168A(3)(c) states the consent authority have particular regard as to whether the work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought.

As stated in Section 3.2 QLDC, as the primary water supplier to the district, is required to provide a supply of water to homes and businesses that is safe for human consumption.

The Glenorchy water supply upgrade which is enabled by the alteration to the designation will meet the objective of providing a safe and secure supply of water by improving the security and resilience of water supply through the removal and replacement of the existing substandard tanks and by ensuring that sufficient water storage can be provided for future growth.

8 Assessment of Planning Documents

8.1 Overview

Section 168A(3) of the RMA states that subject to Part 2 regard must be had to the provisions of a number of planning documents. For this application the most relevant documents are:

- Partially Operative Otago Regional Policy Statement (ORPS)
- Operative Queenstown-Lakes District Plan (ODP)
- Proposed Queenstown-Lakes District Plan (PDP)

The relevant objectives and policies of these documents are commented on below.

8.2 Partially Operative Otago Regional Policy Statement

Objective / Policy	Comments
Chapter 3 Otago has high quality natural resources and ecosystems	
Objective 3.1 The values (including intrinsic values) of ecosystems and natural resources are recognised and maintained or enhanced where degraded. **Objective 3.2** Otago's significant and highly-valued natural resources are identified and protected, or enhanced where degraded **Policy 3.2.4** Managing outstanding natural features, landscapes and seascapes. Protect, enhance or restore outstanding natural features, landscapes and seascapes, by all of the following: a) In the coastal environment, avoiding adverse effects on the values (even if those values are not themselves outstanding) that contribute to the natural feature, landscape or seascape being outstanding; b) Beyond the coastal environment, maintaining the values (even if those values are not themselves outstanding) that contribute to the natural feature, landscape or seascape being outstanding;	The alteration to the designation and the proposed works are located on the Bible Face which is recognised in the ODP and PDP. While the feature has already been modified by the existing terrace and tanks, the proposed new tanks will be set back into the terrace and will be finished in an appropriate colour. Accordingly, the values of the escarpment are recognised and maintained and the new site managed to reduce the impact of infrastructure. The adverse effects are not significant and can be mitigated.

c) Avoiding, remedying or mitigating other adverse effects; d) Encouraging enhancement of those areas and values that contribute to the significance of the natural feature, landscape or seascape. **Policy 3.2.6** Managing highly valued natural features, landscapes and seascapes. Maintain or enhance highly valued natural features, landscapes and seascapes by all of the following: a) Avoiding significant adverse effects on those values that contribute to the high value of the natural feature, landscape or seascape; b) Avoiding, remedying or mitigating other adverse effects; c) Encouraging enhancement of those values that contribute to the high value of the natural feature, landscape or seascape.	
Chapter 4 Communities in Otago are resilient, safe, and healthy	
Objective 4.3 Infrastructure is managed and developed in a sustainable way **Policy 4.3.1** Managing infrastructure activities Recognise and provide for infrastructure by all of the following: a) Protecting and providing for the functional needs of lifeline utilities and essential or emergency services; b) Increasing the ability of communities to respond and adapt to emergencies, and disruptive or natural hazard events; c) Improving efficiency of natural and physical resource use; d) Minimising adverse effects on existing land uses, and natural and physical resources; e) Managing other activities to ensure the functional needs of infrastructure are not compromised. **Policy 4.3.2** Nationally and regionally significant infrastructure Recognise the national and regional significance of all of the following infrastructure: … i) Municipal infrastructure. **Policy 4.3.4** Adverse effects of nationally and regionally significant infrastructure Manage adverse effects of infrastructure that has national or regional significance, by: a) Giving preference to avoiding its location in all of the following: i. Areas of significant indigenous vegetation and significant habitats of indigenous fauna in the coastal environment; ii. Outstanding natural character in the coastal environment; iii. Outstanding natural features and natural landscapes, including seascapes, in the coastal environment;	The water supply for Glenorchy is recognised as nationally and regionally significant infrastructure given its inclusion as “municipal infrastructure” and as an essential utility. The upgrade will strengthen the resilience of the water supply in accordance with Objective 4.3 and Policies 4.3.1 and 4.3.2. Policy 4.3.4 states that preference should be given to avoiding outstanding natural landscapes but that where that is not practicable because of functional needs avoid, remedy or mitigate adverse effects as necessary. In this case there is a functional need to increase designated area and install new water tanks because of the existing facilities and elevation required. Any adverse effects are mitigated by the relatively small area that is to be added and the location and design of the tanks.

iv. Areas of significant indigenous vegetation and significant habitats of indigenous fauna beyond the coastal environment; v. Outstanding natural character in areas beyond the coastal environment; vi. Outstanding natural features and landscapes beyond the coastal environment; vii. Outstanding water bodies or wetlands; viii. Places or areas containing historic heritage of regional or national significance; b) Where it is not practicable to avoid locating in the areas listed in a) above because of the functional needs of that infrastructure: i. Avoid adverse effects on the values that contribute to the significant or outstanding nature of a) i-iii; ii. Avoid significant adverse effects on natural character and natural landscapes in all other areas of the coastal environment iii. Avoid, remedy or mitigate, as necessary, adverse effects in order to maintain the outstanding or significant nature of a) iv-viii; c) Avoid, remedy or mitigate, as necessary, adverse effects on highly valued natural features, landscapes and seascapes. in order to maintain their high values; d) Avoiding, remedying or mitigating other adverse effects; e) Considering offsetting for residual adverse effects on indigenous biological diversity.	

8.3 Operative Queenstown-Lakes District Plan

Objective / Policy	Comments
Chapter 5 – Rural Areas	
Objective	
9 – To protect the heritage value of the Bible Face landform by preventing building and development upon the Bible Face in Glenorchy.	These provisions seek to protect the Bible Face and maintain the rural backdrop of the face. The face is already compromised by the existing terrace and the water tanks and the proposal will marginally increase this development in terms of the overall landform. The heritage values and rural backdrop will still be maintained given there is no significant building and development (such as residential development).
Policies	
9.1 – To protect the visually sensitive Bible Face from development.	
9.2 – To maintain the rural backdrop that the Bible Face provides to the Glenorchy township.	
Chapter 17 – Utilities	
Objective	
1 – Co-ordinate the provision of utilities with the development of the District.	In terms of these provisions:
Policies	

1.2 – To ensure the provision of utilities to service new development prior to buildings being occupied, and activities commencing.	• The upgrade is necessary for the wellbeing of the community • The economic costs have been taken into account when considering alternatives • The strategic needs of the utility have been considered having regard to the existing facility which will also enable "co-location" • The water supply tanks have functional needs in terms of required elevation
1.5 – To recognise the future needs of utilities and ensure their provision in conjunction with the provider.	
1.6 – To assess the priorities for servicing established urban areas, which are developed but are not reticulated.	
1.7 – To ensure reticulation of those areas identified for urban expansion or redevelopment is achievable, and that a reticulation system be implemented prior to subdivision.	
Objective	
2 – Efficient Use and Establishment of Utilities The establishment, efficient use and maintenance of utilities necessary for the wellbeing of the community.	
Policies	
2.1 – To recognise the need for maintenance or upgrading of a utility to ensure its on-going use and efficiency	
2.2 – To take economic costs into account when considering the alternative locations, sites or methods for the establishment or alteration of a utility.	
2.3 – To take into account the strategic needs of a utility when considering possible alternative locations for establishment.	
2.4 – To make specific provisions for certain activities within the District, which are land extensive and/or which have specific locational needs, to ensure the presence and function of the utility is recognised.	
2.5 – To encourage the co-location of facilities where operationally and technically feasible	
Objective	In terms of these provisions the alteration to the designation and the proposed works are located on the Bible Face which is recognised in the ODP and PDP. While the feature has already been modified by the existing terrace and tanks, the proposed new tanks will be set back into the terrace and will be finished in an appropriate recessive colour. Accordingly, the values of the escarpment are recognised and the new site managed to reduce the impact of infrastructure. The adverse effects are able to be mitigated and the provisions recognize the functional need for utilities to locate in certain localities.
3 – Environmental Impacts Avoid, remedy, or mitigate the adverse effects of utilities on the surrounding environments, particularly those in or on land of high landscape value.	
Policies	
3.1 – To avoid, remedy or mitigate the adverse environmental effects created by the operation of utilities through the application of performance standards to separate incompatible activities, maintain visual amenity and the quality of the environment.	
3.2 – To make specific provision for certain utilities which are land extensive and/or which have specific locational needs, ensuring the type and scale of development avoids, remedies or mitigates adverse effects on the environment.	
3.4 – To protect areas identified as possessing important natural features or significant habitats of indigenous fauna from utilities which	
3.9 – To take account of economic and operational needs in assessing the location and external appearance of utilities.	

Chapter 22 – Earthworks	
Objectives	
1 – Enable earthworks that are part of subdivision, development, or access, provided that they are undertaken in a way that avoids, remedies or mitigates adverse effects on communities and the natural environment.	In terms of these provisions the proposed earthworks are relatively limited given the area of the works within the designated areas and the presence of the existing terrace. The earth bund will also provide screening. Erosion and sediment control measures will also be implemented. The values of Bible Face are recognised and protected given the proposed mitigation measures while recognising the presence of the existing facility.
2 – Avoid, remedy or mitigate the adverse effects of earthworks on rural landscapes and visual amenity areas.	
7 – Protect cultural heritage, including waahi tapu, waahi taonga, archaeological sites and Heritage Landscapes from the adverse effects of earthworks.	
Policies	
1.5 – Recognise that earthworks associated with infrastructure can positively contribute to the social and economic wellbeing and the health and safety of people and communities within the District.	The proposed earthworks are associated with water supply infrastructure and will contribute to the economic wellbeing and health and safety of the Glenorchy community.
2.2 – Avoid, where practicable, or remedy or mitigate adverse visual effects of earthworks on visually prominent slopes, natural landforms and ridgelines	
7.3 – Recognise and protect the values of Heritage Landscapes from the adverse effects of earthworks.	

8.4 Proposed Queenstown-Lakes District Plan

Objective / Policy	Comments
Chapter 2 – Strategic Direction	
Objectives	The upgrade will enable the water supply to be operated efficiently for the benefit of the Glenorchy community.
3.2.1.9 – Infrastructure in the District that is operated, maintained, developed and upgraded efficiently and effectively to meet community needs and to maintain the quality of the environment.	
Chapter 5 – Tangata Whenua	
Objectives	The applicant has consulted with Aukaha and Te Ao Mārama Inc who have provided their written approval.
5.3.5 – Wāhi tūpuna and all their components are appropriately managed and protected	
Policy	
5.3.5.5 – Avoid where practicable, adverse effects on the relationship between Ngāi Tahu and the wāhi tūpuna.	

Chapter 6 – Landscapes – Rural Character	
Policies	
6.3.10 Ensure that subdivision and development in the Outstanding Natural Landscapes and Rural Character Landscapes adjacent to Outstanding Natural Features does not have more than minor adverse effects on the landscape quality, character and visual amenity of the relevant Outstanding Natural Feature(s).	In terms of these provisions the alteration to the designation and the proposed works are located on the Bible Face which is in the ONL. While the feature has already been modified by the existing terrace and tanks, the proposed new tanks will be set back into the terrace and will be finished in an appropriate colour. Accordingly, the values of the escarpment are recognised and the new site managed to reduce the impact of infrastructure. The adverse effects are not significant and can be mitigated. The location of the infrastructure is limited by its functional need to locate at higher elevations
6.3.17 Locate, design, operate and maintain regionally significant infrastructure so as to seek to avoid adverse effects on Outstanding Natural Landscapes and Outstanding Natural Features, while acknowledging that location constraints and/or the nature of the infrastructure may mean that this is not possible in all cases.	
6.3.18 In cases where it is demonstrated that regionally significant infrastructure cannot avoid adverse effects on Outstanding Natural Landscapes and Outstanding Natural Features, avoid significant adverse effects and minimise other adverse effects on those landscapes and features.	
Chapter 21 - Rural	
Objective	These provisions seek to protect the values of Bible Face and maintain the rural backdrop of the face. The objective recognises that effects can be remedied or mitigated while the policy is to prevent “subdivision and development”. However, this policy must be read in conjunction with Policy 30.2.7.1 (see below) which recognises that development in the form of utilities may be appropriate in such areas as the Bible Face. Clearly the Bible Face already has “development” on it in the form of the existing tanks and its integrity is already compromised by the existing formed terrace and the tanks. The proposal will marginally increase the effects of this development in terms of the overall landform of the Face. The heritage values and rural backdrop will still be maintained given there is no significant building and development (such as residential subdivision and development) which the policy seems to set its face against (rather than utilities as per Policy 30.32.7.1). The overarching objective recognises that effects can be remedied or mitigated rather than avoided (or prevented) and appropriate measures will be put in place.
21.2.8 Subdivision, use and development in areas that are unsuitable due to identified constraints not addressed by other provisions of this Plan, is avoided, or the effects of those constraints are remedied or mitigated.	
Policy	
21.2.8.1 Prevent subdivision and development within the building restriction areas identified on the District Plan maps, in particular: a. in the Glenorchy area, protect the heritage value of the visually sensitive Bible Face landform from building and development and to maintain the rural backdrop that the Bible Face provides to the Glenorchy Township;	
Chapter 25 – Earthworks	
Objectives	

25.2.1 – Earthworks are undertaken in a manner that minimises adverse effects on the environment, protects people and communities, and maintains landscape and visual amenity values	In terms of these provisions the earthworks will allow for continued access to the water reservoirs for operational requirements and thus provides for the social, cultural and economic wellbeing of the Glenorchy community. The proposed earthworks are relatively limited given the area of the works within the designated areas and the presence of the existing terrace. The earth bund will also provide screening. Erosion and sediment control measures will also be implemented. The values of Bible Face are recognised and protected given the proposed mitigation measures while recognising the presence of the existing facility. Erosion and sediment controls will be implemented during the earthworks activity to mitigate offside discharge. Comment has been sought from Iwi to ensure components in relation to Bible Face are appropriate managed and protected
25.2.2 – The social, cultural and economic wellbeing of people and communities' benefits from earthworks	
Policies	
25.2.1.1 – Ensure earthworks minimise erosion, land instability, and sediment generation and off-site discharge during construction activities associated with subdivision and development.	
25.2.1.2 – Manage the adverse effects of earthworks to avoid inappropriate adverse effects and minimise other adverse effects, in a way that: a) Protects the values of Outstanding Natural Features and Landscapes; b) Protects Māori cultural values, including wāhi tapu and wāhi tūpuna and other sites of significance to Māori; c) Protects the values of heritage sites, precincts and landscape overlays from inappropriate subdivision, use and development;	
25.2.1.3 – Avoid, where practicable, or remedy or mitigate adverse visual effects of earthworks on visually prominent slopes, natural landforms and ridgelines.	
25.2.1.4 - Manage the scale and extent of earthworks to maintain the amenity values and quality of rural and urban areas.	
25.2.1.5 – Design earthworks to recognise the constraints and opportunities of the site and environment.	
25.2.1.8 – Undertake processes to avoid adverse effects on cultural heritage, including wāhi tapu, wāhi tūpuna and other taonga, and archaeological sites, or where these cannot be avoided, effects are remedied or mitigated.	
Chapter 26 – Historic Heritage	
Objectives	These provisions seek to protect the Bible Face and its heritage values. The proposal is of a relatively small scale when viewed in the context of the whole feature and the existing water infrastructure present. Existing views are unlikely to be compromised given the scale of the development and appropriate mitigation measures are implemented to enable any
26.3.1 – The District's historic heritage is recognised, protected, maintained and enhanced.	
26.3.2 – The sustainable use of historic heritage features.	
Policies	
26.3.1.3 - Protect historic heritage values while managing the adverse effects of land use, subdivision and development, including cumulative effects, taking into account the significance of the heritage feature, area or precinct.	

26.3.1.4 - Where activities are proposed within the setting or extent of place of a listed heritage feature, to protect the heritage significance of that feature by ensuring that: • the form, scale and proportion of the development, and the proposed materials, do not detract from the listed feature located within the setting or extent of place; • the location of development does not detract from the relationship that exists between the listed heritage feature and the setting or extent of place, in terms of the values identified for that feature; • existing views of the protected feature from adjoining public places, or publicly accessible places within the setting or extent of place, are maintained as far as is practicable; • hazard mitigation activities and network utilities are located, designed, or screened to be as unobtrusive as possible	development to be unobtrusive as possible. Clause 26.2.2 also states that the Council will be more flexible regarding significant alterations to heritage features in Category 3 (which the Bible Face is).

Chapter 30 - Energy and Utilities	
Objectives	These provisions recognise the importance of utilities in terms of new development and also in the maintenance of existing utilities. In terms of these provisions: • The upgrade is clearly necessary for the wellbeing of the community • Consideration of alternatives have been undertaken into account and in which the proposed site is ideally located for technical and operational requirements of the utility (particularly when regard is had to the existing facility). • The strategic needs of the utility have been considered having regard to the existing facility which will also enable "co-location" as encouraged by Policies 30.2.6.4 and 30.2.7.1 (b). • The water supply tanks have functional needs in terms of a required elevation, which is provided by the Bible Face site. The alteration to the designation and the proposed works are located on the Bible Face which is recognised in the ODP and PDP. Policy 30.2.7.1 specifically recognises utilities can locate in these areas. In respect of the proposal the effects cannot be avoided but are not considered to be significant and can be minimised by mitigation measures. While the feature has already been modified by the existing terrace and tanks, the proposed new tanks will be set back into the terrace and will be finished in an appropriate colour. Accordingly, the values of the escarpment are recognised and the new site managed to reduce the impact of infrastructure. The adverse effects are not are visually and environmentally incompatible and the provisions recognize the functional need for utilities to locate in certain localities.
30.2.5 – Utilities are provided to service new development prior to buildings being occupied, and activities commencing.	
Policies	
30.2.5.1 – Utilities are provided to service new development prior to buildings being occupied, and activities commencing.	
30.2.5.3 – Recognise the future needs of utilities and ensure their provision in conjunction with the provider.	
Objective	
30.2.6 – The establishment, continued operation and maintenance of utilities supports the well-being of the community.	
Policies	
30.2.6.1 – Provide for the need for maintenance or upgrading of utilities including regionally significant infrastructure to ensure its on-going viability and efficiency subject to managing adverse effects on the environment consistent with the objectives and policies in Chapters 3, 4, 5 and 6.	
30.2.6.2 – When considering the effects of proposed utility developments consideration must be given to alternatives, and also to how adverse effects will be managed through the route, site and method selection process, while taking into account the locational, technical and operational requirements of the utility and the benefits associated with the utility.	
30.2.6.3 – Ensure that the adverse effects of utilities on the environment are managed while taking into account the positive social, economic, cultural and environmental benefits that utilities provide, including: a. enabling enhancement of the quality of life and standard of living for people and communities b. providing for public health and safety c. enabling the functioning of businesses d. enabling economic growth e. enabling growth and development f. protecting and enhancing the environment g. enabling the transportation of freight, goods, people h. enabling interaction and communication	
30.2.6.4 – Encourage the co-location of facilities where operationally and technically feasible.	
30.2.6.5 – Manage land use, development and/or subdivision in locations which could compromise the safe and efficient operation of utilities.	
Objective	
30.2.7 – The adverse effects of utilities on the surrounding environments are avoided or minimised.	

Policies	
30.2.7.1 – Manage the adverse effects of utilities on the environment by: a. avoiding their location on sensitive sites, including heritage and special character areas, Outstanding Natural Landscapes and Outstanding Natural Features, and skylines and ridgelines and where avoidance is not practicable, avoid significant adverse effects and minimise other adverse effects on those sites, areas, landscapes or features; b. encouraging co-location or multiple use of network utilities where this is efficient and practicable in order to avoid, remedy or mitigate adverse effects on the environment; c. ensuring that redundant utilities are removed; d. using landscaping and or colours and finishes to reduce visual effects; e. integrating utilities with the surrounding environment; whether that is a rural environment or existing built form.	
30.2.7.4 – Take account of economic and operational needs in assessing the location and external appearance of utilities.	
Chapter 39 - Wāhi Tūpuna	
Objective	The site is located in Wāhi Tūpuna Area 14 Tāhuna. The proposed activity is not listed in Policy 39.2.1.1 but a utility is identified as a "threat" in Schedule 39.6. However, the applicant has consulted with Aukaha and Te Ao Mārama Inc who have provided their written approval.
39.2.1 - Manawhenua values, within identified wāhi tūpuna areas, are recognised and provided for.	
Policies	
39.2.1.1 Recognise that the following activities may have effects that are incompatible with Manawhenua values where they occur within identified wāhi tūpuna areas; a. Mining and mining activities, including gravel extraction; b. Landfills; c. Cemeteries and crematoria; d. Forestry; e. Removal of indigenous vegetation from significant natural areas (SNA); and f. Wastewater treatment plants. 39.2.1.2 Recognise that the effects of activities may be incompatible with Manawhenua values when that activity is listed as a potential threat within an identified wāhi tūpuna area, as set out in Schedule 39.6. 39.2.1.3 Within identified wāhi tūpuna areas: a. avoid significant adverse effects on Manawhenua values and avoid, remedy or mitigate other adverse effects on Manawhenua values from subdivision, use and development listed as a potential threat in Schedule 39.6; and b. avoid, remedy or mitigate adverse effects on Manawhenua values from subdivision, use and development within those identified wāhi tūpuna areas where potential threats have not been identified in Schedule 39.6. 39.2.1.4 Encourage consultation with Manawhenua as the most appropriate way for obtaining understanding of the effects of any activity on Manawhenua values in a wāhi tūpuna area.	

8.5 Summary

The above provisions seek to maintain the values that contribute to the heritage and landscape features of the Bible Face. The provisions also give a direction to have regard to the functional needs of utilities, and co-location of utilities and the benefit to communities of a resilient water supply.

Accordingly, there is potential tension between the “heritage and landscape” and “utilities” provisions. In particular, Policy 28.8.2.1 seeks to “subdivision and development” on the Bible Face. However, the district plan must be read as a whole and in this respect Policy 30.2.7.1 recognises that development in the form of utilities may be appropriate in such areas as the Bible Face. In this particular case, the proposed development is considered appropriate having regard to existing formed terrace and tanks, the relatively small scale of the development, the encouragement to “co-locate” utilities and the proposed mitigation measures. There is no significant building and development (such as residential subdivision and development) proposed which the thrust of Policy 28.8.2.1 appears to be directed to.

This view is supported by the provisions of Clause 26.2.2 of the PDP (refer Section 2.2 of AEE) which states that the Council will be more flexible regarding significant alterations to heritage features in Category 3 (which the Bible Face is), notwithstanding that the proposal is not considered to involve “significant alterations.” In addition, if resource consent was applied for the activity would be a restricted discretionary activity as set out in Section 5.1 of the AEE, which again lessens the force of Policy 28.8.2.1 applying to all development.

As such, it is considered that any tension between the “heritage and landscape” and “utilities” provisions is resolved by provisions such as Policy 30.2.7.1 and Clause 26.2.2.

Having regard to the above, matters it is considered that overall, the proposal is in accordance with the above provisions.

9 Part 2 of RMA

Part 2 of the RMA comprises sections 5-8 of the RMA and are discussed below.

Section 5 - Purpose and Principles

The purpose of the RMA is to promote the sustainable management of natural and physical resources. Sustainable management is defined in Section 5(2) as:

> *"…managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –*
>
> *(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
>
> *(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
>
> *(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment."*

The proposal will allow for QLDC to continue to provide community water supplies which in turn contributes to the efficient running of the local economy and benefits Glenorchy's social and economic wellbeing. Section 5 of this report contains an assessment of environmental effects, demonstrating that the actual and potential adverse effects on the environment that may result from the proposal are less than minor.

Section 6 - Matters of National Importance

Section 6 of the RMA sets out the matters of national importance that shall be recognised and provided for. Given Bible Terrace is a protected heritage feature and located in a ONL and Wāhi Tūpuna area in the ODP and PDP, matters (b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development; (e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga: and (f) the protection of historic heritage from inappropriate subdivision, use, and development are considered relevant to this proposal.

It is submitted that the proposal is not inconsistent with these matters for the reasons identified in section 5 of this report.

Section 7 - Other Matters

> *In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to:*
>
> *(b) The efficient use and development of natural and physical resources*
>
> *(c) The maintenance and enhancement of amenity values*
>
> *(f) Maintenance and enhancement of the quality of the environment*

The above matters are considered relevant in that the enlargement of the existing designation is an efficient use of an existing resource while the amenity values and the quality of the environment will at least be maintained.

Section 8 - Treaty of Waitangi

Section 8 of the RMA requires the principles of the Treaty of Waitangi to be taken into account in resource management decisions. Consultation has been undertaken with Te Ao Mārama Inc and Aukaha who have provided written approvals. Overall, it is considered that the application achieves Part 2 of the RMA.

10 Consultation

Consultation has been undertaken with Te Ao Mārama Inc and Aukaha who have provided written approvals. Consultation was also undertaken with the Shiel Street subdivision developer, Glenorchy Trustee Limited who provided written approval. These written approvals are attached in **Appendix G**.

The proposal was also discussed with the Department of Conservation during the application for the easement to discharge water from the tanks (refer section 1.2 of AEE) and who did not express any opposition.

11 Conclusion

QLDC, pursuant to section 181(1) of the RMA, proposes to alter Designation No 44 which provides for water storage tanks on a site that is located on Bible Face in Glenorchy. Particular regard has been had to the provisions of section 168A of the RMA in considering the application.

The alteration to the designation relates to minor amendments to the northern and western boundaries of the existing designated site and the addition of a parcel of land to the east of the existing designation. The proposed works, in summary, provide for the erection of two new water tanks to be located on a site that is to be added to the existing designation site, and the demolition of four existing water tanks on the existing designation site. The existing designation site will be utilised for future water storage purposes.

The addition of land to the existing designation, which will allow for additional water storage tanks, is an essential component of QLDC's planned water supply network upgrade to improve the security of the water supply to Glenorchy. The alteration of the designation will contribute to the security and resilience of local water supply in Glenorchy and, as such, provide for the social and economic well-being of current and future generations of township residents.

In addition to the substantial positive effects described, the alteration to the designation will also have some adverse effects, both construction and operation related. The landscape and visual effects, which are potentially the most significant effects, are considered to be minor, given the presence of the existing water storage infrastructure and the existing bench; the relatively small area of development in relation to the total Bible Face escarpment; and the proposed mitigation measures. The other identified adverse effects, both construction and operational, are considered to be less than minor. Overall:

- The actual and potential adverse effects of the proposal are less than minor
- The proposal is consistent with the purpose of the RMA and the relevant objectives and policies of relevant planning documents
- The work and designation are reasonably necessary for achieving the objectives of the requiring authority for which the designation is sought, namely the public work of securing Glenorchy's water supply
- There is no practical alternative that would achieve the requiring authority's purpose

Accordingly, it is considered the alteration to the designation and the upgrade works can be confirmed in accordance with sections 181 and 168A (4) of the RMA.

A

Appendix A – Certificate of Title

B

Appendix B– Land Requirement Plan

C

Appendix C – Landscape Visual Assessment

D

Appendix D – Geotechnical Assessment

E

Appendix E – Archaeological Assessment

F

Appendix F – Design Drawings

G

Appendix G – Written Approvals

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **946694**

Land Registration District **Otago**

Date Issued 16 November 2020

Prior References
518571

Estate Fee Simple

Area 4.3618 hectares more or less

Legal Description Lot 202 Deposited Plan 544220

Registered Owners

Queenstown Lakes District Council

Interests

7951426.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 30.9.2008 at 9:00 am (affects part formerly Lot 3 DP 394250)

Land Covenant in Easement Instrument 7951426.4 - 30.9.2008 at 9:00 am

Subject to a right of way (in gross) over part marked BA on DP 544220 and a right to convey water over part marked D and E on DP 544220 in favour of the Queenstown Lakes District Council created by Easement Instrument 7951426.5 - 30.9.2008 at 9:00 am

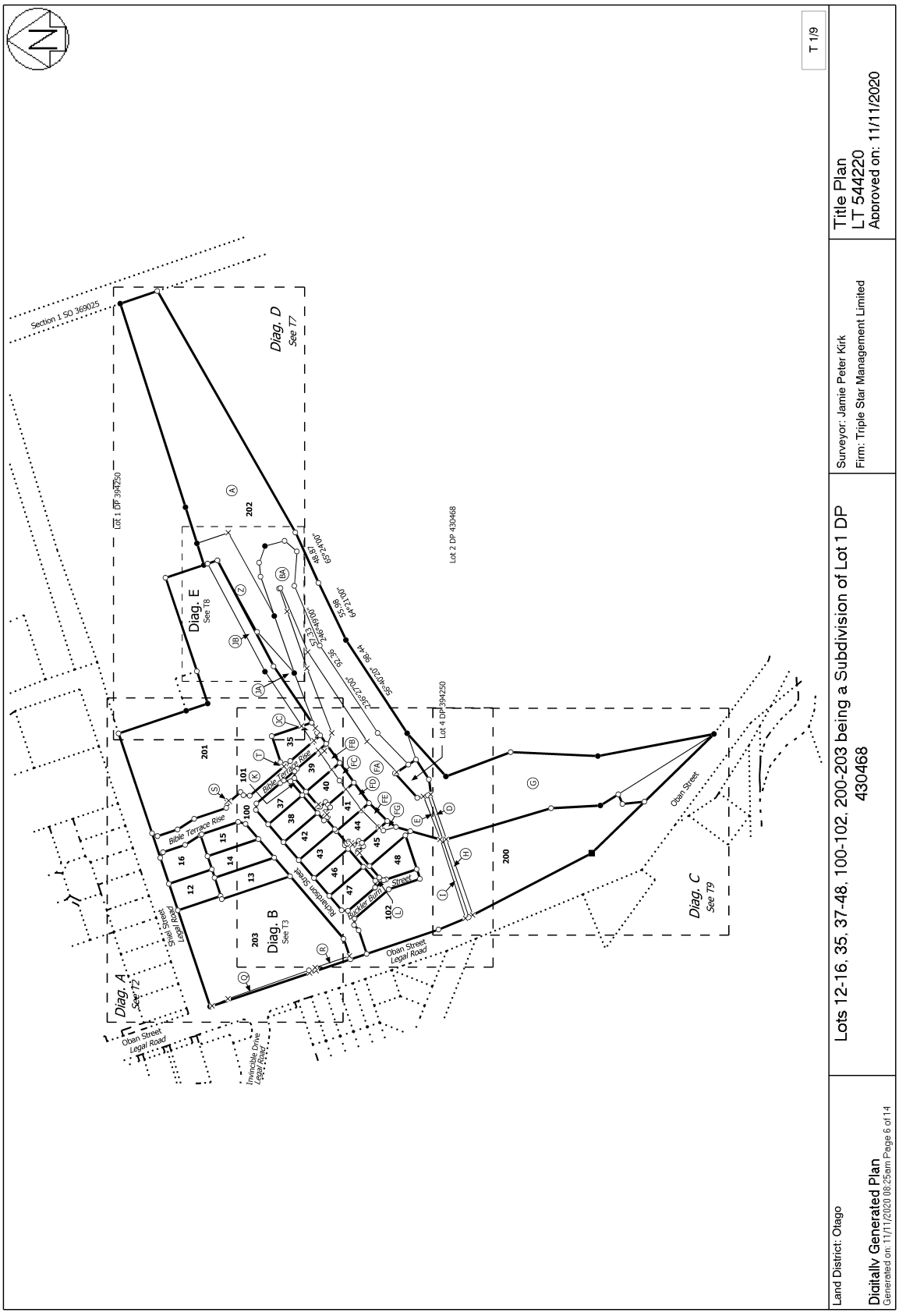
The easements created by Easement Instrument 7951426.5 are subject to Section 243 (a) Resource Management Act 1991

Appurtenant hereto is a right of way created by Easement Instrument 8325482.2 - 25.2.2010 at 3:40 pm

Subject to a right (in gross) to convey electricity and right to convey telecommunications over part marked BA on DP 544220 in favour of Queenstown Lakes District Council created by Easement Instrument 11926951.8 - 16.11.2020 at 5:35 pm

The easements created by Easement Instrument 11926951.8 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Covenant Instrument 11926951.12 - 16.11.2020 at 5:35 pm



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**377050**
Land Registration District	**Otago**
Date Issued	30 September 2008

Prior References
OT13A/87

Estate	Fee Simple
Area	585 square metres more or less
Legal Description	Lot 4 Deposited Plan 394250
Purpose	Local Purpose Reserve

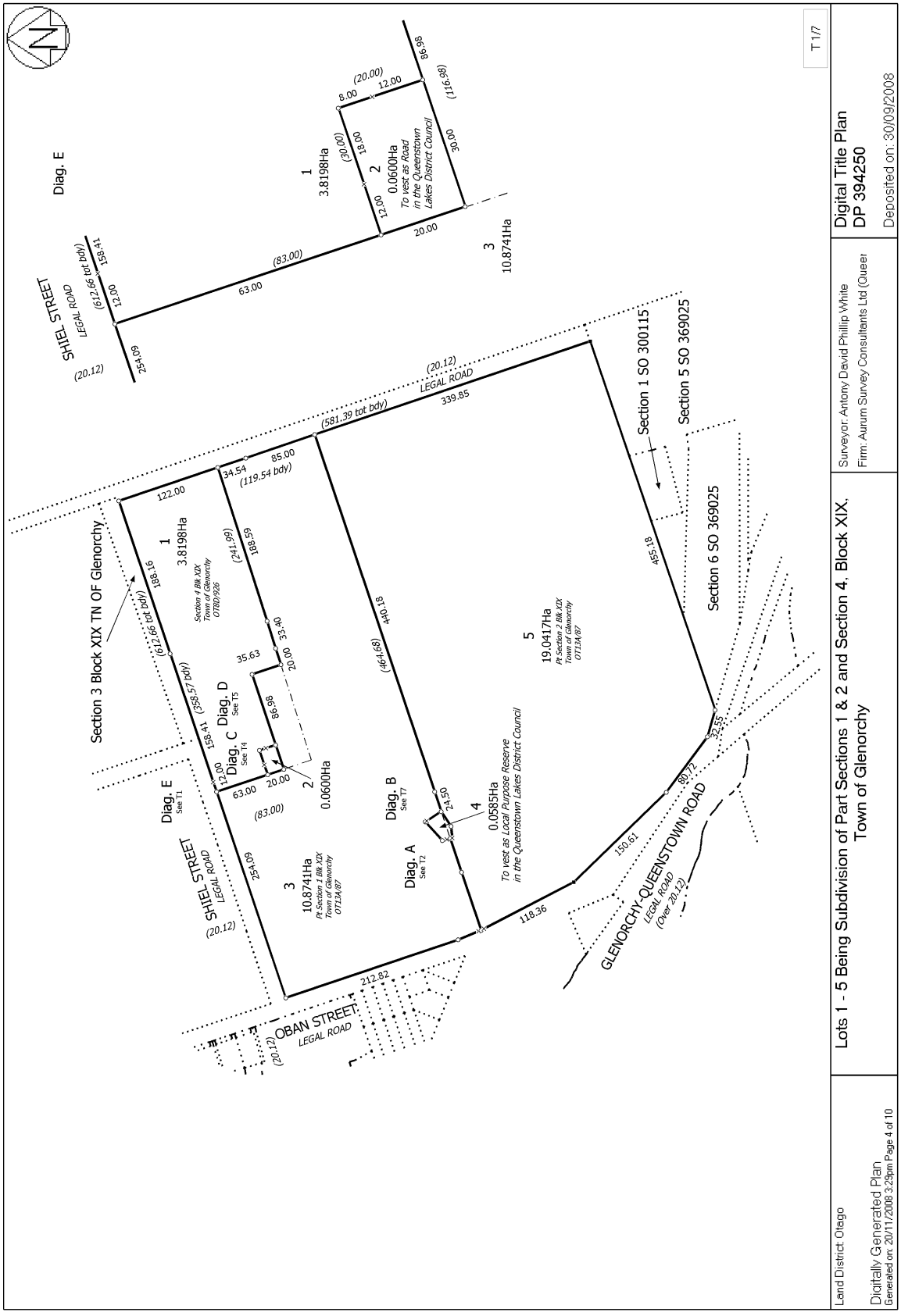
Registered Owners
Queenstown Lakes District Council

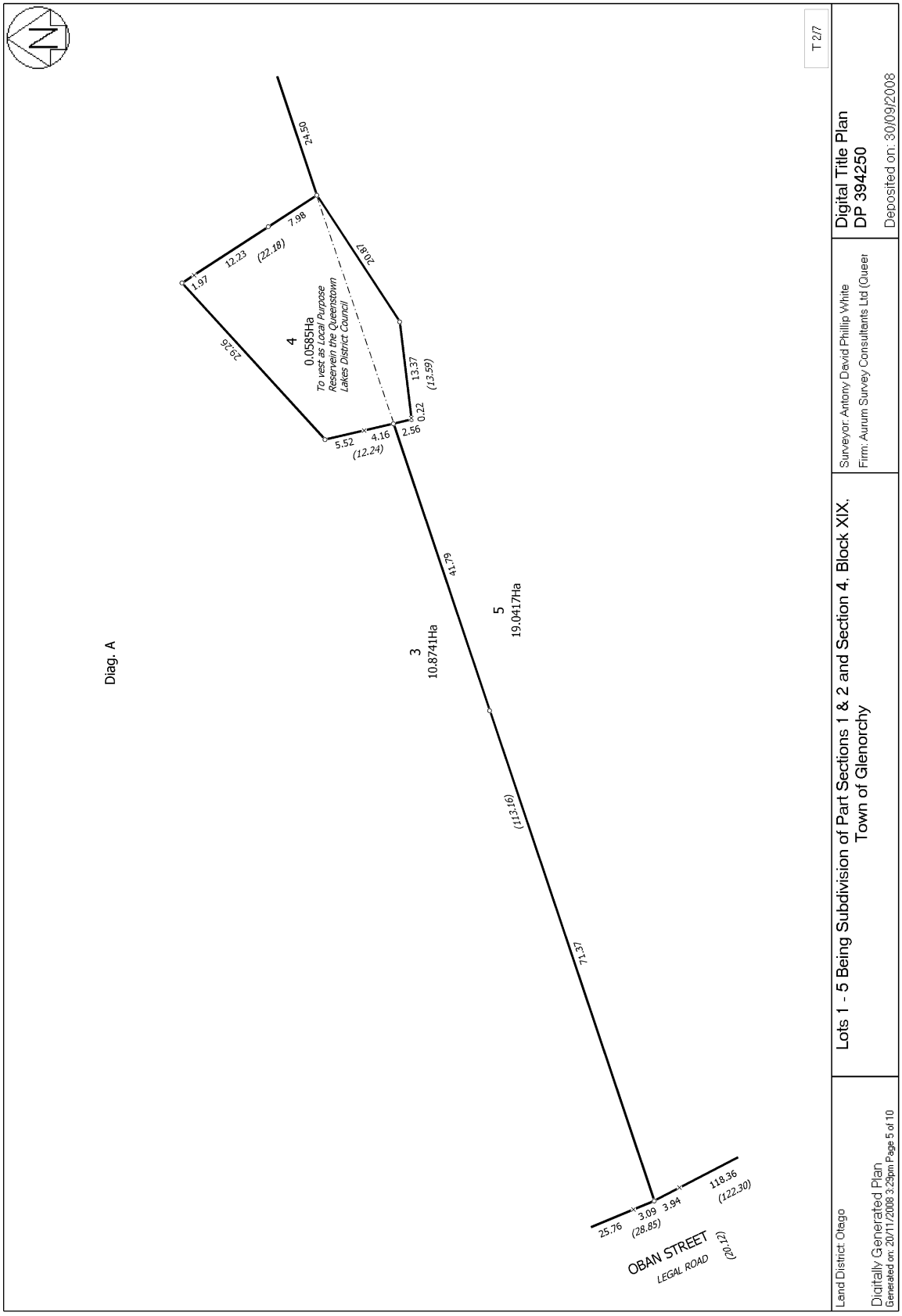
Interests

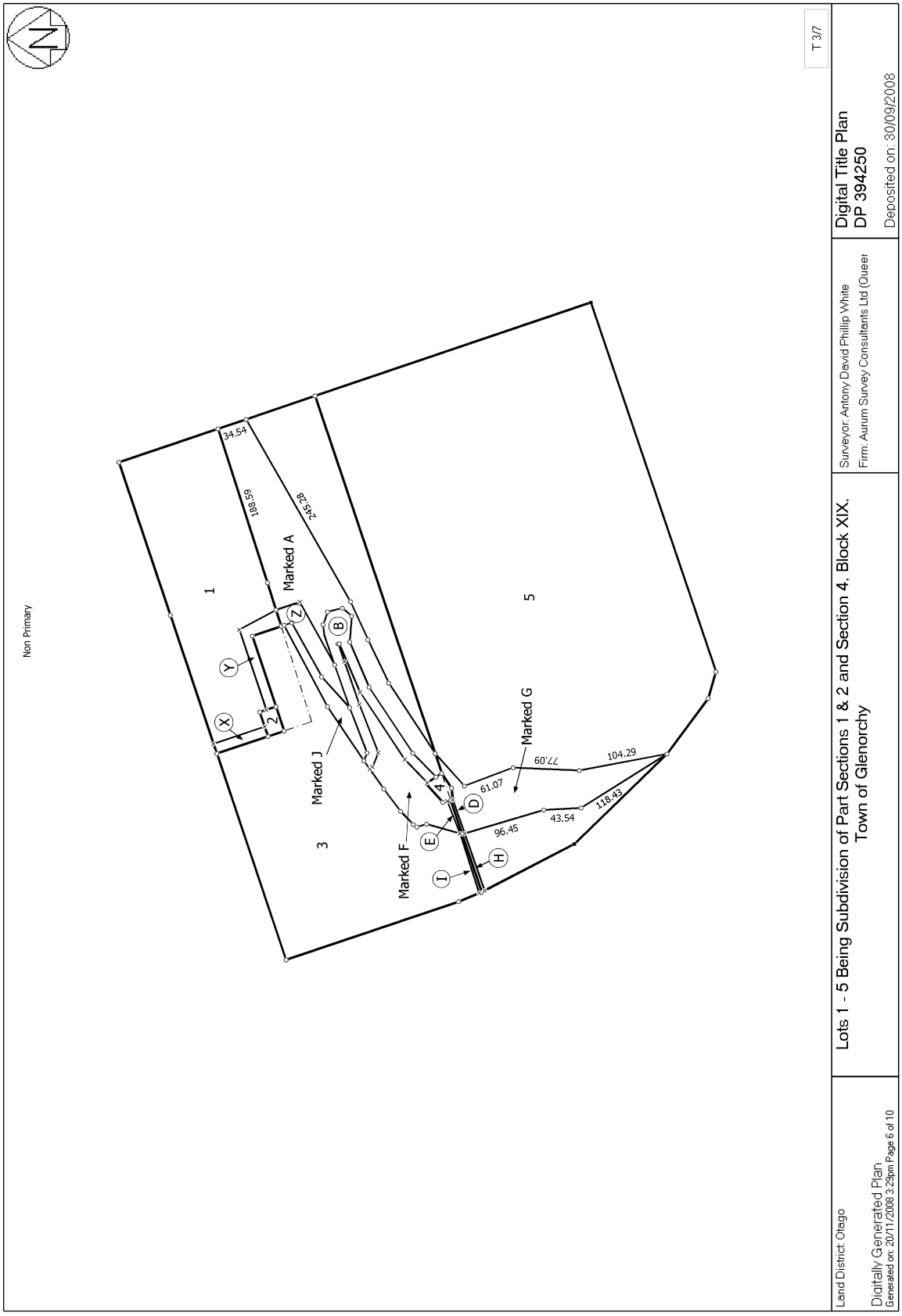
Subject to the Reserves Act 1977

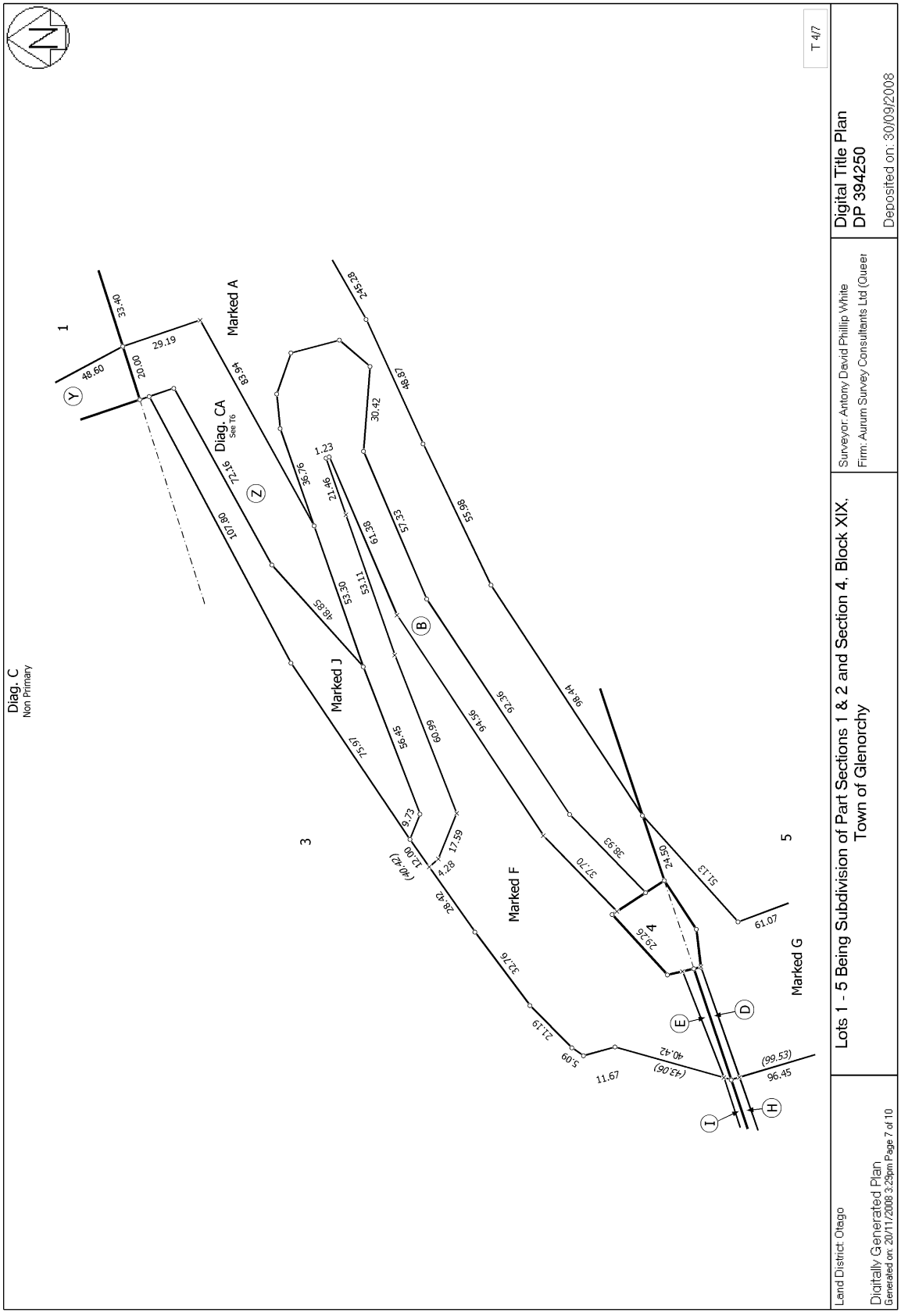
Land Covenant in Easement Instrument 7951426.4 - 30.9.2008 at 9:00 am

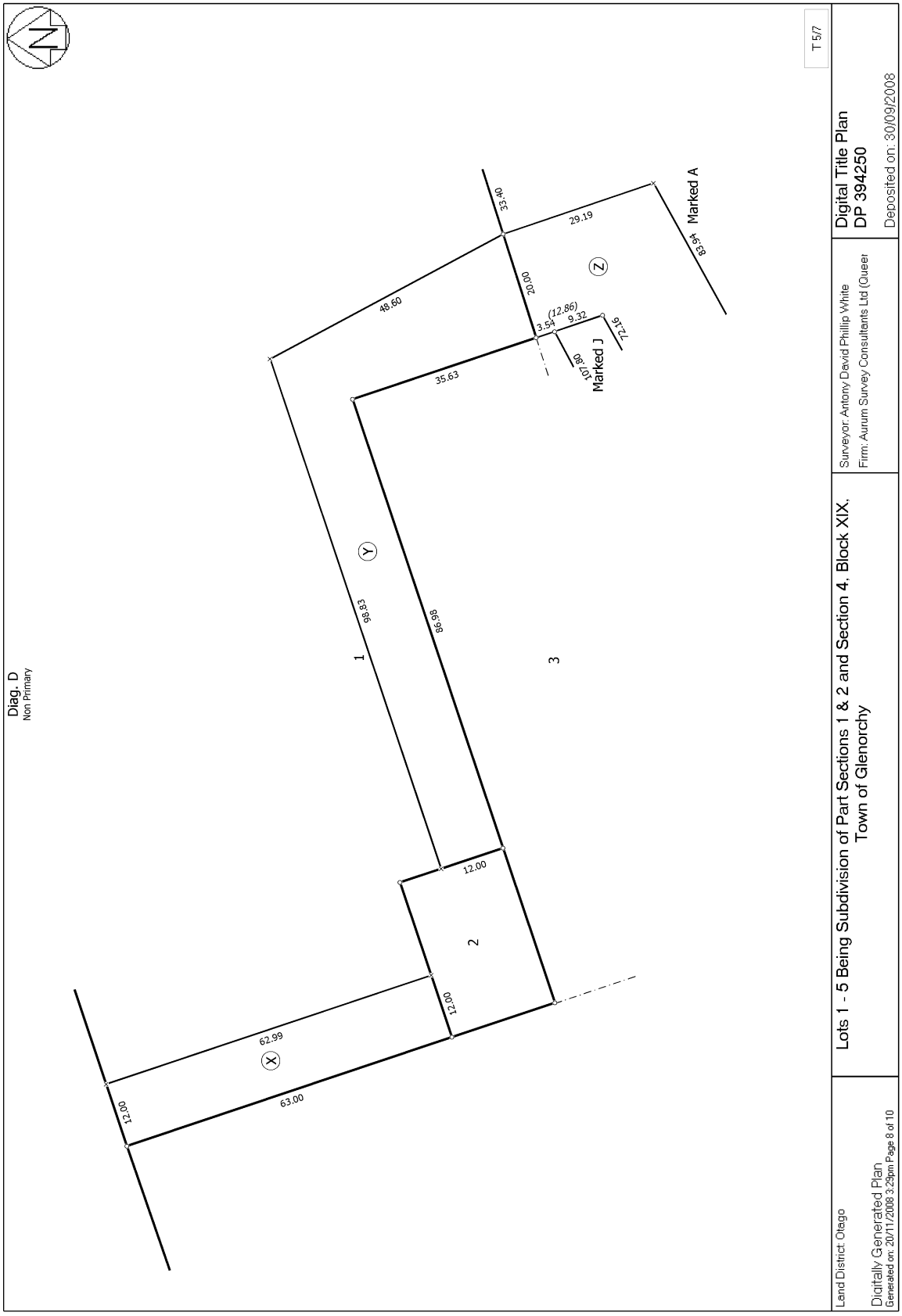
11926951.3 Revocation of Land Covenant 7951426.4 over part marked B and J on DP 430468 contained in Lot 100 DP 544220 appurtenant hereto - 16.11.2020 at 5:35 pm

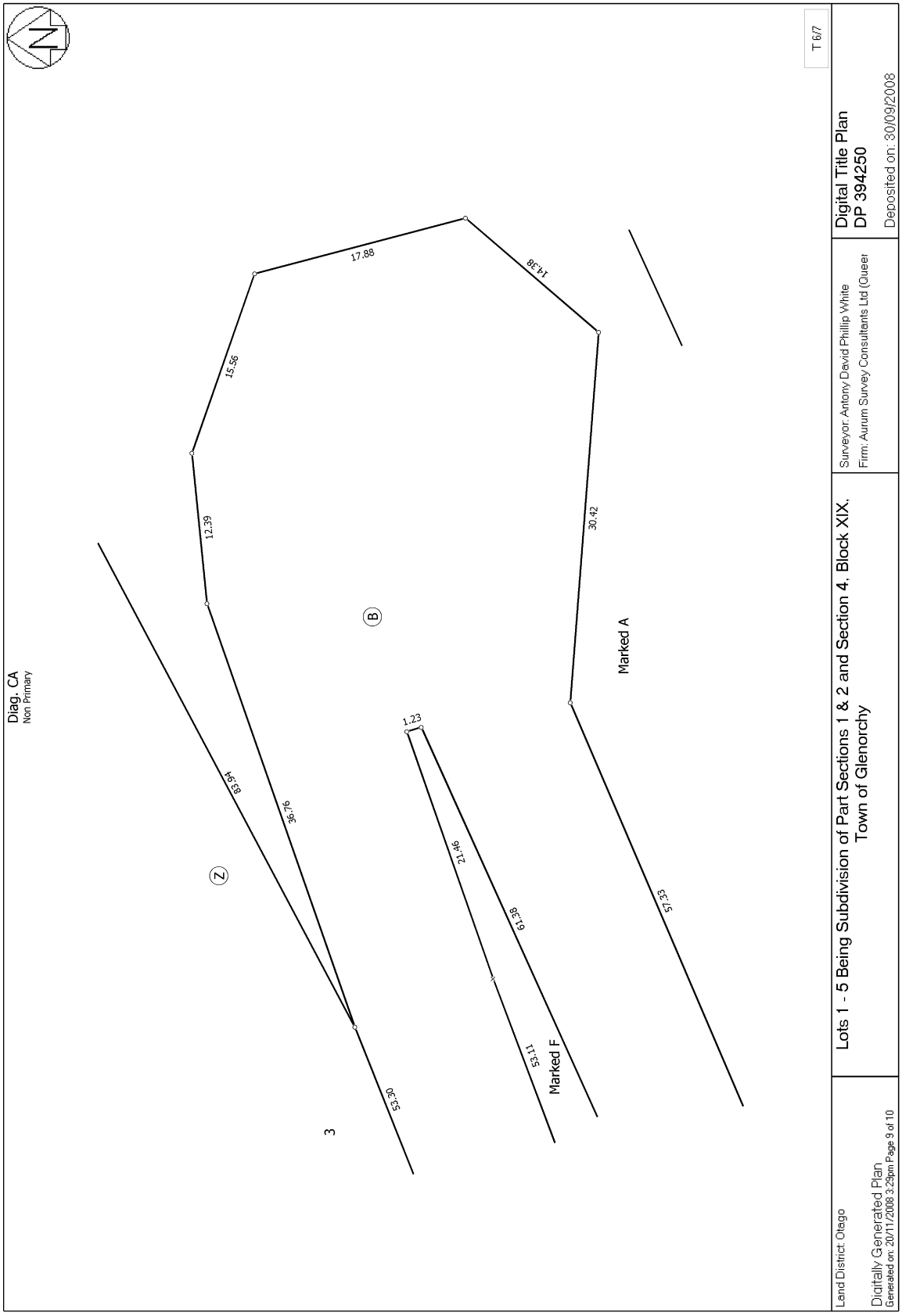


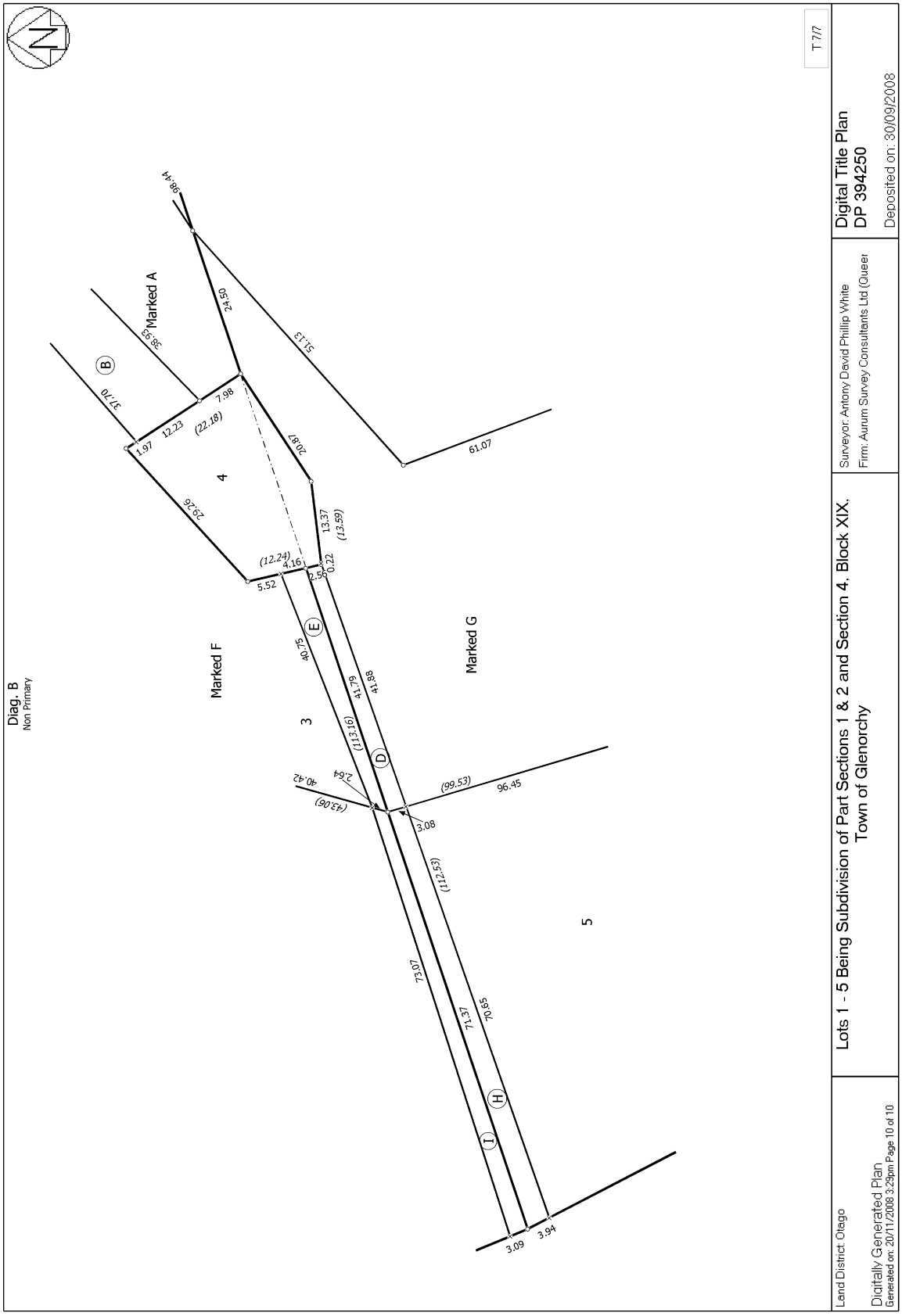












ALTERATION OF DESIGNATION UNDER SECTION 181 OF THE RESOURCE MANAGEMENT ACT 1991: QUEENSTOWN LAKES DISTRICT COUNCIL PROPOSED DISTRICT PLAN

Designation	Appellation	Type	Title	Owner(s)	Parcel Area (m²)	Designation Area (m²)
Existing	Lot 4 DP 394250	Fee Simple Title	377050	Queenstown Lakes District Council	585	585
Additional	Lot 202 DP 544220	Fee Simple Title	946694	Queenstown Lakes District Council	43,618	1,017
					Total	1,602

Legend

- Existing Designation
- Additional Designated Area
- NZ Primary Parcels

Map Scale @ A3: 1:600

0 5 10 20

Metres

N

Revision	Author	Verified	Approved	Date
3	BGP	TK	AJ	19/08/2021
2	BGP	HP	AJ	29/10/2020
1	BGP	DRAFT	DRAFT	30/09/2019

Title:

Land Requirement Plan

Additional Land to be designated "Water Storage Tanks"

Client: **Queenstown Lakes District Council**

Project: **Glenorchy Reservoir Upgrade**

Beca

Discipline: **GIS**

Drawing No: **GIS-3334040-02**

Glenorchy Reservoirs - Landscape and Visual Effects Assessment Report

Prepared for Queenstown Lakes District Council
Prepared by Beca Limited

20 August 2021

Creative people together transforming our world

Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
A	**Paul Smith**	For External Review	23.05.2019
B	**Paul Smith**	For Internal Review	28.05.2019
C	**Paul Smith**	For RMA Approval	12.06.2019
D	**Jesse Byrne**	For RMA Approval	5.11.2020
E	**Jesse Byrne**	For RMA Approval	25.11.2020
F	**Jesse Byrne**	For RMA Approval	16.08.2021

Document Acceptance

Action	Name	Signed	Date
Prepared by	**Jesse Byrne**		16.08.2021
Reviewed by	**Wade Robertson**		16.08.2021
Approved by	**Jim Dabkowski**		16.08.2021
on behalf of	Beca Limited		

1 Introduction

The proposal is to amend an existing designation (#44) to enable sufficient water storage for the future growth of Glenorchy. The amended designation will (at the outset) include the replacement of four existing water reservoirs within Lot 4 DP 394250 (**the site**) with two larger reservoirs and the potential for two additional reservoirs to be added in the future (i.e., total of four reservoirs). A concurrent resource consent application (RM200917) has been lodged with QLDC for earthworks associated with upgrading the existing access track on Bible Face that is located outside the existing and proposed designation areas and relocation of an existing earth bund.

This Landscape and Visual Effects Assessment (**LVA**) has been prepared by Beca Limited on behalf of the Queenstown Lakes District Council to assess the potential landscape and visual effects of the four reservoirs including the cumulative effects of the reservoirs and the works associated with the access track.

1.1 Scope

The scope of this report is to assess the landscape and visual effects associated with the proposal. The methodology that forms the basis for the assessment is set out in Section 1.2 below, it is based on accepted industry practice and addresses the relevant policy direction and (where relevant) specific provisions of the Queenstown Lakes Operative and Proposed District Plans (**the Operative and Proposed District Plan**). The structure of the report includes:

- A description of the proposal
- A description of the existing environment including:
  - Identification of the 'site' and local landscape as it relates to this assessment
  - Identification of the key physical and perceptual characteristics, including a summary statement of the overall character of the site and local landscape
  - A brief evaluation of the sensitivity of the site and local landscape to development
  - Identification of the relevant viewing catchment as it relates to an assessment of visual effects
- Identification of the relevant District Plan policies and provisions as identified in the paragraph above
- An assessment of landscape and visual effects (shaped by the relevant policy provisions and methodology below)
- Identification of appropriate mitigation measures, including potential consent conditions

The preparation of this assessment included the following tasks:

- Preliminary discussions with the project team regarding the intended outcomes of the proposal
- A desk top review of the relevant parts of the Operative District Plan and the relevant project material
- A formal site visit on the 8th May 2019
- Follow up meetings with the project team to discuss landscape related aspects of the proposal

1.2 Methodology

The methodology for this assessment is based on:

- The New Zealand Institute of Landscape Architects (**NZILA**), Landscape Assessment and Sustainable Management Practice Note 10.1[1]
- The Draft NZ Transport Agency (**NZTA**) Landscape and Visual Assessment Guidelines[2]
- The Guidelines for Landscape and Visual Impact Assessment[3] (**GLVIA**)

These documents are recognised within the industry as providing 'good practice guidance' in the assessment of landscape and visual effects under the RMA. As described in Section 1.1 above the structure of this report follows the structure set out in Section 2.0 of the NZTA guidelines (with the exception of the consideration of alternatives).

The documents above recommend that a landscape and visual effects assessment use a scale to assist in the consideration of 1) the quality of the landscape and its sensitivity[4] to change and 2) the degree of effect resulting from a proposal.

1.2.1 Landscape Sensitivity

The consideration of the sensitivity of a particular landscape or specific site is based on the identification of those characteristics (or attributes) that exist within a landscape, how they combine as landscape character, how valued that character is and ultimately how sensitive that value is to change. In this instance a simple 3-point scale has been adopted.

Low	Moderate	High

A landscape or site that exhibits a 'high' degree of sensitivity will likely be highly susceptible / vulnerable to change. Conversely a landscape or site that exhibits a 'low' degree of sensitivity will have more capacity to absorb change without significantly impacting the existing landscape character and values.

1.2.2 Degree of Effect

The seven-point assessment scale below combines the guidance provided in the NZILA and NZTA documents referenced above and have been applied in assessing the degree of landscape and visual effects that have been identified. The scale is used to determine negative effects of the proposal, whereas positive effects of the proposal are not scaled, they are simply described as positive effects.

For the purpose of assisting project planners and decision makers in understanding the degree of landscape and visual effects of the proposal and also undertaking the broader 'balance' required under the RMA those effects that are assessed as 'low moderate' are 'minor' in planning evaluation terms. Effects that are at the 'very low' end of the scale are negligible and those effects that are 'high to very high' are significant.

Very Low	Low	Low – Moderate	Moderate	High – Moderate	High	Very High

[1] *Best Practice Note: Landscape Assessment and Sustainable Management 10.1. (2010). New Zealand Institute of Landscape Architects.*
[2] *App1: NZTA Landscape and Visual Assessment Guidelines (draft), October 2013.*
[3] *Guidelines for Landscape and Visual Impact Assessment, Third Edition. (2013). Landscape Institute and Institute of Environmental Management and Assessment.*
[4] *NZILA Best Practice Note: "the degree to which the character and values of a particular landscape are susceptible to the scale of external change."*

2 Proposal

It is proposed to amend existing Designation #44 to ensure sufficient water storage can be provided for the future growth of Glenorchy. The amendment will initially provide for the replacement of four existing 25m^3 water reservoirs with two, 250 m^3 reservoirs located immediately to the northeast. Based on the current and anticipated growth of Glenorchy it is likely that two additional 250 m^3 reservoirs will be required within 5 to 10 years. A detailed description of the project scope is outlined in the Alteration to Designation Report and Assessment of Environmental Effects for the accompanying Resource Consent Application. The parts of the proposal that are relevant to the LVA are outlined below and illustrated on **Figures 1 – 4**.

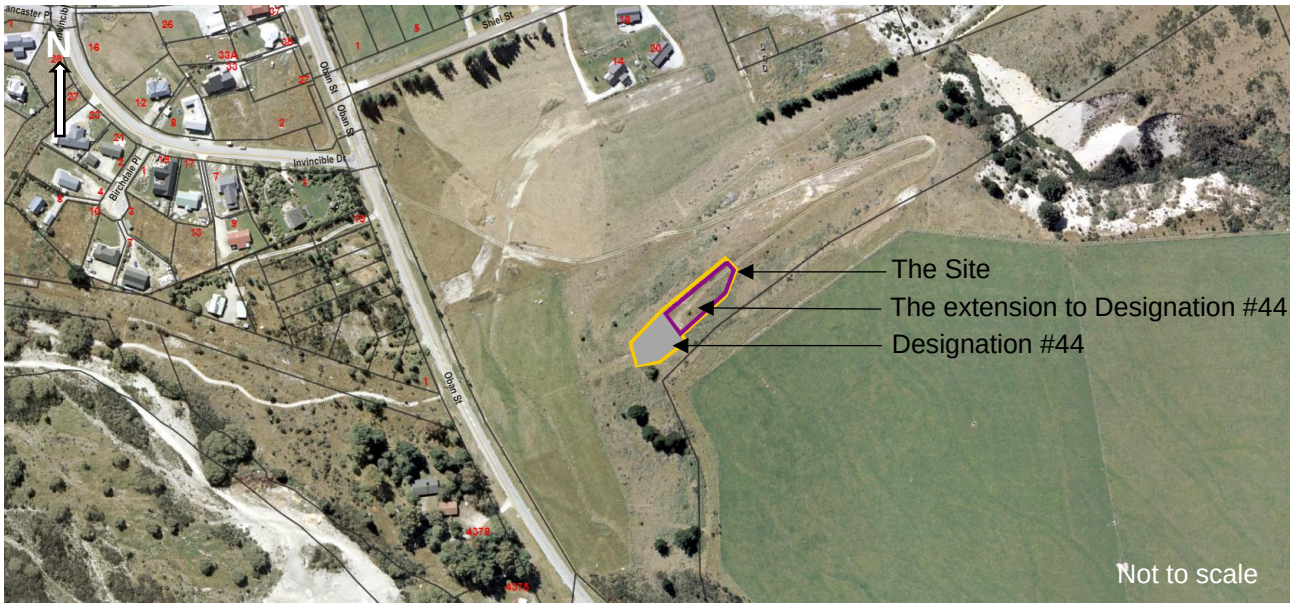


Figure 1: *The location of the Designation #44 (grey hatched area containing the four existing reservoirs), the proposed extension (highlighted in purple) and the site (highlighted in yellow).*

- QLDC proposes to extend Designation #44 (**the designation**) to the northeast
- **Figure 3** shows the location of the two initially proposed reservoirs located immediately northeast of the four existing reservoirs, and the likely location of future additional reservoirs where the existing ones are currently located
- The overall height of each tank is 7.1 m, measured from the bottom of the tank floor level to the top of the pitched roof. Each tank will have a safety rail (approximately 1 m in height) around the top of the tank and a ladder at the rear for access, the diameter of each tank is approximately 8.2 m.
- The reservoirs are constructed of steel and will be finished in the colour Grey Olive (RAL 6006), that has a Light Reflectivity Value (**LRV**) of 7.43%, the ladder and handrails will be a galvanised finish
- A 2.3 m (maximum) tall timber retaining wall, will be located immediately south of the proposed reservoirs
- The accessway surface within the designation will be upgraded to an AP65 material
- A 1.9 m high security fence will be located around the site perimeter, wire mesh and posts to be finished in black

Figure 2: *An example of the overall shape of the proposed reservoirs.*

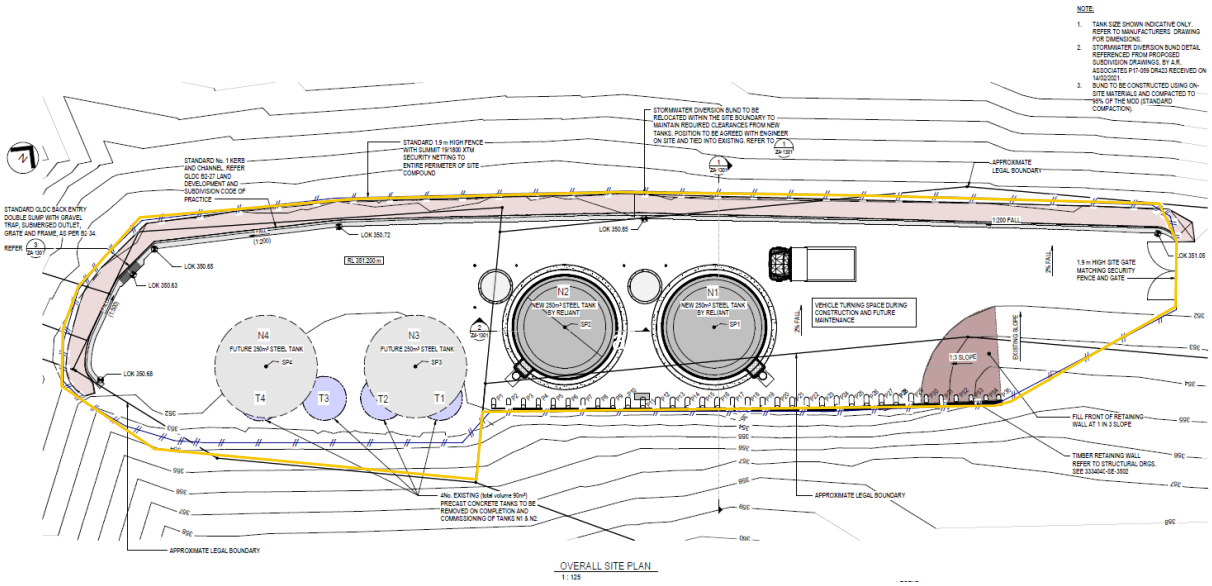


Figure 3: *A site layout plan illustrating the location of the four existing reservoirs (T1 – T4), the two proposed reservoirs (N1 and N2), the two future reservoirs (N3 and N4), the extent of the flat gravel surface and accessway and security fence. The boundary line of the site is highlighted in yellow.*

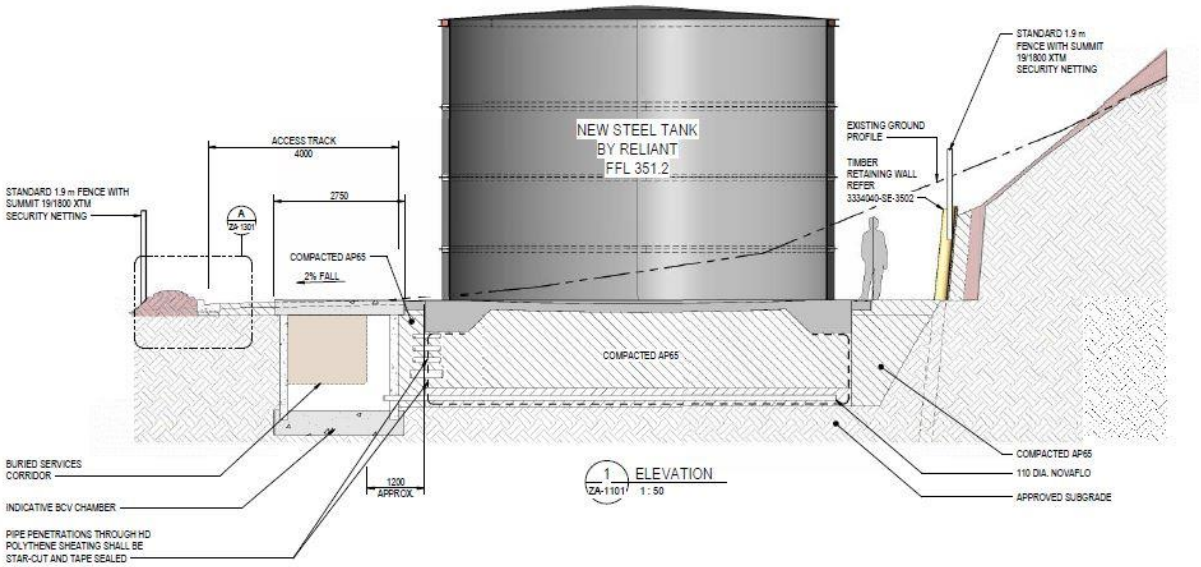


Figure 4: *A cross section through Reservoir 2 illustrating the reservoirs' height, the changes in topography, retaining wall, existing stormwater bund, security fence and the proposal's overall relationship with the escarpment face.*

3 Policy Framework

The site is situated within the Rural General Zone of the Operative and Proposed District Plans. The Council made its decisions on Chapter 37 (Designations) of the PDP on 7 March 2019. There are no outstanding appeals against those decisions affecting Designation 44. For that reason, the ODP is required to be treated as inoperative, and the PDP to be treated as operative.

Operative District Plan Appendix 8A – Map 1 outlines that all areas zoned Rural General within the Glenorchy area are categorised as being within the Outstanding Natural Landscape (District Wide) (**ONL(DW)**) overlay. This is also the case for the Proposed District Plan.

The site is also situated within Heritage Landscape Feature #8 – Bible Face, Glenorchy[5] which is a building restriction area. The purpose of this restriction area is to protect "*the visually sensitive Bible Face landform from building and development and to maintain the rural backdrop that the Bible Face provides to the Glenorchy Township*"[6].

Designation #44[7] provides for Water Storage Tanks on Bible Face.

[5] *QLDC Proposed District Plan, Chapter 26.8.8*
[6] *QLDC Proposed District Plan, Chapter 21 Rural, Policy 21.2.8.1 (a).*
[7] *QLDC Proposed District Plan, Chapter 37.2 Schedule of designations*

4 Existing Environment

4.1.1 Landscape Character Description

A proposal to alter designation #44 was applied for in 2009 by way of Notice of Requirement application RM090008. As part of this application, Dr Michael Steven of Vivian+Espie Ltd produced a Landscape and Visual Effects Assessment of the proposal (**Dr Steven's Report**). The site description in his report was and is still relevant to this proposal.

"*The landscape context of the proposed designation is the north-west facing escarpment of a feature known locally as the Bible Terrace. The name Bible Terrace is apparently a name of local origin and refers to the appearance of the terrace as being like the leaves of an open Bible. The terrace landform is a wave cut formation formed during a period when Lake Wakatipu was some 50m higher than current lake level. The escarpment features a narrow intermediate terrace on the north-west facing escarpment upon which the Glenorchy water reservoir tanks (4) are currently located*. …

Vegetation is predominantly rough pasture grasses, with some indigenous grey scrub and woody weeds. The location of the current designation features several large wilding conifers on the steep slope above the Glenorchy—Queenstown Road. Overall, the natural vegetation cover of the terrace and terrace escarpment is highly modified, but still displays a moderate degree of naturalness." [8]

At the time of the May 2019 site visit, it is worthwhile adding that the vegetation on Bible Face had matured over a decade and was predominantly covered in woody weed species and wilding conifers with an incremental amount of indigenous grey scrub coming through. (**Appendix 2 – Photographs 1 – 4**)

However, since this site visit the vegetation has been altered and is more representative of Dr Michael Stevens description above, rough pasture grasses, low height grey scrub with some woody species. This alteration has removed some of the natural screening provided by these species, observed during the May 2019 site visit.

The rarity and naming origins of Bible Face is discussed further in Dr. Stevens Report which provides some more insight into the heritage value of the landform to the community.

"Terrace landforms are not an uncommon feature of the wider Wakatipu Basin, but Bible Terrace and in particular the prominent escarpments facing the village, are well-defined and could be regarded as an exemplar of its landform type. …

The nature of the association between the local community and the landform is perhaps not of a strictly historical nature, in that the terrace is not associated with an historical event, as such. Rather, the association of more of a cultural link, given that the name was probably ascribed to the landscape feature by members of the local community and has been maintained in the community consciousness through popular use. The landform name is recognised in the New Zealand Geographic Place Names Database, and is also identified as Bible Terrace on Topographic map 260-E41 Queenstown." [9]

Overall, the landform of Bible Face remains legible, and the landscape continues to display a moderate degree of naturalness.

[8] *QLDC Resource Consent Application RM090002 - Vivian+Espie Ltd, Dr Michael Steven, Glenorchy Water Storage Reservoir Site Designation, Landscape and Visual Effects Assessment Report, 5 January 2009, Page 2 and 3.*
[9] *QLDC Resource Consent Application RM090002 - Vivian+Espie Ltd, Dr Michael Steven, Glenorchy Water Storage Reservoir Site Designation, Landscape and Visual Effects Assessment Report, 5 January 2009, Page 6.*

4.1.2 Visual Catchment

As discussed in Dr Steven's Report "*…the site of the proposed designation is highly visible from many areas within Glenorchy township, but particularly areas immediately north of the terrace escarpment, such as Sheil Street and Coll Street. The site is also visible when approaching the town travelling south on the Glenorchy—Paradise Road, and when leaving the town on the Glenorchy— Queenstown Road. That said, the existing water storage tanks have been part of the view for a very long time*." [10]

The visual catchment includes the public and private places within Glenorchy that currently have views of the four existing water tanks. The four viewpoints listed below and as illustrated on **Appendix 2 and 3** reflect these views:

1. Oban and Sheil Street intersection
2. Coll Street and Old Dairy Close intersection
3. Mull Street
4. Glenorchy-Paradise Road

4.1.3 Summary

The site has a moderate degree of sensitivity and the ability to absorb the proposed reservoirs. This is due to the relevant policy provisions, the escarpment's moderate degree of naturalness, the existing water storage tanks being present for a number of decades and forming part of the view where the legibility of the landform remains.

[10] *QLDC Resource Consent Application RM090002 - Vivian+Espie Ltd, Dr Michael Steven, Glenorchy Water Storage Reservoir Site Designation, Landscape and Visual Effects Assessment Report, 5 January 2009, Page 3.*

5 Landscape and Visual Effects

5.1 Terms of Reference

The key landscape and visual effects resulting from the proposal include:

5.1.1 Landscape Character

Assessing the effects of future development on landscape character, including the overall balance between built (i.e., structures and human modification) and non-built (i.e., natural) elements and how they are perceived, involves the consideration of:

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

These specific factors and the factors that (generally) contribute to effects on landscape character have been taken into consideration when assessing the proposal.

5.1.2 Visual Amenity

The impact that the proposal will have on the existing visual qualities of the local landscape and if this will detract from existing visual amenity. The factors that (generally) contribute to effects on visual amenity include:

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

The degree of effect on both landscape character and visual amenity have been considered using the seven-point scale described in Section 1.2.2 of this report.

5.2 Landscape Effects

In assessing overall effects of the proposal, it is important to acknowledge that water storage reservoirs are not only existing elements in the landscape, but the existing designation provides for their placement at Bible Face.

The proposed amendment to the designation will provide for additional water storage infrastructure at the site, which means that future use will be consistent in *nature and location* to existing development albeit at a increased *scale* (i.e. larger tanks and approximately 10x storage). Despite this increased scale, the extent of excavation and landform modification will be low because the terrace is flat. There is no notable vegetation on the site so negative impacts on land cover will be negligible.

Topographically, the terrace is relatively uniform along its length, except that it becomes narrower to the east. The proposal is limited to the wider, western part of the terrace; therefore, the proposal will not result in the spread of development beyond this discrete area. The one notable change to the character of the landscape is the inclusion of the 1.9m high mesh security fence. Overall, the proposal will be of a tidier and more utilitarian appearance than currently exists, due to the dilapidated state of the existing reservoirs.

Landscape character effects resulting from the amended designation, and resulting reservoir development, will be **low - moderate.**

Should the amended designation be approved, and additional water storage reservoirs be constructed, upgrades to the existing farm access track will also be required. This has been lodged as part of application (RM200917) which found effects on the landscape character of Bible Face escarpment, resulting from excavation construction, to be **low**. Due to limited area of cut required as well as the track being an existing feature within the landscape.

The cumulative effects of the proposal, including the temporary works to the access track, will not compromise the heritage value and physical integrity of Bible Face due to the levels of landform modification proposed compared to the expansive area of the Bible Face terrace landform. Cumulative effects of the proposal will be **low**.

Overall, because the level of physical change to Bible Face is minimal and because water storage infrastructure is already part of the fabric of Bible Face, the amended designation, and resulting reservoir development, will result in a **low – moderate degree of effect on landscape character**.

5.3 Visual Effects

The viewpoint photographs (**Appendix 2 – Photographs 1 – 4**) are static examples of views towards the site. However, when travelling around Glenorchy, existing dwellings, buildings, and tall amenity plantings often limit views to the site, particularly west of Oban Street.

The reservoirs will form part of the same visual context as the existing reservoirs. They will be seen in the context of the wider landscape, surrounding mountain ranges to the south and of the Bible Face terraces which provide a backdrop to the Glenorchy township.

The key elements that will contribute to visual effects include:

- The reservoir tanks – proposed and future
- The security fence
- The retaining wall, to the rear of the reservoir tanks
- Unmitigated / bare soil cut faces

5.3.1 Viewpoint 1 – Sheil and Oban Streets (290 m distance)

Viewpoint 1 provides a view looking southeast on Oban Street toward the site. This view is representative of those from residential properties within southern parts of the township as well as experienced from a travelling vehicle or by pedestrians on Oban Street traveling toward Queenstown. The view toward Bible Face includes the recently developed subdivision in the foreground and the expansive Mount Larkin ranges in the background. The existing water reservoirs are visible within this context.

When viewed from this location the proposal, in particular the security fence and reservoir tanks, will be more visually prominent than any other location due to the proximity to the site (290 m).

The rooflines of the recently subdivided development will reduce the visual prominence of the fence line and the reservoir tanks, as the number of built structures in the landscape increase. Natural screening of the bottom (1 to 2 m) of the proposed reservoirs and retaining wall will occur due to the stormwater bund and angle of this viewpoint to the site. Although permeable, the proposed security fence will provide some level of screening to the retaining wall and the resurfaced accessway. The overall height of the reservoirs will not break the skyline or form of the terrace edge that is directly behind them.

The resulting visual effects from this viewpoint will be low – moderate.

5.3.2 Viewpoint 2 – Coll Road and Old Dairy Close (450 m distance)

Viewpoint 2 provides a view looking southeast on Coll Road toward the site. This viewpoint is approximately 450 m from the proposed reservoirs and is a view representative of those from residential properties within southern parts of the township.

The view is toward Bible Face with residential dwellings and amenity plantings in the foreground and Bible Face as the background with the expansive Mount Larkin ranges to the left of the view. The existing water reservoirs are visible within this context.

The reservoirs will be visible from this location. Although the distance has increased by almost two times, the clarity of the proposed tanks and security fence will remain similar to that observed from Viewpoint 1. It is expected that the clarity of the structures within the proposal will begin to reduce when viewed from a distance greater than 500 m from the site.

However, the prominence will be somewhat reduced due to the increase in distance and the recessive colours proposed will help to blend the elements into the vegetated backdrop.

The resulting visual effects from this viewpoint will be low – moderate.

5.3.3 Viewpoint 3 – Mull Street (750 m distance)

Viewpoint 3 provides a view looking south on Mull Street toward the site. This view is representative of those from residential properties within northern parts of the township and glimpses that motorists traveling toward Queenstown would see.

The view looks toward Bible Face with an open pastoral block in the foreground and the rooflines of a number of residential dwellings and amenity plantings between that and Bible Face, which is the background. The existing water reservoirs are visible within this context.

When viewed from this location the detail of the elements in the view become less visible, due to the distance. The bulk of the proposed reservoirs will remain visible, however the security fence, reservoir handrails and retaining wall will become indistinguishable when viewed against the vegetated back drop.

The resulting visual effects from this viewpoint will be low.

5.3.4 Viewpoint 4 – Glenorchy-Paradise Drive (1.35 km distance)

Viewpoint 4 provides a view looking south on Glenorchy-Paradise Drive toward the site. This view is representative of those experienced from a travelling vehicle or by pedestrians on Glenorchy-Paradise Drive traveling toward Glenorchy township.

The view looks toward Bible Face with a mixture of natural and rural character to the landscape in the foreground and the rooflines of Glenorchy visible amongst the tree canopies to the right of the view. Bible Face and the existing tanks are visible within this context, but the dominant feature is the Tooth Peaks mountain range which creates the backdrop to the view.

When viewed from this location the scale of the development within the landscape will becomes less prominent and will not detract or dominate views of the wider landscape.

The resulting visual effects from this viewpoint will be very - low.

Should the amended designation be approved, and additional water storage reservoirs be constructed, upgrades to the existing farm access track will also be required. This has been lodged as part of application (RM200917) which found the degree of visual effect on the Bible Face escarpment, resulting from the temporary access track construction to be **low** reducing to **very low** over time as grass replaces the bare earth exposed during construction and other vegetation naturally occurs.

With regard to cumulative effects, due to the history of the site and the proposed development not being visually prominent, the proposal including the temporary works to the access track and the future reservoirs (depending on their location, size, design, and colour) will not further compromise the visually sensitive Bible Face landform that is a valued rural backdrop to the Glenorchy Township. Visual effects of the potential future water storage reservoirs will be **low – moderate**.

Overall, visual effects of the proposal will be of a low – moderate degree and while the larger scale of the reservoirs will increase visual prominence compared to the existing storage tanks, they remain consistent with existing development typology (i.e., water storage) and for this reason the proposal will maintain the existing visual amenity values and specific views from Glenorchy Township and surrounding public places. The proposal is consistent with the relevant landscape-related objectives, policies, and assessment matters of the Operative and Proposed District Plans.

6 Mitigation Measures

The following mitigation measures are inherent in the assessment above, and as such have been incorporate into the development of the proposal design:

- Locating the reservoir tanks back into the escarpment to reduce their visual prominence when viewed from the township, while also being conscious of the quantum of excavation and landform modification needed to do this
- Locating the ladder access structures to the rear of the escarpment
- Selecting visually recessive colours for the security fence and reservoir tanks
- The relocation of the existing 1 m high grass vegetated stormwater bund, which extends along the northern edge of the accessway, which provides screening the lower portions of the proposed elements
- Applying grass hydroseed to areas of bare earth exposed during construction

The introduction of vegetation to reduce the prominence or screen the reservoir tanks has been considered as part of this assessment, of which there could be two approaches. The first being a typical screening approach, of localised indigenous shrub and tree plantings directly adjacent the designation and access track works. The second would be a more natural approach and involve the re-establishment of indigenous shrubland to the large areas of the escarpment.

Both these approaches would provide a high degree of visual screening for the reservoir tanks and associated development within the designation and the access track, but at the cost of the legibility of the landform of Bible Face. It is for this reason that we have not proposed any revegetation or screen planting to the Bible Face escarpment or terrace.

7 Conclusion

The proposal will provide for four new reservoirs, a retaining wall, security fencing and levelled gravel surface within and immediately adjacent to the designation on Bible Face, Glenorchy.

Four existing reservoirs have been located on the terrace for the past few decades and the Operative and Proposed District Plan's designation anticipates that reservoir infrastructure will be situated in this area. The proposal will ultimately double the reservoir infrastructure that can occur by way of the designation and has been designed within a well contained part of this terrace. Due to this, the proposed reservoir infrastructure will have a **low – moderate degree of adverse effect on the landscape character** of the site and surrounding area.

The proposed reservoirs will be visible from the same visual catchment as the existing reservoirs, which is anticipated under the existing Designation. The proposal has also been designed to reduce its potential visual prominence from the surrounding area (e.g., low reflectivity, natural materials, and siting the reservoirs in line with existing features). Due to this, the proposal will have a **low – moderate degree of adverse visual effects** when seen from the surrounding public places.

1

Appendix 1 – QLDC Proposed District Plan Policy Provisions

Proposed QLDC District Plan

Chapter 6 Landscapes and Rural Character

6.3 Policies

Managing Activities in the Rural Zone, the Gibbston Character Zone, the Rural Residential Zone and the Rural Lifestyle Zone

6.3.10 *- Ensure that subdivision and development in the Outstanding Natural Landscapes and Rural Character Landscapes adjacent to Outstanding Natural Features does not have more than minor adverse effects on the landscape quality, character and visual amenity of the relevant Outstanding Natural Feature(s).*

Managing Activities in Outstanding Natural Landscapes and on Outstanding Natural Features

6.3.17 *- Locate, design, operate and maintain regionally significant infrastructure so as to seek to avoid adverse effects on Outstanding Natural Landscapes and Outstanding Natural Features, while acknowledging that location constraints and/or the nature of the infrastructure may mean that this is not possible in all cases.*

6.3.18 *- In cases where it is demonstrated that regionally significant infrastructure cannot avoid adverse effects on Outstanding Natural Landscapes and Outstanding Natural Features, avoid significant adverse effects and minimise other adverse effects on those landscapes and features.*

Chapter 21 Rural

21.2 Objectives and Policies

21.2.8 Objective *- Subdivision, use and development in areas that are unsuitable due to identified constraints not addressed by other provisions of this Plan, is avoided, or the effects of those constraints are remedied or mitigated.*

Policies 21.2.8.1 *- Prevent subdivision and development within the building restriction areas identified on the District Plan maps, in particular:*

a. in the Glenorchy area, protect the heritage value of the visually sensitive Bible Face landform from building and development and to maintain the rural backdrop that the Bible Face provides to the Glenorchy Township;

21.7 Rules – Standards for Buildings

Table 4 – Standards for Structures and Buildings

21.7.4 Building Height The maximum height shall be 8m.

(Restricted Discretionary) - Discretion is restricted to:

a. rural amenity and landscape character;

b. privacy, outlook and amenity from adjoining properties;

c. visual prominence from both public places and private locations.

21.21 Assessment Matters (Landscape)

21.21.1 Outstanding Natural Features and Outstanding Natural Landscapes (ONF and ONL).

21.21.1.1 In applying the assessment matters, the Council will work from the presumption that in or on Outstanding Natural Features and Landscapes, the applicable activities are inappropriate in almost all locations and that successful applications will be exceptional cases where the landscape or feature can absorb the change and where the buildings and structures and associated roading and boundary changes are reasonably difficult to see from beyond the boundary of the site the subject of application.

21.21.1.2 Existing vegetation that:

a. was either planted after, or, self-seeded and less than 1 metre in height at 28 September 2002; and,

b. obstructs or substantially interferes with views of the proposed development from roads or other public places, shall not be considered:

i. as beneficial under any of the following assessment matters unless the Council considers the vegetation (or some of it) is appropriate for the location in the context of the proposed development; and

ii. as part of the permitted baseline.

21.21.1.3 Effects on landscape quality and character

In considering whether the proposed development will maintain or enhance the quality and character of Outstanding Natural Features and Landscapes, the Council shall be satisfied of the extent to which the proposed development will affect landscape quality and character, taking into account the following elements:

a. physical attributes:

i. geological, topographical, geographic elements in the context of whether these formative processes have a profound influence on landscape character;

ii. vegetation (exotic and indigenous);

iii. the presence of waterbodies including lakes, rivers, streams, wetlands.

b. visual attributes:

i. legibility or expressiveness – how obviously the feature or landscape demonstrates its formative processes;

ii. aesthetic values including memorability and naturalness;

iii. transient values including values at certain times of the day or year;

iv. human influence and management – settlements, land management patterns, buildings, roads.

c. Appreciation and cultural attributes:

i. Whether the elements identified in (a) and (b) are shared and recognised;

ii. Cultural and spiritual values for tangata whenua;

iii. Historical and heritage associations. The Council acknowledges that Tangata Whenua beliefs and values for a specific location may not be known without input from iwi.

d. In the context of (a) to (c) above, the degree to which the proposed development will affect the existing landscape quality and character, including whether the proposed development accords with or degrades landscape quality and character, and to what degree.

e. any proposed new boundaries will not give rise to artificial or unnatural lines (such as planting and fence lines) or otherwise degrade the landscape character.

21.21.1.4 Effects on visual amenity

In considering whether the potential visibility of the proposed development will maintain and enhance visual amenity, values the Council shall be satisfied that:

a. the extent to which the proposed development will not be visible or will be reasonably difficult to see when viewed from public roads and other public places. In the case of proposed development in the vicinity of unformed legal roads, the Council shall also consider present use and the practicalities and likelihood of potential use of unformed legal roads for vehicular and/or pedestrian, cycling, equestrian and other means of access;

b. the proposed development will not be visually prominent such that it detracts from public or private views of and within Outstanding Natural Features and Landscapes;

c. the proposal will be appropriately screened or hidden from view by elements that are in keeping with the character of the landscape;

d. the proposed development will not reduce the visual amenity values of the wider landscape (not just the immediate landscape);

e. structures will not be located where they will break the line and form of any ridges, hills and slopes;

f. any roads, access, lighting, earthworks and landscaping will not reduce the visual amenity of the landscape.

21.21.1.5 Design and density of Development

In considering the appropriateness of the design and density of the proposed development, whether and to what extent:

a. opportunity has been taken to aggregate built development to utilise common access ways including roads, pedestrian linkages, services and open space (i.e. open space held in one title whether jointly or otherwise);

b. there is merit in clustering the proposed building(s) or building platform(s) within areas that are least sensitive to change;

c. development, including access, is located within the parts of the site where it would be least visible from public and private locations;

d. development, including access, is located in the parts of the site where it has the least impact on landscape character.

21.21.1.6 Cumulative effects of subdivision and development on the landscape

Taking into account whether and to what extent existing, consented or permitted development (including unimplemented but existing resource consent or zoning) may already have degraded:

a. the landscape quality or character; or,

b. the visual amenity values of the landscape.

The Council shall be satisfied the proposed development, in combination with these factors will not further adversely affect the landscape quality, character, or visual amenity values.

Chapter 25 Earthworks

25.2 Objectives and Policies

***25.2.1 Objective** – Earthworks are undertaken in a manner that minimises adverse effects on the environment, protects people and communities, and maintains landscape and visual amenity values.*

Policies

***25.2.1.1** – Ensure earthworks minimise erosion, land instability, and sediment generation and off-site discharge during construction activities associated with subdivision and development.*

***25.2.1.2 –** Manage the adverse effects of earthworks to avoid inappropriate adverse effects and minimise other adverse effects, in a way that:*

a. Protects the values of Outstanding Natural Features and Landscapes;

b. Maintains the amenity values of Rural Character Landscapes

***25.2.1.3** – Avoid, where practicable, or remedy or mitigate adverse visual effects of earthworks on visually prominent slopes, natural landforms and ridgelines.*

***25.2.1.4** – Manage the scale and extent of earthworks to maintain the amenity values and quality of rural and urban areas.*

VIEWPOINT LOCATION PLAN:
The four arrows represent the location of each of the viewpoint photographs.

VIEWPOINT 1: Located on the corner of Sheil Street and Oban Street facing the site and the existing reservoirs.

Updated site image illustrating the vegetation alterations

VIEWPOINT 2: Located on the corner of Coll Road and Old Dairy Close facing towards the site and the existing reservoirs.

Updated site image illustrating the vegetation alterations

VIEWPOINT 3: Located on Mull Street facing towards the site and existing reservoirs.

Updated site image illustrating the vegetation alterations

VIEWPOINT 4: Located along Glenorchy-Paradise Road facing towards the Glenorchy township, the site and the existing reservoirs.

Updated site image illustrating the vegetation alterations

Glenorchy Reservoirs Upgrade

Geotechnical Assessment Report

Prepared for Queenstown Lakes District Council
Prepared by Beca Limited

10 January 2019

Creative people together transforming our world

Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
1	Madeleine Prebble	Issued to client	10/01/2019

Document Acceptance

Action	Name	Signed	Date
Prepared by	**Madeleine Prebble**		10/01/2019
Reviewed by	**Jim Dabkowski**		10/01/2019
Approved by	**Phil Wilkins**		10/01/2019
on behalf of	Beca Limited		

Executive Summary

Queenstown Lakes District Council are replacing the visibly cracked Glenorchy water reservoirs and upgrading the overall water capacity to meet future water supply demands. The proposed upgrade currently comprises the construction of two new 250m^3 reservoirs, followed by the replacement of the existing four reservoirs with two 250m^3 reservoirs. Upgraded connections to water mains and an upgrade of the access track are also proposed.

Geotechnical investigations were conducted at the site on the 27th to 28th of November 2018 comprising one sonic borehole to 15m below ground level and six dynamic cone penetrometer tests across the site. The investigations confirmed the mapped geology of Quaternary-aged alluvial fan materials comprising dense to very dense sands.

The liquefaction potential has been assessed using liquefaction assessment methodology developed by Idriss and Boulanger (2014) by evaluating the SPT data collected. Liquefaction is not expected to occur under an ultimate limit state seismic event.

The existing slopes above and below the reservoir site are approximately 1.5 Horizontal to 1 Vertical (1.5H:1V). The existing slope profile is expected to meet design criteria in static conditions and during a SLS earthquake. Some lateral movement is predicted to occur during an ULS earthquake, on the order of 100mm for the slope below the reservoir and around 10mm displacement for the slope above.

The reservoirs are expected to be founded on 8.25m diameter shallow concrete pads, approximately 400mm thick, bearing on medium dense sands. An ultimate geotechnical bearing capacity of 400kPa has been determined using bearing capacity methods published in B1/VM4 by MBIE (2016b). A strength reduction factor of 0.85 is recommended to be adopted for load combinations involving earthquake overstrength and 0.5 for non overstrength load cases. Settlements of up to 5 to 10mm may occur in the upper medium dense sands as the loads are applied during construction.

The current access road is a narrow, single vehicle width, track which is partially vegetated and rocky. A sharp corner exists approximately halfway up the hill and a small slip was observed near the gate in the fence. The slip is on the downhill side of the track and appears to be caused by surface erosion. The track will likely require regrading, slight widening, stabilization of the slip area, and vegetation removed to allow construction and maintenance vehicles access the reservoir site. The corner is currently too sharp for a standard-size vehicle to turn and will likely require widening for which there is ample room. Widening of the track should ensure that the above and below slopes are not steepened to gradients greater than 1.5H:1V.

1 Introduction

Queenstown Lakes District Council (QLDC) are replacing the visibly cracked Glenorchy water reservoirs and upgrading the overall water capacity to meet future water supply demands. Beca Ltd (Beca) have been commissioned by QLDC to assist with the design of the proposed reservoir upgrade. This report summarises the geotechnical investigations and assessment undertaken to inform the reservoir design.

2 Site Location and Description

The site is located south of the Glenorchy township, in Central Otago as shown on Figure 1 in Appendix A. There are four existing concrete tanks on a relatively flat bench, part way up a terraced plateau south of Shiel Street. The bench appears to have been cut into the side of the plateau, with the excavated material cast to the downhills side. The site is accessed via a dirt track off Oban Street (south of Shiel Street), and the tanks are situated on the approximately 20m wide bench. The slopes above and below the site are approximately 1.5 Horizontal to 1 Vertical (1.5H:1V).

3 Geology

The geological map of the Wakatipu area (Turnbull, 2000) is shown in Figure 3.1 below. The site is mapped as Quaternary-aged alluvial fan material comprising loose, commonly angular, boulders, gravel, sand, and silt forming alluvial fans. This is expected to be underlain by Caples Group semischist at depth.

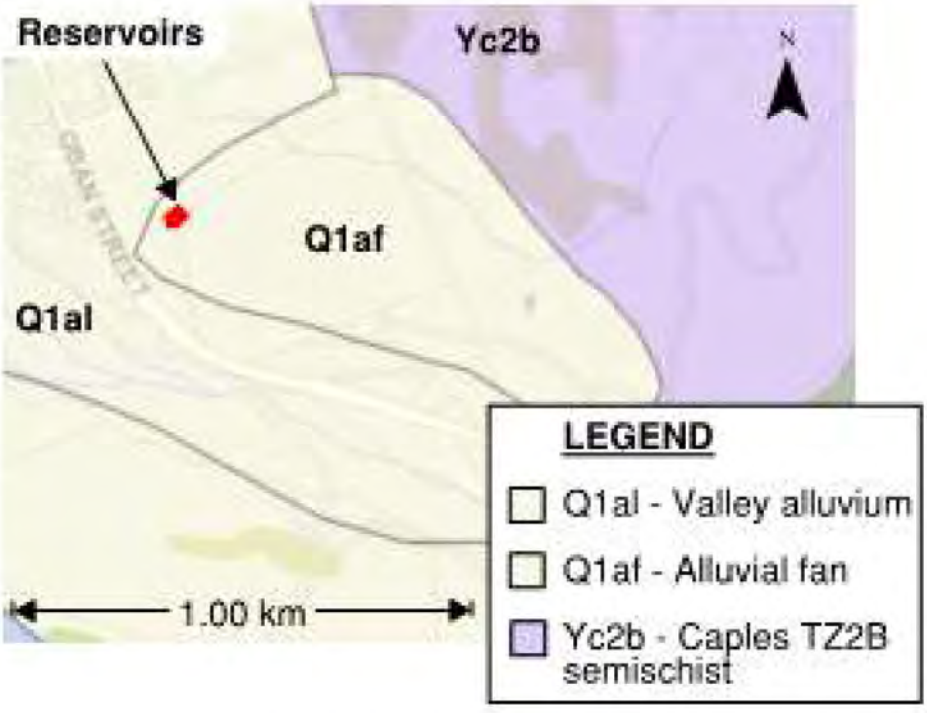


Figure 3.1 - Geology of the Site (Turnbull, 2000)

4 Proposed Development

The proposed upgrade comprises:

- Two new 250m^3 reservoirs
- The replacement of the existing four reservoirs with an additional two 250m^3 reservoirs
- Integration and connection with existing rising and falling mains pipework
- Upgrade of site access track and platform as required

The new reservoirs are expected to be 8.25m diameter, proprietary, potable steel water storage tanks.

5 Geotechnical Investigations

The site investigation was commenced on 27 November 2018 and was completed by 28 November 2018 and consisted of:

- One machine boreholes to 15m depth
- Six dynamic cone penetrometer (DCP) tests up to 1.8m depth or refusal

The machine borehole was carried out by Speights Drilling at the proposed tank location using a HD900 sonic drill rig. A Beca Geotechnical Engineer advanced six dynamic cone penetrometer (DCP) tests to refusal from 0.3m to 1.8m below ground level (bgl) under the proposed reservoir location and across the existing bench.

The investigation locations were recorded using a handheld GPS in terms of NZTM coordinates and are shown on the Site Investigation Location Plan (Figure 1 in Appendix A). Machine borehole and photos are presented in Appendix B and dynamic cone penetrometer test results are presented in Appendix C.

5.1 Standards and Calibration

The site investigation was undertaken in general accordance with the New Zealand Ground Investigation Specification (2017); a list of standards used during the site investigation is shown in Table 5.1.

Table 5.1 – Summary of Standards Used

Field Procedure	Standard Used
Soil and Rock Logging	In general accordance with New Zealand Geotechnical Society Guidelines (NZGS, 2005)
Standard Penetration Testing	ASTM D1586 -11 (1)
Standard Penetration Testing – Hammer Efficiency	ASTM D4633-10
Dynamic Cone Penetrometer Testing	NZS 4402.6.5.2:1988

(1) Standard adopted to provide for variation in SPT split spoon diameter with results reported in 75mm increments including seating drive.

5.2 Machine Boreholes

A single borehole was advanced to 15m bgl with standard penetration tests (SPT) performed at 1.5m centres. The uncorrected N-values were based on field-recorded blow counts are recorded on the borehole logs. Soil samples from the SPT tests were logged by a Beca Geotechnical Engineer in accordance with the New Zealand Geotechnical Society (NZGS, 2005) guidelines. Logs and photographs of the soils encountered, verified by a Beca Senior Engineering Geologist, are presented in Appendix B.

After the core samples had been logged they were placed in labelled core boxes before being transferred to Beca's office in Christchurch. The core samples will be stored until the completion of the construction, and final logs uploaded to the New Zealand Geotechnical Database. Some natural desiccation and degradation of the core samples may occur through time following storage.

5.3 Dynamic Cone Penetrometer Tests

DCP testing was undertaken from the ground level at six locations across the bench to a maximum depth of 1.8m bgl. The DCP is a widely used device to determine *insitu* strength properties of subgrade soils. The four main components of the DCP include the cone, rod, anvil, and hammer. The cone is attached to one end of the DCP rod while the anvil and hammer are attached to the other end. Energy is applied to the cone tip through the rod by dropping the 8kg hammer exactly 575mm against the anvil. The diameter of the cone is 4mm larger that the rod to ensure that only tip resistance is measured. The number of blows required to advance the cone 100mm into the subsurface is recorded. Tests were carried out in general accordance with the methods described in NZS 4402.6.5.2 (1988); test results have been included in Appendix C.

6 Ground Conditions

6.1 Soil Profile

The upper soils observed on site comprised firm silt overlying sand, becoming denser with depth. A representative soil profile is given below in Table 6.1 and soil parameters adopted for design are given below in Table 6.2. A cross-section of the site is given in Appendix A, Figure 3.

Table 6.1 - Soil Profile

Unit	Description	Depth to Top of Layer (m)	Thickness of Layer (m)	SPT N-Values	DCP Values (blows/100mm)
1 – Fill	Firm silt	0	0-0.6	N/A	0-2
2 – Alluvial Fan	Medium dense sand, some gravel and silt	0-0.6	0.4-1.3	N/A	3-7
3 – Alluvial Fan	Dense sand, some gravel and silt	1.0-1.3	8	29-37	7+
4 – Alluvial Fan	Very dense sand, some gravel and silt	9.0	N/A	50+	N/A

Table 6.2 - Soil Parameters for Design

Unit	Density, γ (kN/m^3)	Friction Angle, Φ' (°)	Cohesion, c' (kPa)	Young's Modulus, E (MPa)
1 – Fill	16	28	1	8
2 – Alluvial Fan	18	30	0	10
3 – Alluvial Fan	19.5	40	0	60
4 – Alluvial Fan	21	43	0	90

6.2 Groundwater

Groundwater was measured at 5.95m bgl in the borehole at the completion of drilling. A representative groundwater level of 5m below ground level was adopted for liquefaction and slope stability assessments to account for seasonal variation in groundwater levels.

Groundwater levels at 0.4m bgl were also considered for the foundation assessments, allowing for elevated groundwater levels because of heavy rainfall or reservoir leakage.

7 Design Criteria

7.1 Design Life and Importance Level

The design life of the new reservoirs is 100 years, and the Importance Level (IL) of the reservoirs is expected to be IL3 in accordance with AS/NZS1170.0:2002.

7.2 Site Subsoil Class

The soil subclass in accordance to NZS 1170.5:2004 depends on the depth of soils to rock with each site being classified with categories A, B, C, D or E. Class A and B refer to sites founded directly on very strong and slightly less competent rock material respectively. As this was not the case for the investigation area, these classes are not applicable. Class E refers to site with more than 10m of soils with SPT-N value less than 6 which is not the case at this site. Class C refers to shallow soils sites with limits to the maximum depths of soils depending on the geology and density. At this site, most of the strata is a very dense sand, which is likely to extend beyond 60m depth as rock was not encountered in the borehole or nearby water bores (the maximum very dense sand depth according to NZS 1170.5:2004 for a Class C site). Therefore, the most applicable subsoil class is Class D, defined as being deep soil.

7.3 Seismic Loading

Seismic loads were determined as part of the assessment of the liquefaction potential of the site. The Ministry of Business Innovation and Employment Guidance (MBIE, 2016a) recommends that the NZ Transport Agency Bridge Manual (3rd Edition including Amendment 2) be used to derive seismic accelerations for liquefaction analyses. Seismic loads are summarised in Table 7.1.

The Annual Probability of Exceedance is based on Table 3.3 of AS/NZS 1170.0:2002. The unweighted peak ground acceleration and the effective magnitude are derived from the NZ Transport Agency Bridge Manual Third Edition, Amendment 2. These earthquake loads are applicable only to the ground profile and not to the structural design of the reservoir.

Table 7.1 - Geotechnical Seismic Design Criteria

Inputs	Serviceability Limit State (SLS)	Ultimate Limit State (ULS)
Site Subsoil Class	D	D
Seismic Coefficient ($C_{0,1000}$)	0.52	0.52
Annual Probability of Exceedance	1/25	1/2500
Unweighted Peak Ground Acceleration (g)	0.1	0.72
Effective Magnitude	6.0	6.75

8 Liquefaction and Lateral Spreading

Liquefaction is a phenomenon where saturated granular soils temporarily lose strength due to attempted contraction resulting in high pore pressure developing during and after earthquake shaking. Liquefaction predominantly occurs in soft silt and loose sands below the water table where the deposits are non-plastic or have low plasticity (i.e., they have “sand-like” behaviour). The cyclic softening causes the soil’s shear strength to reduce from a peak to remoulded level under successive cyclic actions.

The liquefaction potential has been assessed using liquefaction assessment methodology developed by Idriss and Boulanger (2014) by evaluating the SPT data collected. The results of this assessment indicate that liquefaction is not expected to occur under a SLS or ULS seismic events. The upper soil layers are predominantly dense enough that they are not considered susceptible to liquefaction.

Lateral spreading is the permanent horizontal movement of a liquefiable soil deposit due to the presence of non-zero initial shear stressed on horizontal planes within the soil during a seismic event. It occurs predominantly within gradual slopes or on flat sites situated near steeper slopes. Considering the very dense sand soil profile that is not prone to liquefaction, there is little risk of lateral spreading.

9 Slope Instability

The existing slopes above and below the reservoir site are approximately 1.5H:1V, with no evidence of deep instability observed from a site inspection and review of aerial photography.

The existing slopes were modelled using the GeoStudio software package Slope/W (GEOSLOPE, 2018), adopting the Morgenstern and Price method for force and mass equilibrium and a Factor of Safety (FoS) approach. Seismic loads as set out in Section 7.3 were applied to the slope models. Design groundwater levels were adopted as given in Section 6.2.

Lateral displacements under earthquake loading were estimated using a Newmark sliding block approach and an empirical relationship developed by Jibson (2007) as a function of the peak ground acceleration and the yield acceleration. The results of the analyses are given below in Table 9.1.

Table 9.1 - Slope Stability Analysis Results

Design case	Target FoS	FoS	FoS Met?
Long term static	1.5	1.6	Yes
Seismic SLS	1.2	1.3	Yes
Seismic ULS	1.0	<1.0	No, 100mm displacement of lower slope predicted, and 10mm displacement of upper slope.

The existing slope profile is expected to meet design criteria in static conditions and during a SLS earthquake. Some lateral movement is predicted to occur during a ULS earthquake, in the order of 100mm for the slope below the reservoir and around 10mm displacement for the slope above.

10 Foundations

The reservoirs are expected to be founded on individual, shallow, reinforced concrete pad foundations at 0.4m deep, approximately 8.25m diameter and 400mm thick. The foundations are expected to be founded in medium dense sands of Unit 2. Where fill or cohesive materials are encountered, these are expected to be undercut and replaced with compacted hardfill. A compacted hardfill layer (100mm to 200mm thick) is recommended to be placed below foundations to protect the underlying sand subgrade from loosening prior to the reinforced concrete foundation being constructed.

10.1 Bearing Capacity

An ultimate geotechnical bearing capacity of 400kPa was determined for the medium dense sands expected to be encountered, using methods published in B1/VM4 (MBIE, 2016b) and the assumptions presented above.

B1/VM4 (MBIE, 2016b) gives a strength reduction factor for bearing and passive earth pressure of between 0.45 to 0.60 for load combinations excluding earthquake overstrength based on the design approach and the testing regime. A strength reduction factor of 0.50 has been adopted for the shallow foundations considering the level of geotechnical investigation completed and field testing assumed.

For load combinations involving earthquake overstrength, B1/VM4 gives a strength reduction factor of 0.80 to 0.90. A strength reduction factor of 0.85 has been used in this analysis.

This equates to a design bearing strength of 200kPa for non-overstrength and 340kPa for overstrength conditions.

10.2 Settlement

Significant settlement under the reservoirs is not expected. Settlements of 5 to 10mm may occur in the upper medium dense sands during construction and initial loading.

11 Access Road

The current access road is a narrow, single vehicle width, track which is partially vegetated and rocky. A sharp corner exists approximately halfway up the hill and a small slip was observed near the gate in the fence. The slip is on the downhill side of the track and appears to be caused by surface erosion.

The track will likely require regrading, slight widening, stabilization of the slip area, and vegetation removed to allow construction and maintenance vehicles access the reservoir site. The gradient of the access road appears reasonable for construction and maintenance traffic. The corner is currently too sharp for a standard-size vehicle to turn and will likely require widening for which there is ample room. Widening of the track should ensure that the above and below slopes are not steepened to gradients greater than 1.5H:1V as assessed in Section 9.

12 Construction Recommendations

12.1 Site Work Preparation

Prior to construction of any new foundations, the area that will receive fill, base rock, or structures should be stripped of all surface vegetation, organic topsoil, and any unsuitable materials that may be encountered. Any soft or unsuitable soils encountered during stripping or excavation should be removed and replaced with engineered hardfill. All subgrades should be approved by the Engineer prior to the placement of any fill materials or foundation elements.

12.2 Excavation

We recommend that the excavation for the foundations to be accomplished with a straight-edged grading bucket to minimize disturbance of the bearing surfaces. Following excavation, the bearing surface be thoroughly cleaned of loosened or disturbed soil, by hand if necessary. Any soft or unsuitable soils encountered at the base of foundation excavation should be removed and replaced with compacted engineered hardfill.

After the area has been stripped or excavated to design elevations, we recommend proof rolling the subgrade with 10 tonne vibratory, smooth-drum roller. Should the subgrade deflect under the proof rolling, it should be recompacted or removed and replaced with hardfill.

12.3 Engineered Hardfill Material

We recommend that the fill intended to support the foundation to be placed in horizontal lifts not exceeding about 200mm in loose thickness and be compacted to at least 95 percent of the maximum dry density as determined by the standard compaction test (NZS 4402:1986 Test 4.1.1).

The on-site sand could be used as fill provided that the material larger than 65mm is removed. This material may be sensitive to moisture, so may be difficult to work with if wetter than its optimum moisture content. Engineered hardfill should be clean, well graded granular AP65 material, free of organics and debris. The structure to achieve proper density of a compacted fill depends on the size and type of compacting equipment, the number of passes, thickness of the layer being compacted and certain soil properties. When the size of the excavation restricts the use of heavy equipment, smaller equipment can be used, and the soil must be placed in lifts thin enough to achieve the required compaction. We recommend that methods of compaction be left to the discretion of the contractor, with compaction testing performed to verify the density.

13 Applicability Statement

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

Should you be in any doubt as to the applicability of this report and/or its recommendations for the proposed development as described herein, and/or encounter materials on site that differ from those described herein, it is essential that you discuss these issues with the authors before proceeding with any work based on this document.

14 References

Australia/New Zealand Standard, 2002. AS/NZS1170.0:2002. Structural design actions, Part 0: General principles.

Boulanger, R. W. and Idriss, I. M., 2014. CPT and SPT based liquefaction triggering procedures. Report No. UCD/CGM-14/01, Center for Geotechnical Modeling, Department of Civil and Environmental Engineering, University of California, Davis, CA, 134 pp.

GEOSLOPE, 2018. GeoStudio [Computer software] Version 9.1.1.16749. Calgary, Alberta, Canada.

Jibson, R.W. 2007. Regression models for estimating coseismic landslide displacement. Engineering Geology Vol 91, Issues 2-4, pp. 209-218.

Ministry of Business Innovation and Employment (MBIE), 2016a. Earthquake geotechnical engineering practice. Module 3: Identification, assessment and mitigation of liquefaction hazards

Ministry of Business Innovation and Employment (MBIE), 2016b. Acceptable Solutions and Verifications Methods: For New Zealand Building Code Clause B1 Structure.

New Zealand Geotechnical Society, 2005. Field Description for Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes.

New Zealand Standard, 1986. NZS 4402.4.1.1:1986. Methods of testing soils for civil engineering purposes – soil compaction tests – Determination of the dry density/water content relationship – 4.1.1 New Zealand standard compaction test.

New Zealand Standard, 1988. NZS 4402.6.5.2:1988, Methods of testing soils for civil engineering purposes - Soil strength tests - Determination of the penetration resistance of a soil - Test 6.5.2 Hand method using a dynamic cone penetrometer.

New Zealand Standard, 2016. NZS1170.5 Structural Design Actions Part 5: Earthquake Actions: New Zealand, Amendment 1.

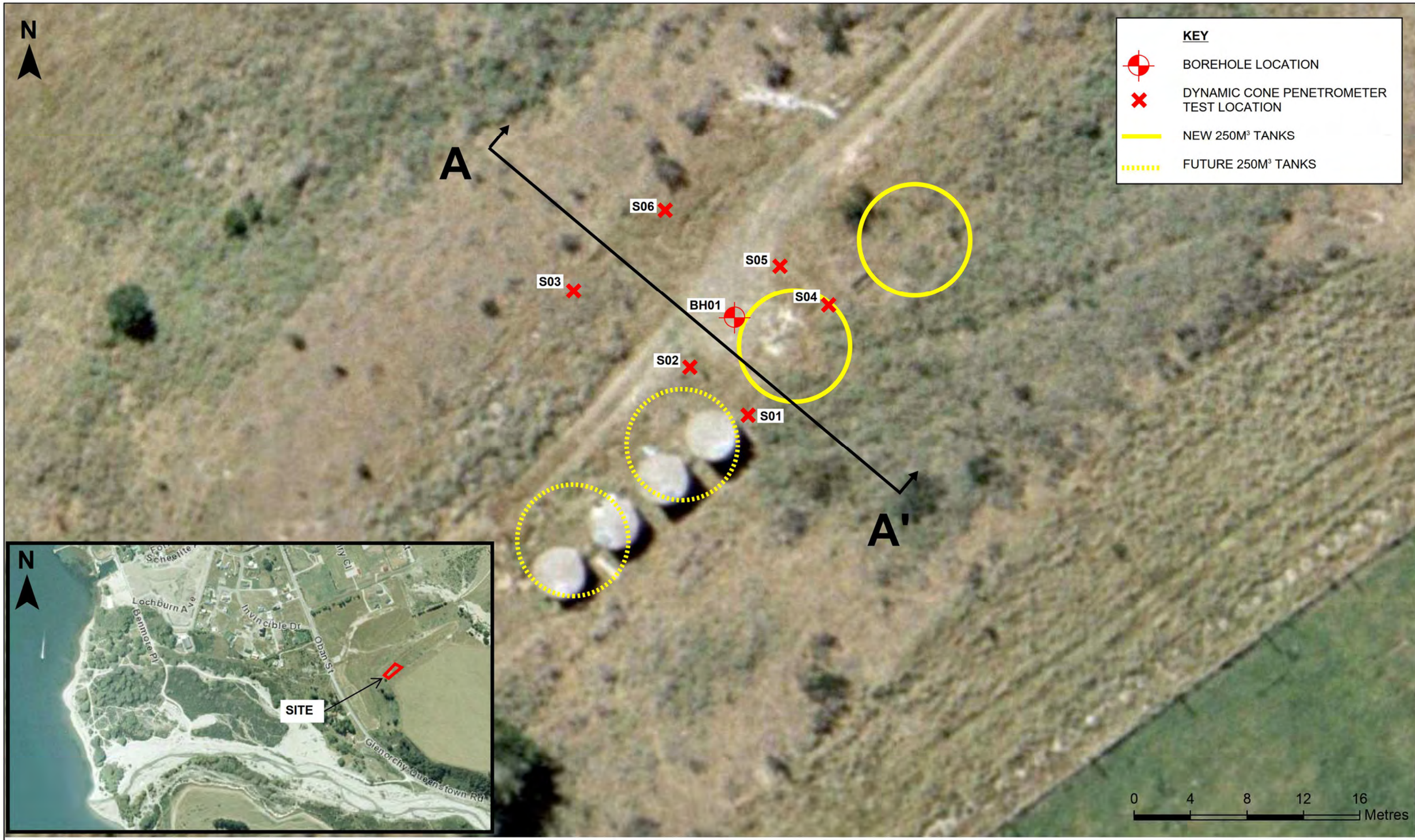
NZ Transport Agency, 2016. Bridge Manual (SP/M/022), Third edition, Amendment 2.

Stockwell, M. J.,1977. Determination of allowable bearing pressure under small structures. New Zealand Engineering, 132-135.

Turnbull, I.M. (compiler), 2000. Geology of the Wakitipu area. Institute of Geological & Nuclear Sciences 1:250 000 geological map 18. 1 sheet + 72p. Lower Hutt, New Zealand. Institute of Geological & Nuclear Sciences Ltd.

A

Appendix A – Figures



PDF ONLY
NO DWG FILE

Rev	Description	By	Chk	Appd	Date

Drawing Originator: Beca

Original Scale (A1): 1:125
Reduced Scale (A3): 1:250

Design | Drawn | Dsg Verifier | Dwg Check | * Refer to Revision 1 for Original Signature

Client: QUEENSTOWN - LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIRS UPGRADE

Title: GEOTECHNICAL INVESTIGATION LOCATON PLAN

Discipline: GEOTECHNICAL

Drawing No: FIGURE 1

Rev: 1

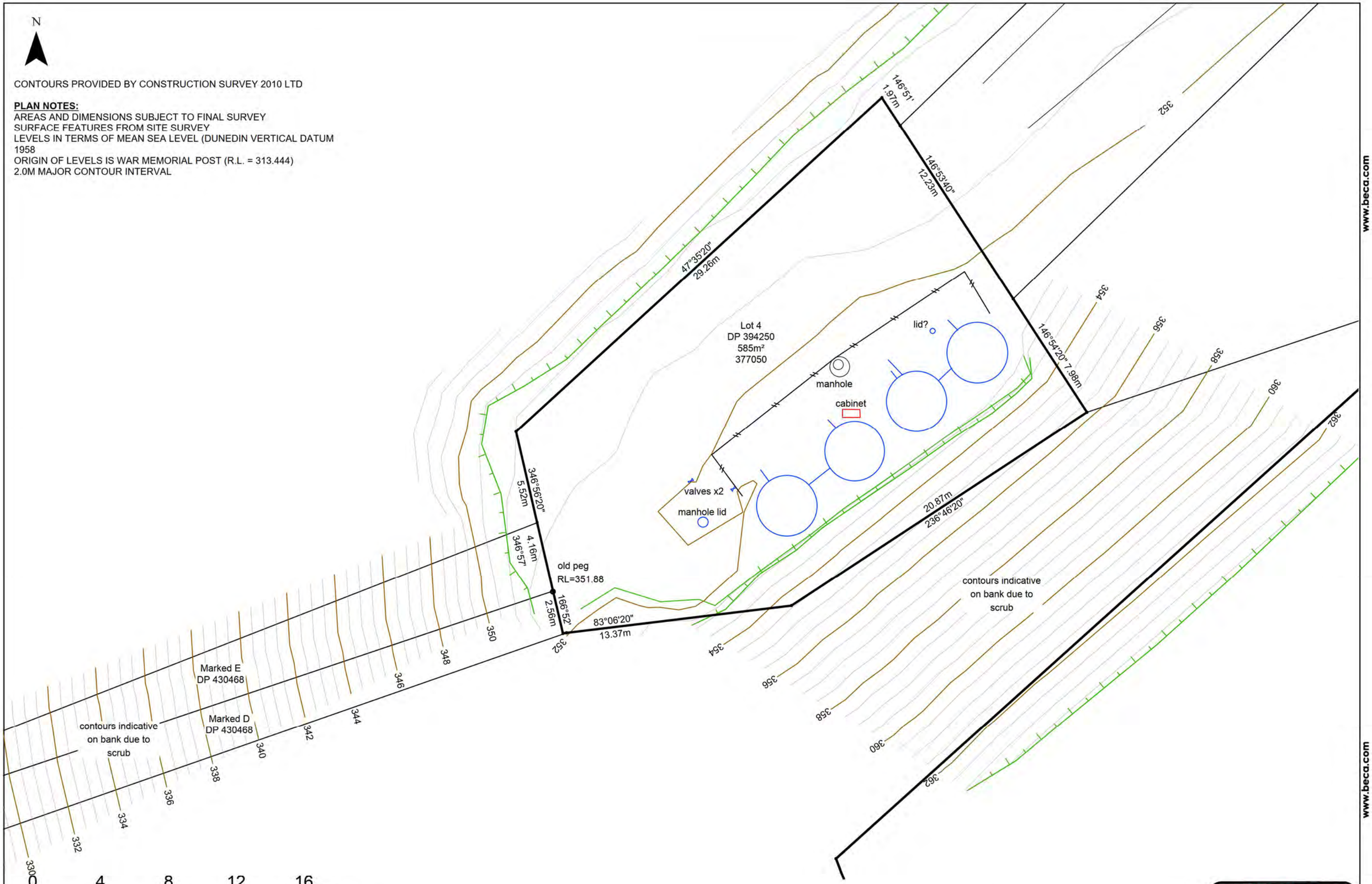
DO NOT SCALE

IF IN DOUBT ASK

N

CONTOURS PROVIDED BY CONSTRUCTION SURVEY 2010 LTD

PLAN NOTES:
AREAS AND DIMENSIONS SUBJECT TO FINAL SURVEY
SURFACE FEATURES FROM SITE SURVEY
LEVELS IN TERMS OF MEAN SEA LEVEL (DUNEDIN VERTICAL DATUM 1958
ORIGIN OF LEVELS IS WAR MEMORIAL POST (R.L. = 313.444)
2.0M MAJOR CONTOUR INTERVAL



www.beca.com

PDF ONLY
NO DWG FILE

No.	Revision	By	Chk	Appd	Date	Drawing Originator: Beca	Original Scale (A1) 1:100	Design			Client: QUEENSTOWN LAKES DISTRICT COUNCIL	Project: GLENORCHY RESERVOIRS UPGRADE	Title: TOPOGRAPHIC SURVEY EXISTING SITE PLAN	Discipline: GEOTECHNICAL
								Drawn						
							Reduced Scale (A3) 1:200	Dsg Verifier						Drawing No: FIGURE 2
								Dwg Check						Rev: 1
								* Refer to Revision 1 for Original Signature						

DO NOT SCALE

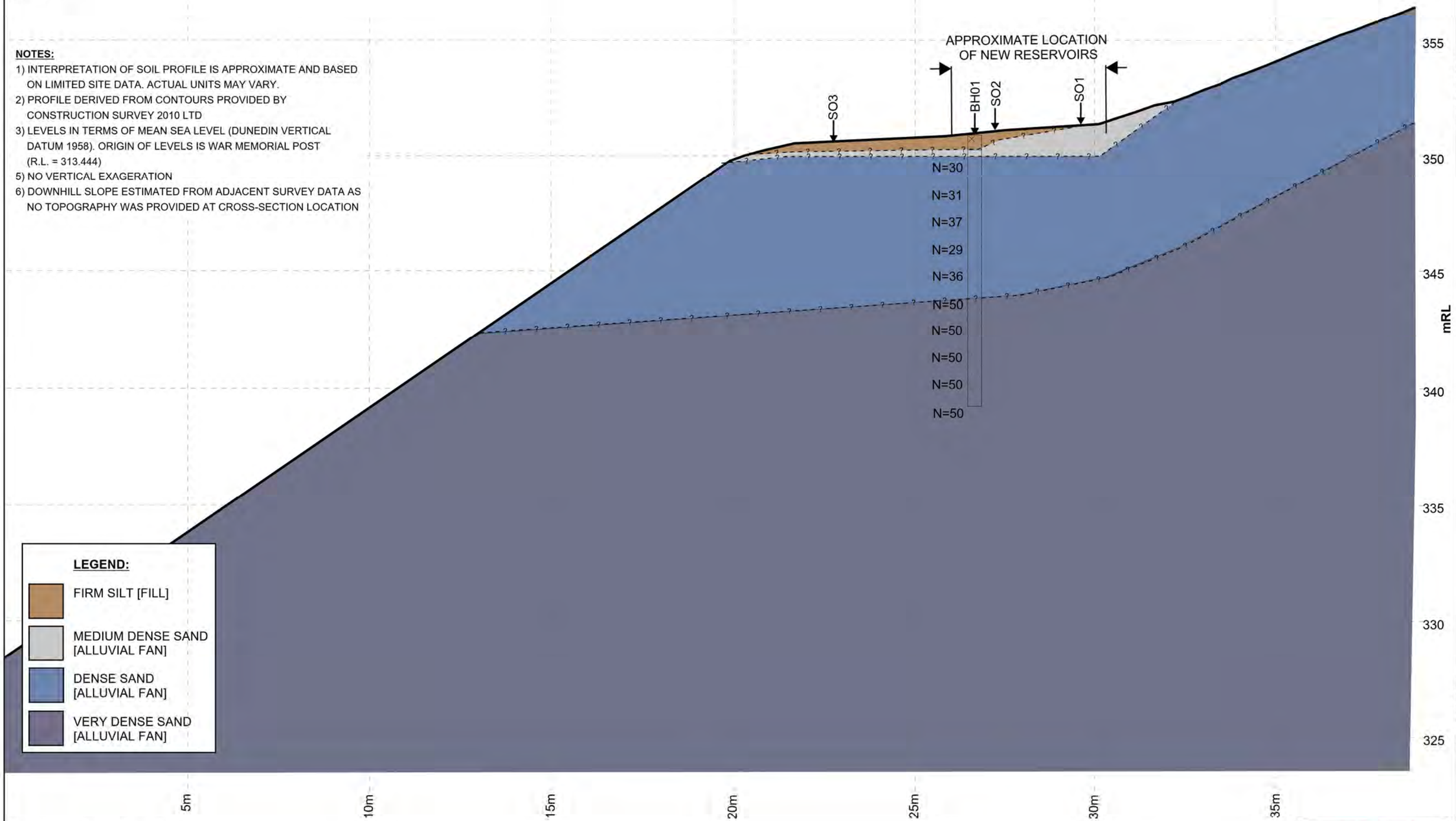
IF IN DOUBT ASK

A

A'

NOTES:

1) INTERPRETATION OF SOIL PROFILE IS APPROXIMATE AND BASED ON LIMITED SITE DATA. ACTUAL UNITS MAY VARY.
2) PROFILE DERIVED FROM CONTOURS PROVIDED BY CONSTRUCTION SURVEY 2010 LTD
3) LEVELS IN TERMS OF MEAN SEA LEVEL (DUNEDIN VERTICAL DATUM 1958). ORIGIN OF LEVELS IS WAR MEMORIAL POST (R.L. = 313.444)
5) NO VERTICAL EXAGERATION
6) DOWNHILL SLOPE ESTIMATED FROM ADJACENT SURVEY DATA AS NO TOPOGRAPHY WAS PROVIDED AT CROSS-SECTION LOCATION



LEGEND:

- FIRM SILT [FILL]
- MEDIUM DENSE SAND [ALLUVIAL FAN]
- DENSE SAND [ALLUVIAL FAN]
- VERY DENSE SAND [ALLUVIAL FAN]

www.beca.com

PDF ONLY
NO DWG FILE

Drawing Originator: Beca	Original Scale (A1): 1:200	Design:		Approved For Construction*
	Reduced Scale (A3): 1:100	Drawn:		
		Eng Verifier:		
		Dwg Check:		Date
		* Refer to Revision 1 for Original Signature		

Client: QUEENSTOWN-LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIRS UPGRADE

Title: GEOLOGICAL LONG SECTION A-A'

Discipline: GEOTECHNICAL

Drawing No: FIGURE 3

Rev: 1

DO NOT SCALE

IF IN DOUBT ASK

B

Appendix B – Borehole Log and Photos

Log Key Sheet

WATER

Water level on date shown

METHOD *(shows drilling method)*

OB	open barrel
Wash	wash boring
TT	triple tube
UT	thin walled undisturbed tube
SPT	standard penetration test – open nose sampler
Nc	standard penetration test – solid nose sampler
MA	machine auger
PS	piston sample
PCT	percussion – top drive
PCB	percussion – bottom drive
Conc	concentrics
Sonic	sonic
HA	hand auger
VE	vacuum excavation

SAMPLES

Dx	Disturbed sample, number x
Bx	Bulk sample, number x
Ux(d)	Undisturbed sample, number x, tube diameter d in mm
Wx	Water sample, number x

MOISTURE

Dry, looks and feels dry
Moist, no free water on hand when remoulding
Wet, free water on hand when remoulding
Saturated, soil below water table

SOIL AND ROCK DESCRIPTIONS

Soil and Rock Descriptions are generally as described in the NZ Geotechnical Society "Field Description of Soil and Rock – Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes", dated December 2005.
Vane Shear Strength measurements in accordance with the NZ Geotechnical Society "Guideline for hand held shear vane test" dated August 2001.

IN SITU TESTS

SV	= 40/10	In situ shear strength and remoulded shear strength respectively, as measured by Geotechnics/ Pilcon Shear Vane
τ	= 50/12	Vane shear strength and remoulded vane shear strength respectively, corrected to BS1377
UTP	=	Unable To Penetrate with Shear Vane
N	= 15	SPT uncorrected blow count for 300mm penetration
N_c	= 50+	SPT uncorrected blow count for 300 mm penetration using solid nose sampler

★	**Laboratory Test(s) carried out:**
AL	Atterberg limits
UU	Unconsolidated undrained triaxial
PSD	Particle size
CU	Consolidated undrained triaxial
CONS	Consolidation
COMP	Compaction
UCS	Unconfined compression

WEATHERING

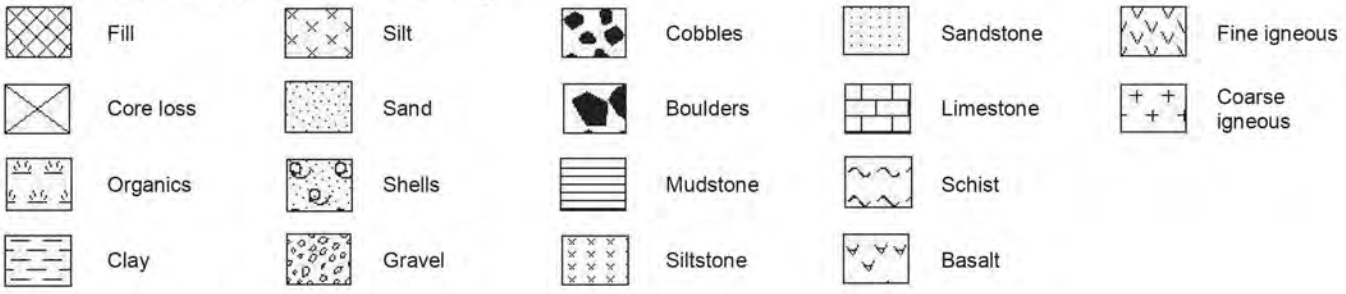
CW	Completely weathered
HW	Highly weathered
MW	Moderately weathered
SW	Slightly weathered
UW	Unweathered

CONSISTENCY

Cohesive Soils	Undrained Shear Strength (kPa)
Very soft	<12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very stiff	100 to 200
Hard	>200

Non-cohesive Soils	SPT – Uncorrected
Very loose	0 to 4
Loose	4 to 10
Medium dense	10 to 30
Dense	30 to 50
Very dense	>50

GRAPHIC LOG (1 or a combination of the following)



ORGANIC SOILS

Von Post Degree of Humification

H1	Completely unconverted and mud-free peat, when pressed gives clear water and plant structure is visible.
H2	Practically unconverted and mud-free peat, when pressed gives almost clear water and plant structure is visible.
H3	Very slightly decomposed or very slightly muddy peat, when pressed gives marked muddy water, no peat substance passes through the fingers and plant structure is less visible.
H4	Slightly decomposed or slightly muddy peat, when pressed gives marked muddy water and plant structure is less visible.
H5	Moderately decomposed or very muddy peat with growth structure evident but slightly obliterated.
H6	Moderately decomposed or very muddy peat with indistinct growth structure.
H7	Fairly well decomposed or very muddy peat but the growth structure can just be seen.
H8	Well decomposed or very muddy peat with very indistinct growth structure.
H9	Practically decomposed or mud-like peat in which almost no growth structure is evident.
H10	Completely decomposed or mud peat where no growth structure can be seen, entire substance passes through the fingers when pressed.

BOREHOLE No: BH01

MACHINE BOREHOLE LOG

SHEET 1 of 2

PROJECT: Glenorchy Reservoirs Upgrade — JOB NUMBER: 3334040

SITE LOCATION: Glenorchy Reservoirs — CLIENT: Queenstown Lakes Dist. Council

CIRCUIT:

COORDINATES: N 5,022,824 m, E 1,235,927 m

BOREHOLE LOCATION: North of existing tanks by access track

R L: 357 m — DATUM: MSL

COORDINATE ORIGIN: hhGPS — ACCURACY: ±5m

DRILLING: FLUID LOSS	DRILLING: DAILY WATER LEVEL	DRILLING: CORE RECOVERY	DRILLING: METHOD	DRILLING: CASING	DRILLING: ROD	IN-SITU TESTS: SV	IN-SITU TESTS: τ (kPa)	IN-SITU TESTS: SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		100 %	Sonic									"Soft" SILT, minor clay, trace organics; dark brown; moist, low plasticity. [Topsoil]		
												"Stiff" medium to coarse sandy fine to coarse gravelly SILT; reddish brown; moist, non plastic. Gravel: subangular to subrounded.	Fill	
		80 %	SPT					10 9 8 8 7 7 N=30		1		Medium dense to dense fine to medium SAND, some fine to coarse gravel, some silt; grey; dry, non plastic (when wetted). Sand: subrounded to subangular, quartzose. Gravel: subrounded, schist, quartzose.		356
		100 %	Sonic							2		From 1.8m: fine to coarse sand. From 2.0m: moist.		355
		89 %	SPT					11 11 7 8 8 8 N=31		3		Medium dense silty fine to medium SAND; grey; dry; non-plastic, quick.		354
		100 %	Sonic							4		Dense medium to coarse gravelly fine to coarse SAND, some silt; grey; dry; non-plastic, quick. Gravel: sub-rounded, schist, quartzose.		353
		64 %	SPT					10 10 9 9 10 9 N=37		5		Dense fine to coarse GRAVEL, some fine to medium sand, minor silt; grey; dry; non-plastic. Gravel: sub-rounded, schist, quartzose.	Alluvial Fan	352
	28/11/2018	100 %	Sonic							6		Medium dense fine to coarse SAND, some fine to coarse gravel, minor silt; brownish grey; dry; non-plastic, quick. Gravel: sub-rounded, schist, quartzose.		351
		71 %	SPT					9 9 6 7 8 8 N=29		7		Medium dense medium to coarse gravelly fine to medium SAND, minor silt; brownish grey; dry; non-plastic, quick. Gravel: sub-rounded, schist; quartzose.		350
		100 %	Sonic							8		Dense fine to coarse SAND, minor fine to medium gravel, minor silt; brownish grey; dry; non-plastic, quick. Gravel: sub-rounded, schist, quartzose.		349
		78 %	SPT					12 14 13 9 8 6 N=36						
		100 %	Sonic							9		Very dense fine to coarse gravelly fine to coarse SAND, trace silt; brownish grey; dry; non-plastic. Gravel: sub-rounded, schist, quartzose.		348
		100 %	SPT					14 36/55mm N=50+						
		77 %	Sonic											

DATE STARTED: 27/11/18
DATE FINISHED: 28/11/18
LOGGED BY: MP
SHEAR VANE No: N/A

DRILLED BY: Speights Drilling Ltd
EQUIPMENT: Drill Rig
DRILL METHOD: Sonic/SPT
DRILL FLUID: Water
DIAMETER/INCLINATION: -/ 90°

COMMENTS:
Groundwater measured 8.00am 28/11/18, 15m casing.
SPT hammer efficiency 69.2%.
Borehole terminated at target depth.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4.GLB Log BECA MACHINE BOREHOLE GLENORCHY RESERVOIRS UPGRADE.GPJ <<DrawingFile>> 10/01/2019 14:38 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2018-01-15 Prj: Beca 1.07 2014-12-16

BOREHOLE No: BH01

MACHINE BOREHOLE LOG

SHEET 2 of 2

PROJECT: Glenorchy Reservoirs Upgrade — JOB NUMBER: 3334040

SITE LOCATION: Glenorchy Reservoirs — CLIENT: Queenstown Lakes Dist. Council

CIRCUIT:

COORDINATES: N 5,022,824 m, E 1,235,927 m

BOREHOLE LOCATION: North of existing tanks by access track

R L: 357 m — DATUM: MSL

COORDINATE ORIGIN: hhGPS — ACCURACY: ±5m

DRILLING: FLUID LOSS	DRILLING: DAILY WATER LEVEL	DRILLING: CORE RECOVERY	DRILLING: METHOD	DRILLING: CASING	DRILLING: RQD	IN-SITU TESTS: SV	IN-SITU TESTS: τ (kPa)	IN-SITU TESTS: SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		77 %	Sonic					16 19 18				Very dense fine to coarse gravelly fine to coarse SAND, trace silt; brownish grey; dry; non-plastic. Gravel: sub-rounded, schist, quartzose.		
		57 %	SPT					14 16 2/65mm N=50+		11		Very dense fine to medium SAND, some fine to medium gravel, minor silt; brownish grey; dry; non-plastic, quick. Gravel: sub-rounded, schist, quartzose.		346
		100 %	Sonic											
		72 %	SPT					16 17 16		12		Very dense fine to medium gravelly fine to coarse SAND, trace silt; brownish grey; dry; non-plastic, quick. Gravel: sub-rounded, schist, quartzose.	Alluvial Fan	345
		102 %	Sonic					14 17 3/25mm N=50+		13				344
		100 %	SPT					9 41/35mm N=50+				Very dense medium to coarse SAND, minor silt; brownish grey; dry; non-plastic; quick.		
		100 %	Sonic					23 27/65mm N=50+		14		Very dense fine to coarse sandy fine to coarse GRAVEL, minor silt; brownish grey; dry; non-plastic. Gravel: sub-rounded, schist, quartzose.		343
										15		END OF LOG @ 15 m		342
										16				341
										17				340
										18				339
										19				338

DATE STARTED: 27/11/18
DATE FINISHED: 28/11/18
LOGGED BY: MP
SHEAR VANE No: N/A

DRILLED BY: Speights Drilling Ltd
EQUIPMENT: Drill Rig
DRILL METHOD: Sonic/SPT
DRILL FLUID: Water
DIAMETER/INCLINATION: -/ 90°

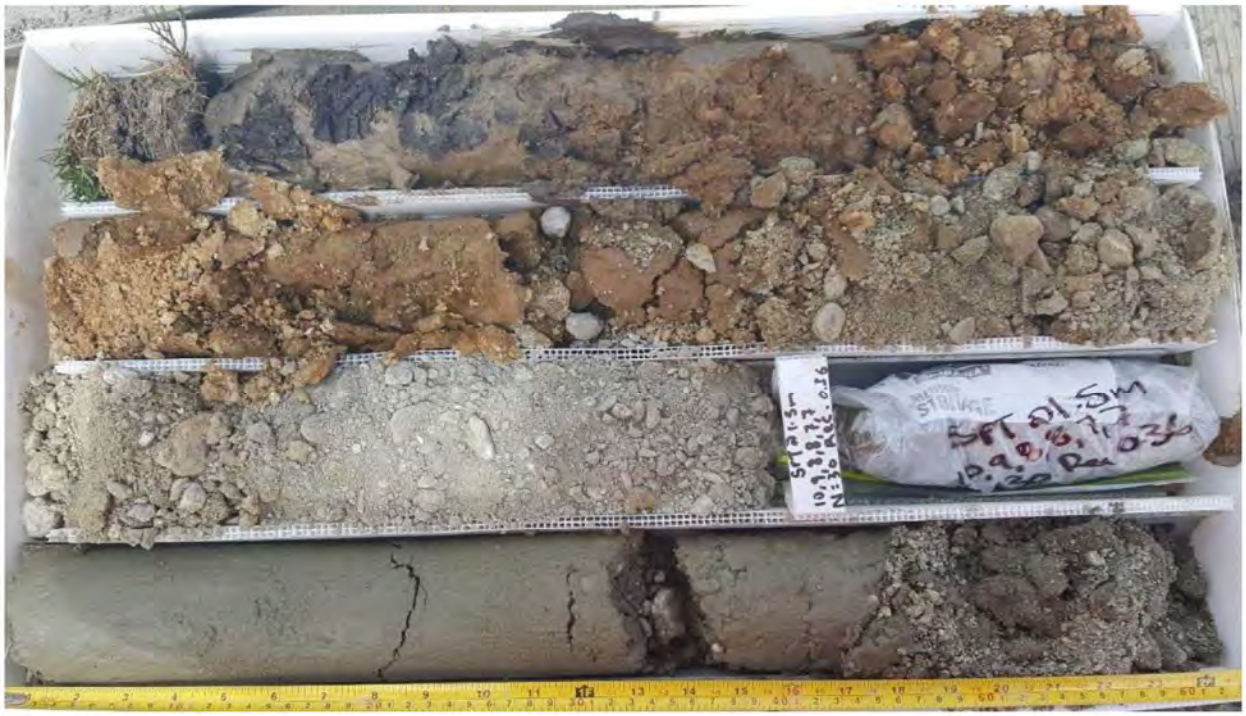
COMMENTS:
Groundwater measured 8.00am 28/11/18, 15m casing.
SPT hammer efficiency 69.2%.
Borehole terminated at target depth.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4 GLB Log BECA MACHINE BOREHOLE GLENORCHY RESERVOIRS UPGRADE.GPJ <<DrawingFile>> 10/01/2019 14:36 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2018-01-15 Prj: Beca 1.07 2014-12-16

Glenorchy Reservoirs Upgrade



BOX: 1 **DEPTH: 0.0 to 2.6m**

BOX: 2 **DEPTH: 2.6 to 5.3m**

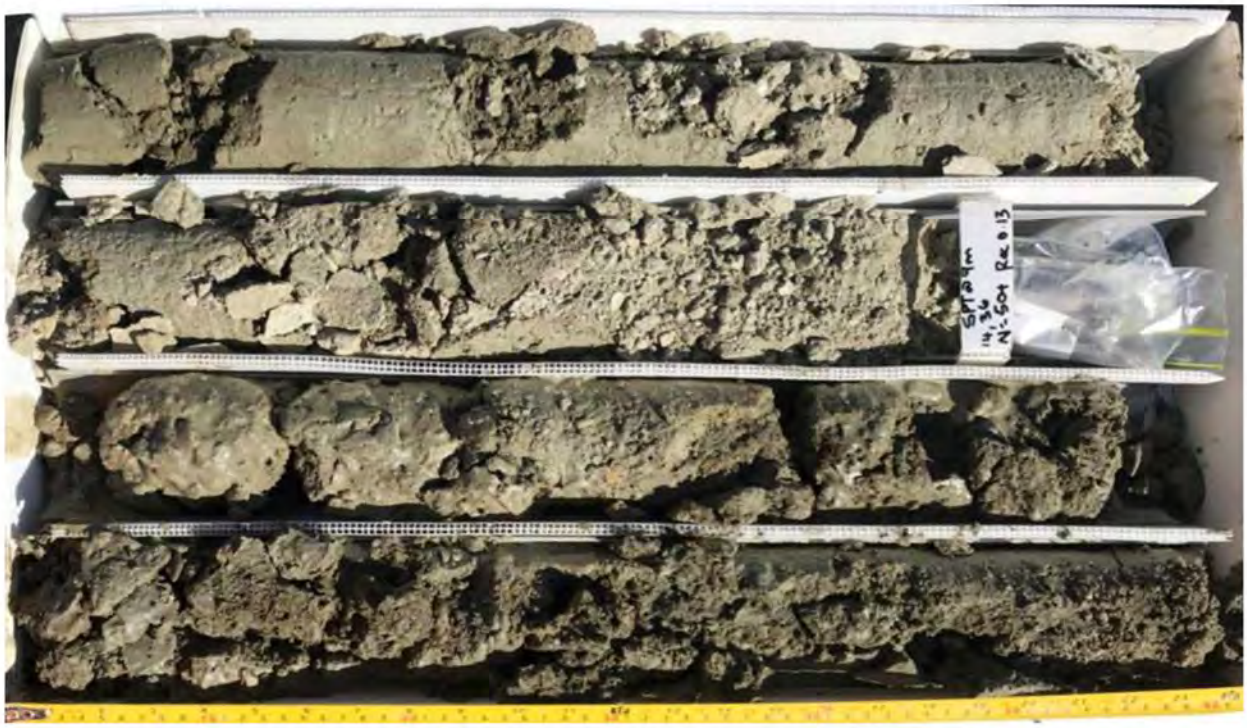
BH01

3334040

Machine Borehole Photos

Glenorchy Reservoirs Upgrade

BOX: 3 **DEPTH: 5.3 to 8.1m**



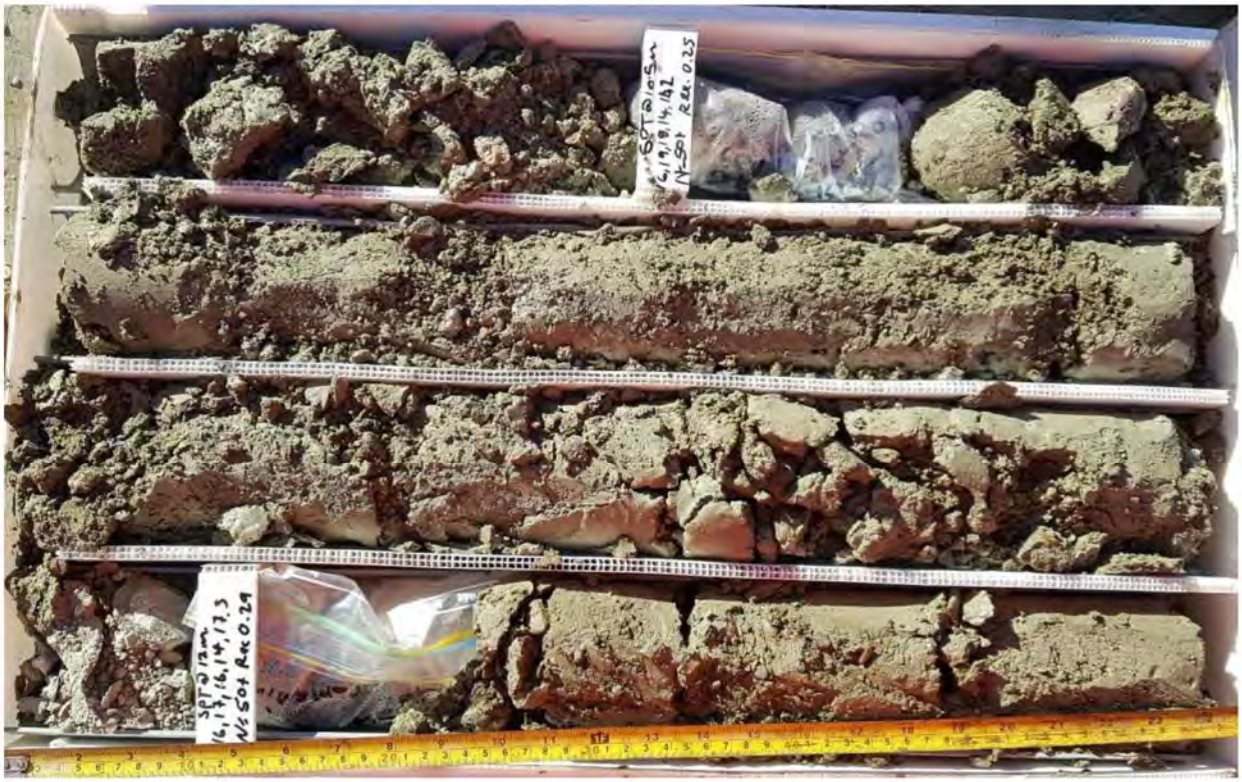
BOX: 4 **DEPTH: 8.1 to 10.2m**

BH01

3334040

Machine Borehole Photos

Glenorchy Reservoirs Upgrade



BOX: 5 **DEPTH: 10.2 to 12.6m**

BOX: 6 **DEPTH: 12.6 to 15.0m**

BH01

Beca

3334040

Machine Borehole Photos

C

Appendix C – Dynamic Cone Penetrometer Tests

Dynamic Cone Penetrometer Tests

Job Number: 3334040 **Location: Glenorchy Reservoirs**

Project: Glenorchy Reservoirs Upgrade **Date: 27 November 2018**

Logged By: Madeleine Prebble

Depth	Dynamic Cone Penetrometer Tests					
mm	S01	S02	S03	S04	S05	S06
0	1	4	1	0	3	0
100	3	4	1	3	4	2
200	3	10	4	4	6	4
300	4	REF	5	6	7	8
400	5		6	7	9	8
500	4		11	5	7	11
600	5		17	7	9	REF
700	8		REF	19	REF	
800	5			9		
900	11			REF		
1000	13					
1100	7					
1200	7					
1300	8					
1400	7					
1500	7					
1600	6					
1700	8					
1800	REF					
1900						
2000						

Comments: REF = 20 blows/150mm or 8 blows/20mm

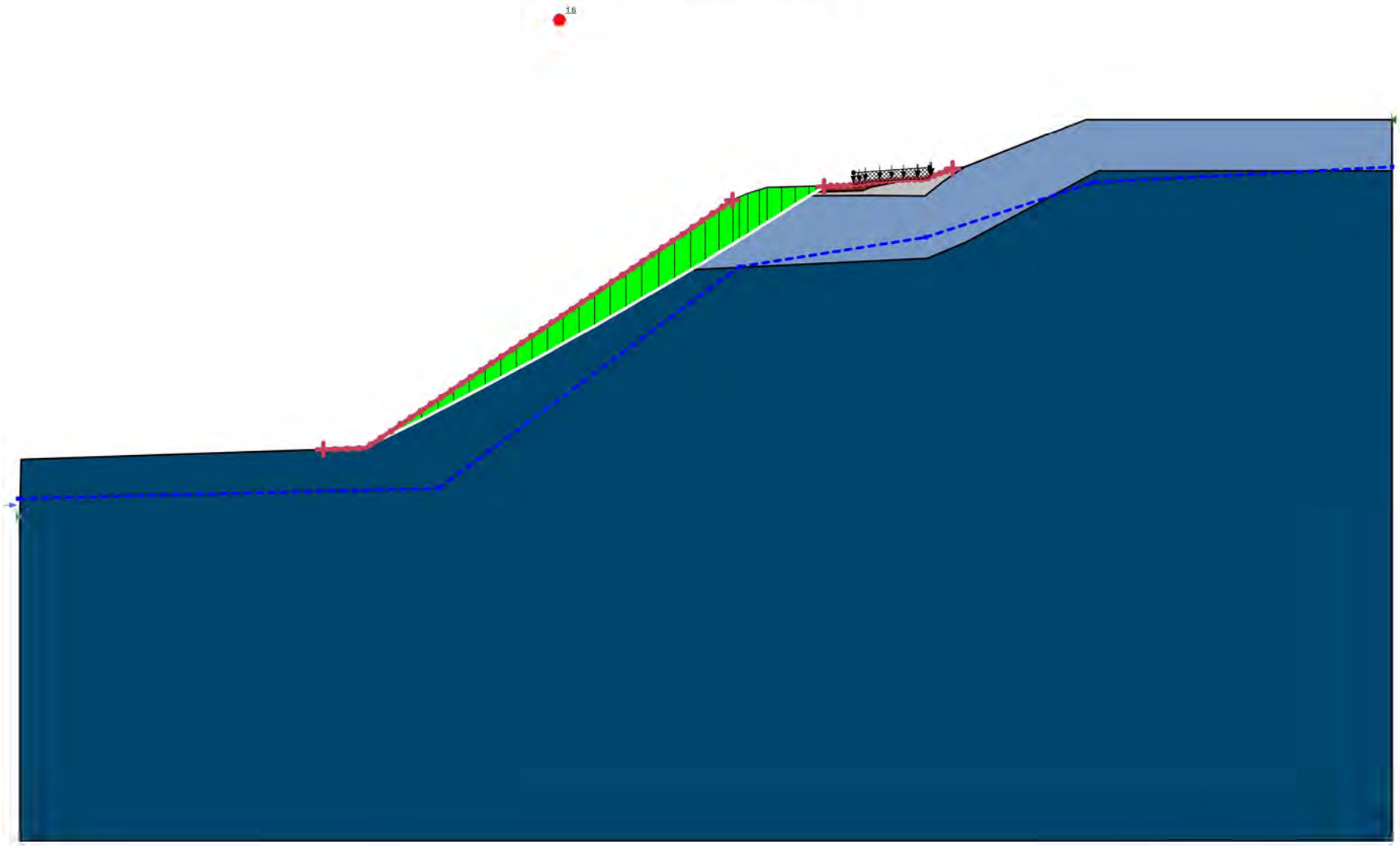
D

Appendix D – Slope Stability Models

Horz Seismic Coef.:

Method: Morgenstern-Price

			(kN/m³)	(kPa)	(°)	(°)	
	Dense Sand	Mohr-Coulomb	19.5	0	40	0	1
	Fill	Mohr-Coulomb	16	0	28	0	1
	Medium Dense Sand	Mohr-Coulomb	18	0	30	0	1
	Very dense sand	Mohr-Coulomb	21	0	43	0	1



Beca	Glenorchy Reservoirs Upgrade	Static Slope Stability - downslope	3334040 / Date: 07/01/2019
			Scale: 1:500 / Figure

P:\333\3334040\TGE\6. Technical work and design\Slope Stability\Glenorchy high parameters sensitivity.gsz, Madeleine Prebble, 07/01/2019,02:59:45 p.m.

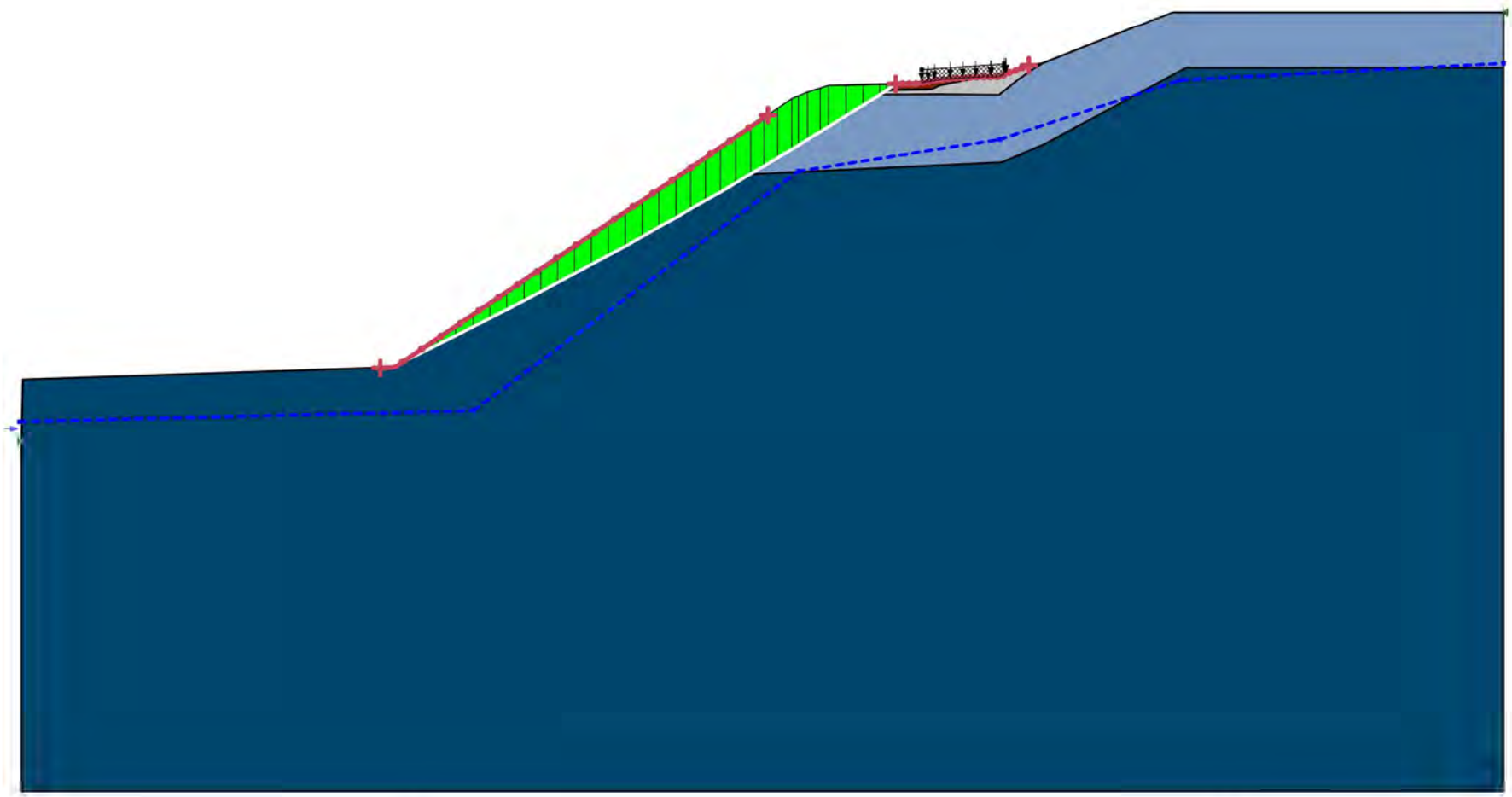
DO NOT SCALE

Version: 9.1.1.16249

Horz Seismic Coef.: 0.1

Method: Morgenstern-Price

			(kN/m³)	(kPa)	(°)	(°)	
	Dense Sand	Mohr-Coulomb	19.5	0	40	0	1
	Fill	Mohr-Coulomb	16	0	28	0	1
	Medium Dense Sand	Mohr-Coulomb	18	0	30	0	1
	Very dense sand	Mohr-Coulomb	21	0	43	0	1



Beca	Glenorchy Reservoirs Upgrade	Seismic (SLS) Slope Stability - downslope	3334040 / Date: 07/01/2019
			Scale: 1:500 / Figure

P:\333\3334040\TGE\6. Technical work and design\Slope Stability\Glenorchy high parameters sensitivity.gsz, Madeleine Prebble, 07/01/2019,02:59:45 p.m.

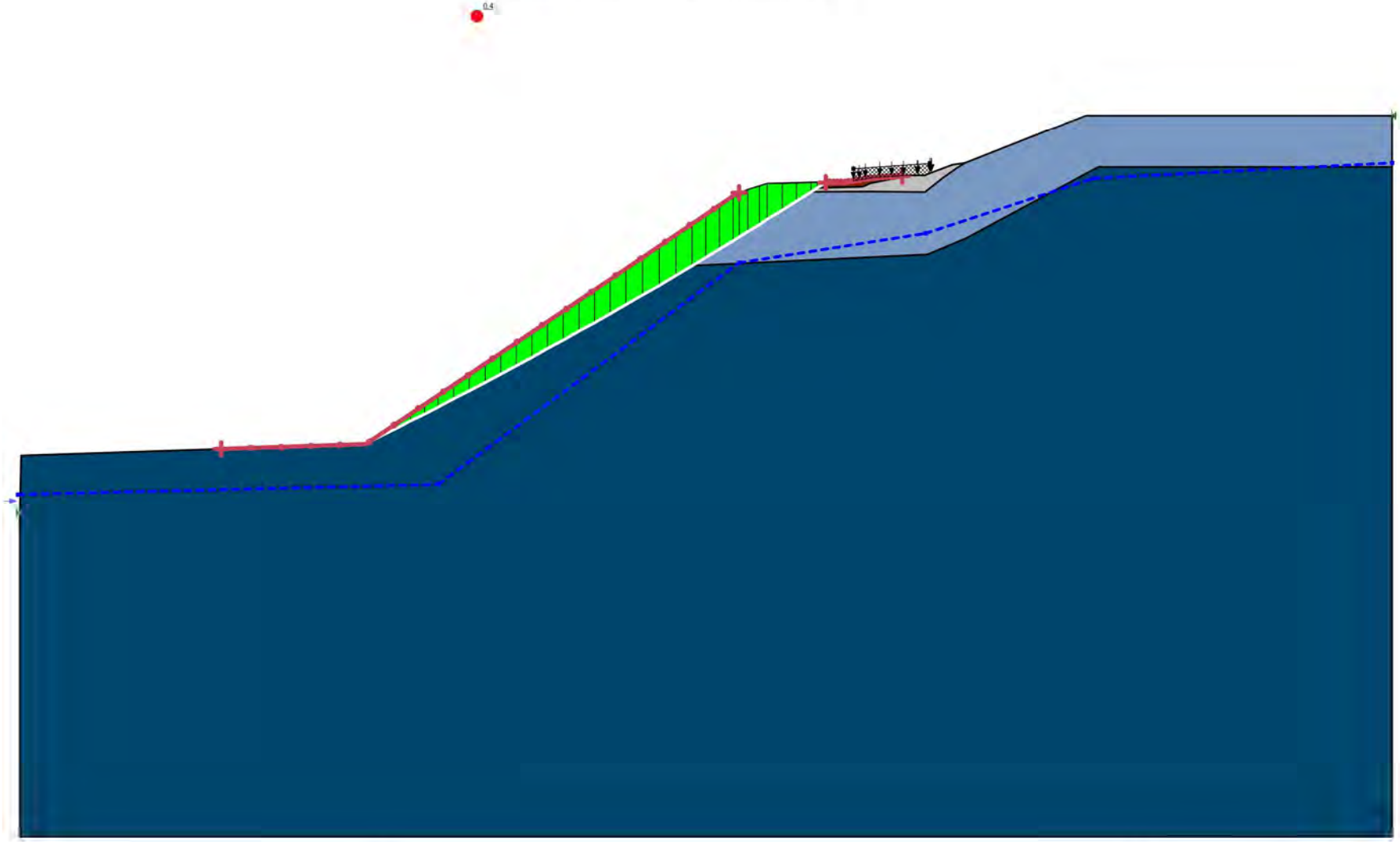
DO NOT SCALE

Version: 9.1.1.16249

Horz Seismic Coef.: 0.72

Method: Morgenstern-Price

			(kN/m³)	(kPa)	(°)	(°)	
	Dense Sand	Mohr-Coulomb	19.5	0	40	0	1
	Fill	Mohr-Coulomb	16	0	28	0	1
	Medium Dense Sand	Mohr-Coulomb	18	0	30	0	1
	Very dense sand	Mohr-Coulomb	21	0	43	0	1



Beca

Glenorchy Reservoirs Upgrade

Seismic (ULS) Slope Stability - downslope

3334040

Date: 07/01/2019

Scale: 1:500

Figure

Version: 9.1.1.16249

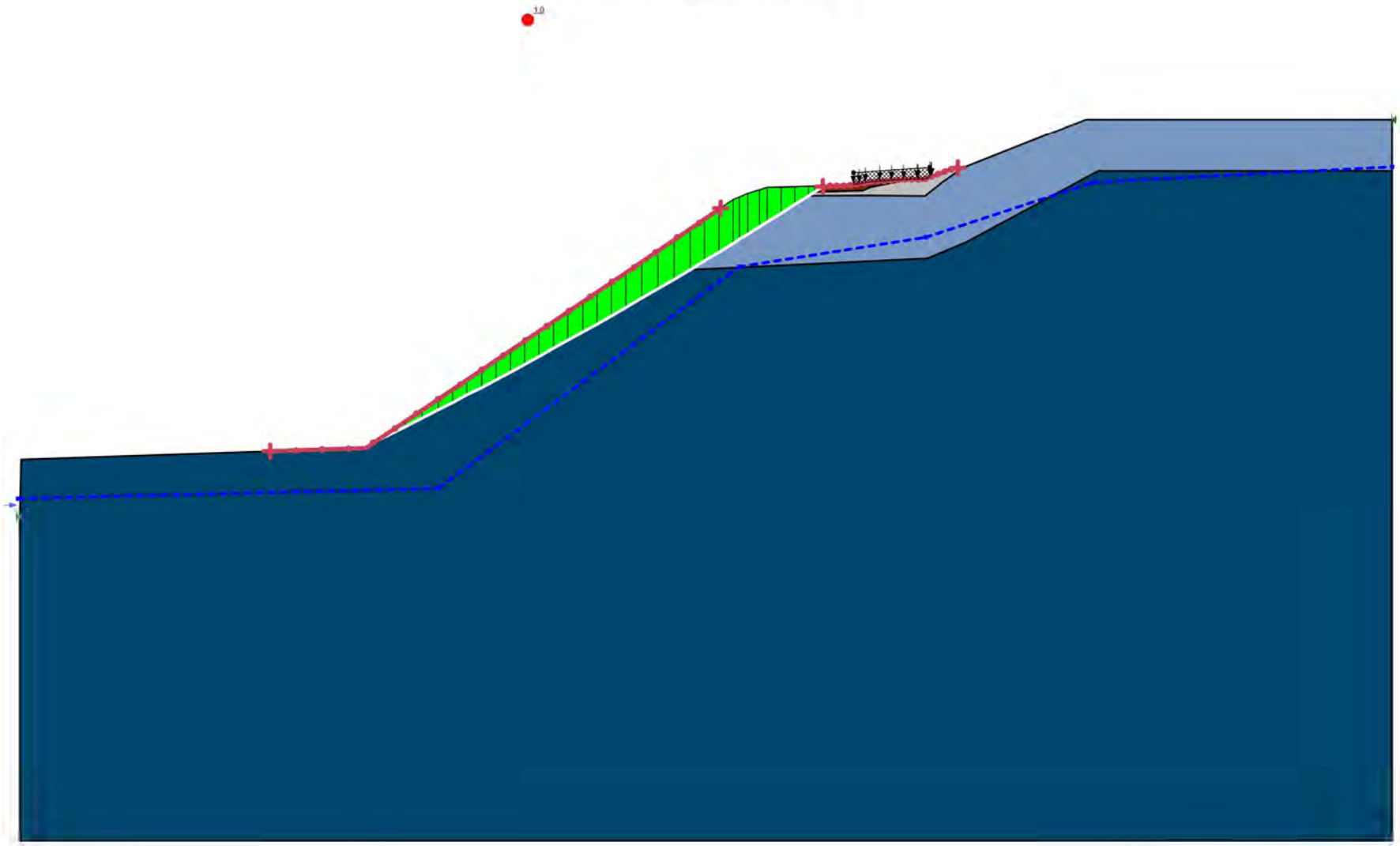
P:\333\3334040\TGE\6. Technical work and design\Slope Stability\Glenorchy high parameters sensitivity.gsz, Madeleine Prebble, 07/01/2019,02:59:45 p.m.

DO NOT SCALE

Horz Seismic Coef.: 0.22

Method: Morgenstern-Price

			(kN/m³)	(kPa)	(°)	(°)	
	Dense Sand	Mohr-Coulomb	19.5	0	40	0	1
	Fill	Mohr-Coulomb	16	0	28	0	1
	Medium Dense Sand	Mohr-Coulomb	18	0	30	0	1
	Very dense sand	Mohr-Coulomb	21	0	43	0	1



Beca

Glenorchy Reservoirs Upgrade

Seismic Yield Slope Stability - downslope under reservoir

3334040

Date: 07/01/2019

Scale: 1:500

Figure

P:\333\3334040\TGE\6. Technical work and design\Slope Stability\Glenorchy high parameters sensitivity.gsz, Madeleine Prebble, 07/01/2019,02:59:45 p.m.

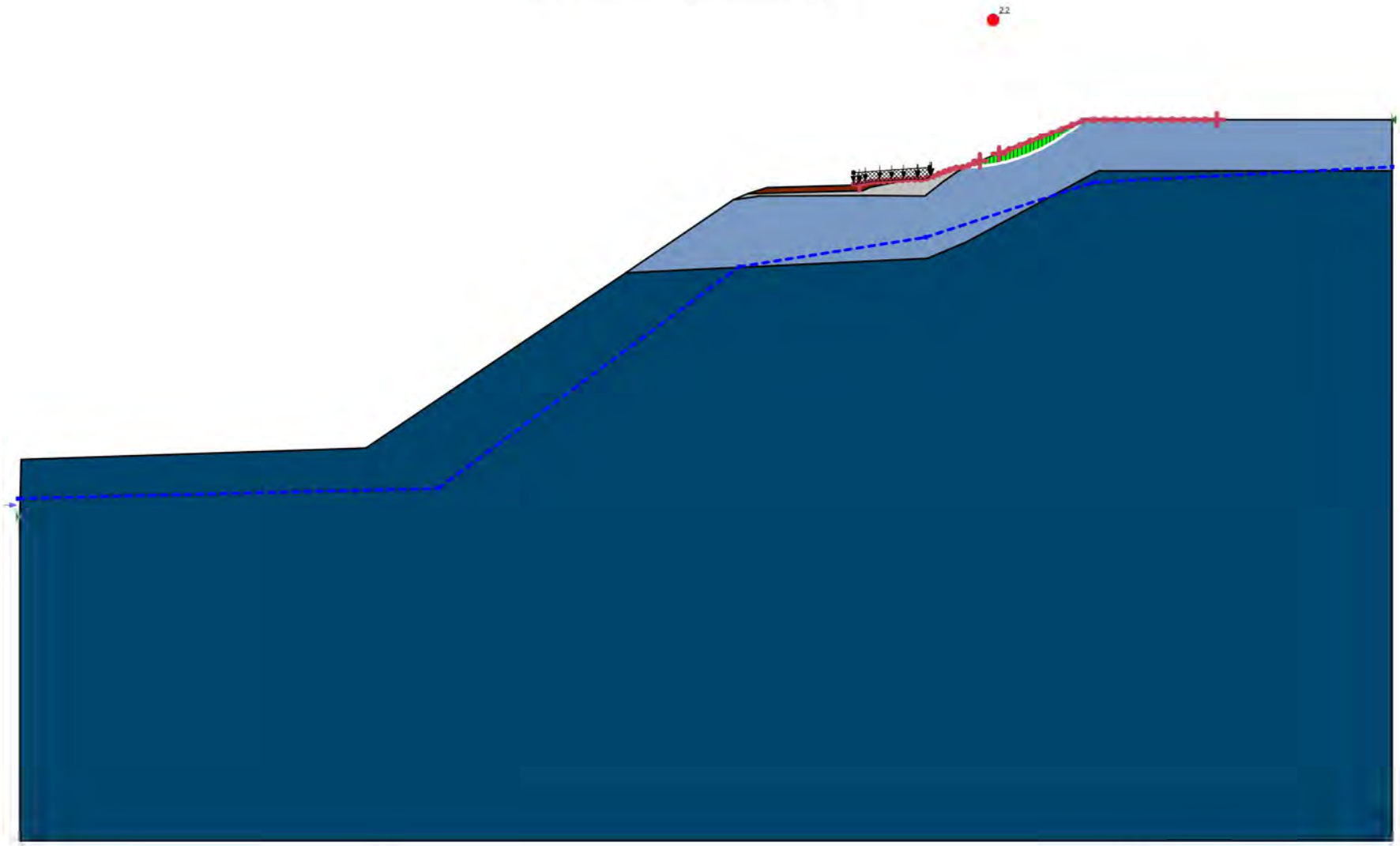
DO NOT SCALE

Version: 9.1.1.16249

Horz Seismic Coef.:

Method: Morgenstern-Price

			(kN/m³)	(kPa)	(°)	(°)	
	Dense Sand	Mohr-Coulomb	19.5	0	40	0	1
	Fill	Mohr-Coulomb	16	0	28	0	1
	Medium Dense Sand	Mohr-Coulomb	18	0	30	0	1
	Very dense sand	Mohr-Coulomb	21	0	43	0	1



Beca

Glenorchy Reservoirs Upgrade

Static Slope Stability - upslope

3334040

Date: 07/01/2019

Scale: 1:500

Figure

Version: 9.1.1.16249

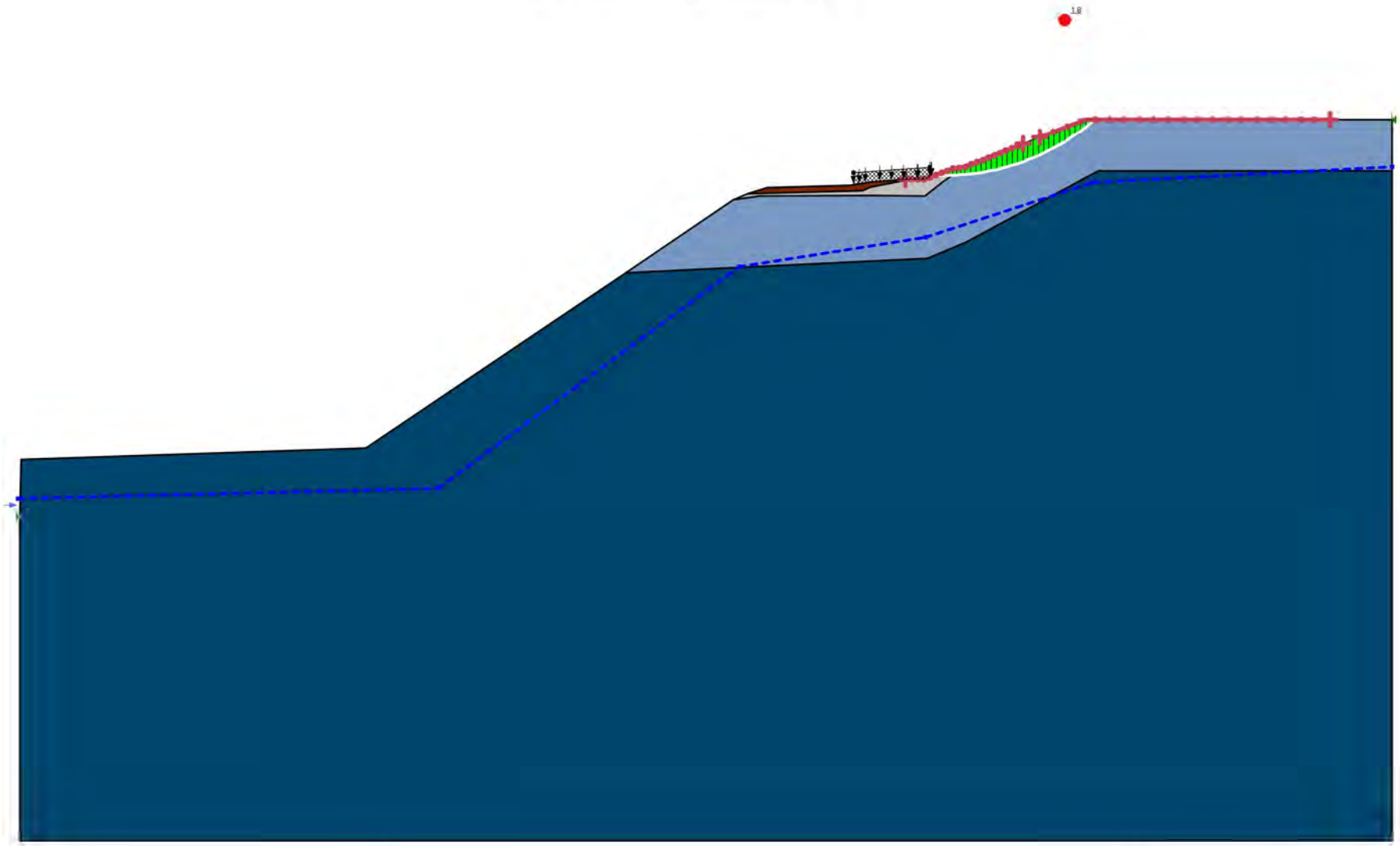
P:\333\3334040\TGE\6. Technical work and design\Slope Stability\Glenorchy high parameters sensitivity.gsz, Madeleine Prebble, 07/01/2019,02:59:45 p.m.

DO NOT SCALE

Horz Seismic Coef.: 0.1

Method: Morgenstern-Price

			(kN/m³)	(kPa)	(°)	(°)	
	Dense Sand	Mohr-Coulomb	19.5	0	40	0	1
	Fill	Mohr-Coulomb	16	0	28	0	1
	Medium Dense Sand	Mohr-Coulomb	18	0	30	0	1
	Very dense sand	Mohr-Coulomb	21	0	43	0	1



Beca	Glenorchy Reservoirs Upgrade	Seismic (SLS) Slope Stability - upslope	3334040 / Date: 07/01/2019
			Scale: 1:500 / Figure

P:\333\3334040\TGE\6. Technical work and design\Slope Stability\Glenorchy high parameters sensitivity.gsz, Madeleine Prebble, 07/01/2019,02:59:45 p.m.

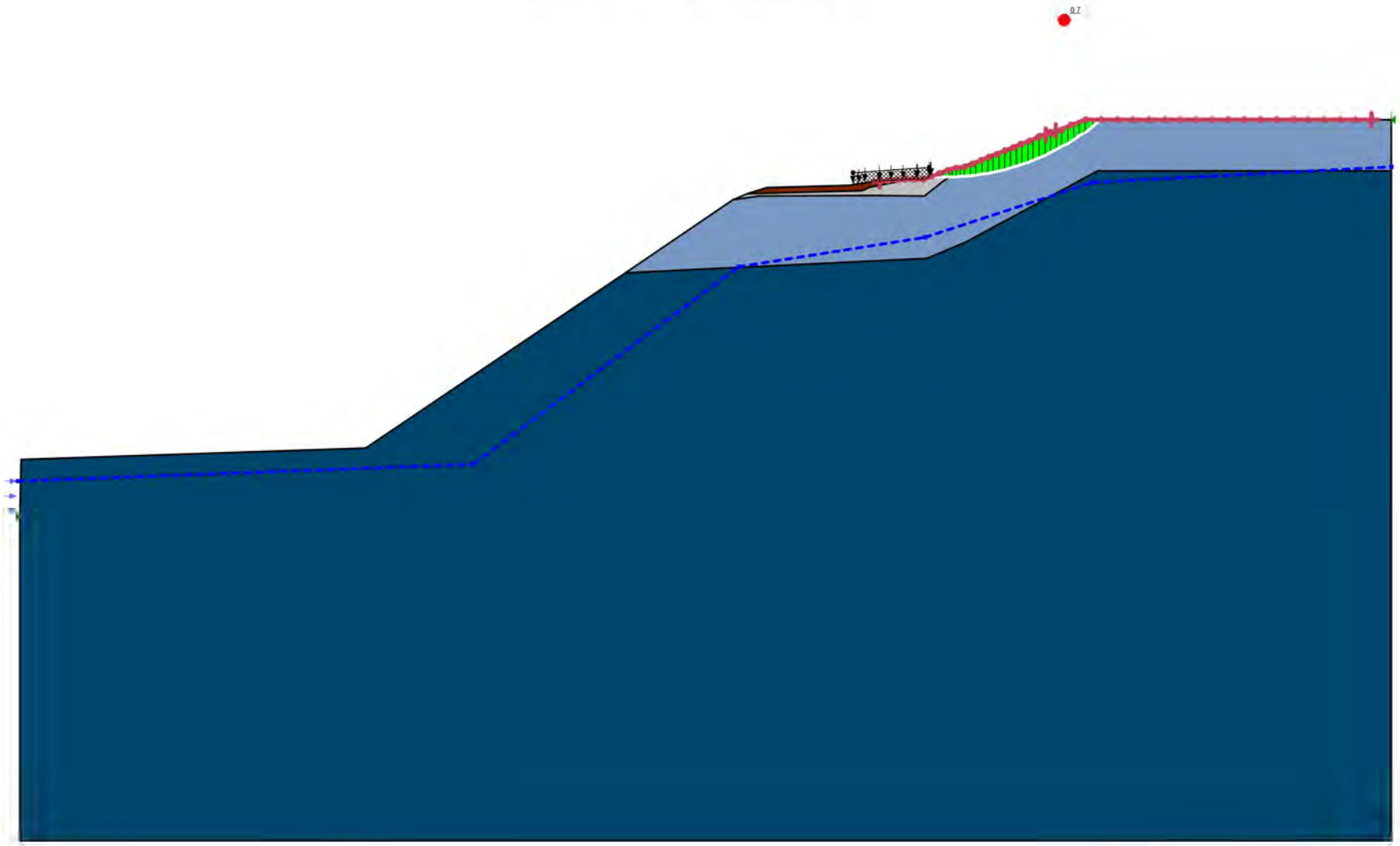
DO NOT SCALE

Version: 9.1.1.16249

Horz Seismic Coef.: 0.72

Method: Morgenstern-Price

			(kN/m³)	(kPa)	(°)	(°)	
	Dense Sand	Mohr-Coulomb	19.5	0	40	0	1
	Fill	Mohr-Coulomb	16	0	28	0	1
	Medium Dense Sand	Mohr-Coulomb	18	0	30	0	1
	Very dense sand	Mohr-Coulomb	21	0	43	0	1



Beca	Glenorchy Reservoirs Upgrade	Seismic (ULS) Slope Stability - upslope	3334040	Date: 07/01/2019
			Scale: 1:500	Figure

P:\333\3334040\TGE\6. Technical work and design\Slope Stability\Glenorchy high parameters sensitivity.gsz, Madeleine Prebble, 07/01/2019,02:59:45 p.m.

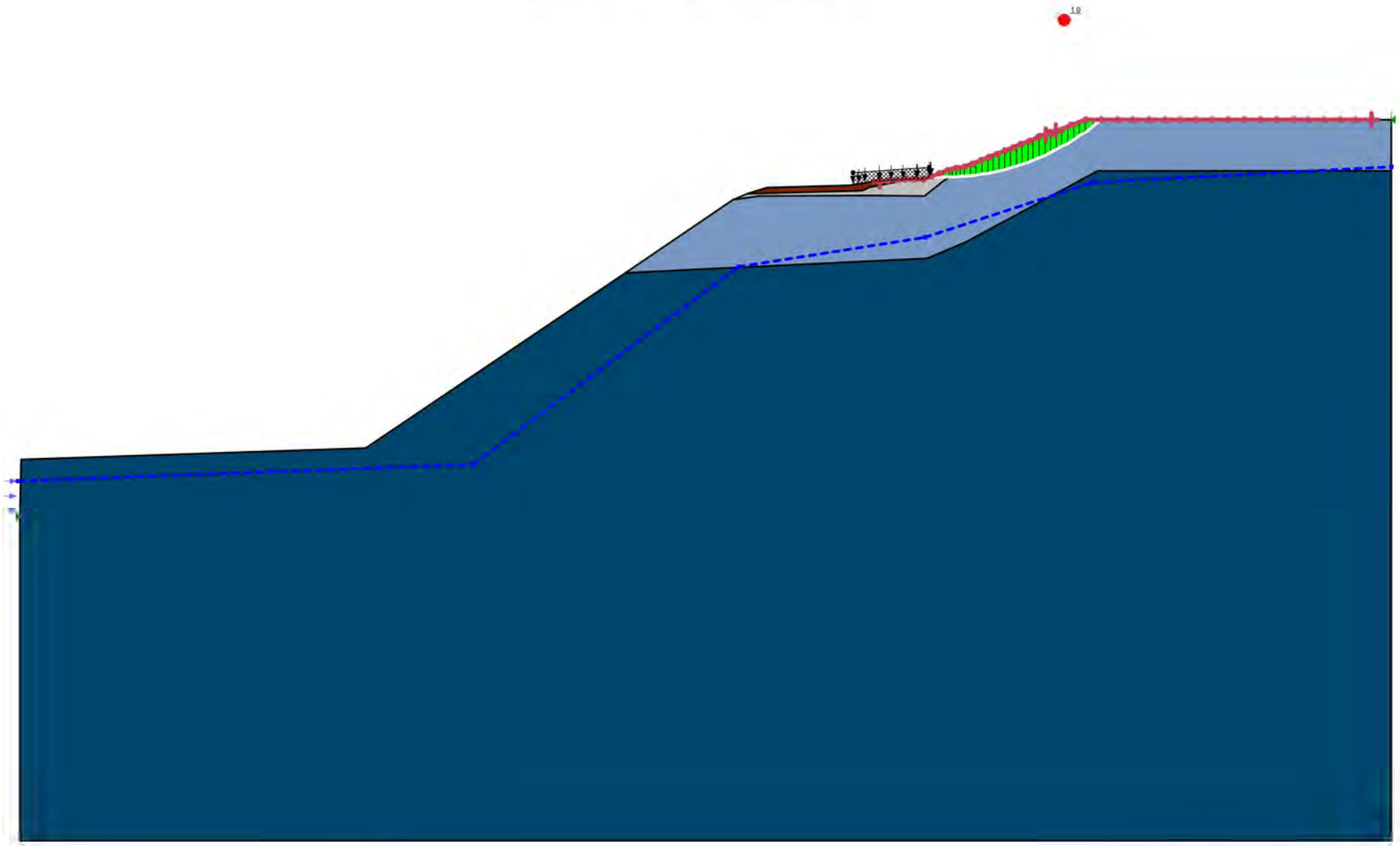
DO NOT SCALE

Version: 9.1.1.16249

Horz Seismic Coef.: 0.44

Method: Morgenstern-Price

			(kN/m³)	(kPa)	(°)	(°)	
	Dense Sand	Mohr-Coulomb	19.5	0	40	0	1
	Fill	Mohr-Coulomb	16	0	28	0	1
	Medium Dense Sand	Mohr-Coulomb	18	0	30	0	1
	Very dense sand	Mohr-Coulomb	21	0	43	0	1



Beca	Glenorchy Reservoirs Upgrade	Seismic Yield Slope Stability - upslope	3334040 / Date: 07/01/2019
			Scale: 1:500 / Figure

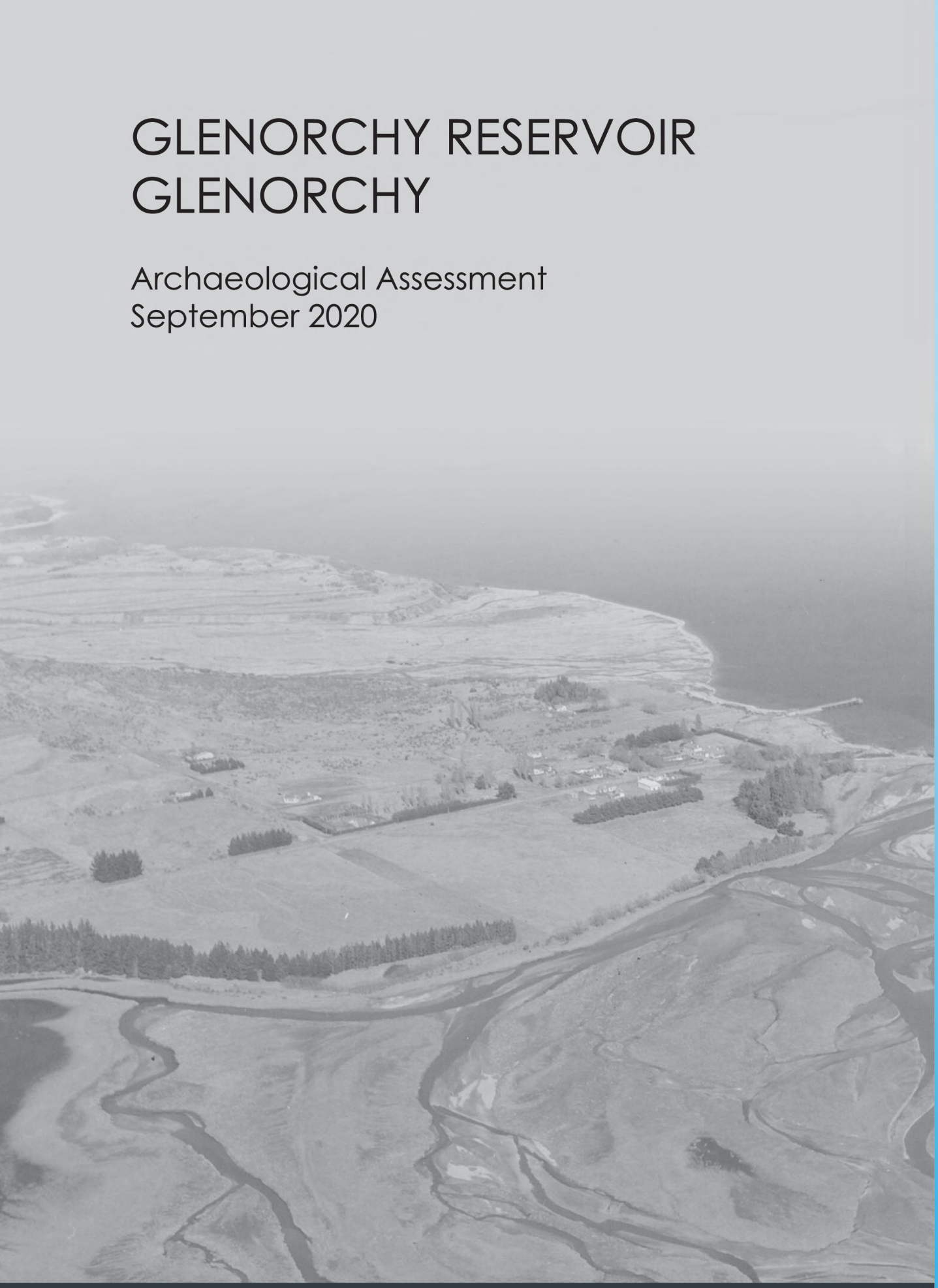
P:\333\3334040\TGE\6. Technical work and design\Slope Stability\Glenorchy high parameters sensitivity.gsz, Madeleine Prebble, 07/01/2019,03:14:13 p.m.

DO NOT SCALE

Version: 9.1.1.16249

GLENORCHY RESERVOIR
GLENORCHY

Archaeological Assessment
September 2020



Origin
CONSULTANTS

Archaeological Assessment for Glenorchy Reservoir

Archaeological Site: -

Commissioned by Beca

Prepared by Benjamin Teele

Origin Consultants Ltd

September 2020

Photograph of Glenorchy from the air in 1959 showing geological feature known as the Bible Terrace (Whites Aviation – WA-50701).

Contents

List of Figures

Introduction

This archaeological assessment has been prepared for Beca as part of a proposal to construct new reservoir capabilities for the Glenorchy Township (Figure 1-Figure 3). This archaeological assessment has been prepared to identify whether there is any potential archaeological considerations for the site works due to the proximity of the site to Glenorchy and the Buckler Burn, and the site being located in a protected landscape feature under the QLDC District Plan (ref. no. 8). This is identified as Bible Face, and is on Part Section 2, Block XIX, Town of Glenorchy.

The legal description of the where site works will take place has been identified as:

- LOT 4 DP 394250

The assessment site covers a wedge-shaped area of land approximately 0.06 hectares. It is situated on the northwest side of the Bible Terrace face and is surrounded by a parcel of land identified as Lot DP 430468. Access is through an easement across this surrounding property from Oban Street. The site is owned by the Queenstown Lakes District Council and it falls under the same local authority, designated as reserve.

The purpose of this assessment is to identify any archaeology that may be affected by the proposed reservoir renewal works. This will determine whether an Archaeological Authority Application is required under the Heritage New Zealand Pouhere Taonga Act 2014, and if so, provide appropriate recommendations for the mitigation and management of any archaeological material encountered. The author of this report is Benjamin Teele, Principal Archaeologist at Origin Consultants Ltd and a member of the New Zealand Archaeological Association.

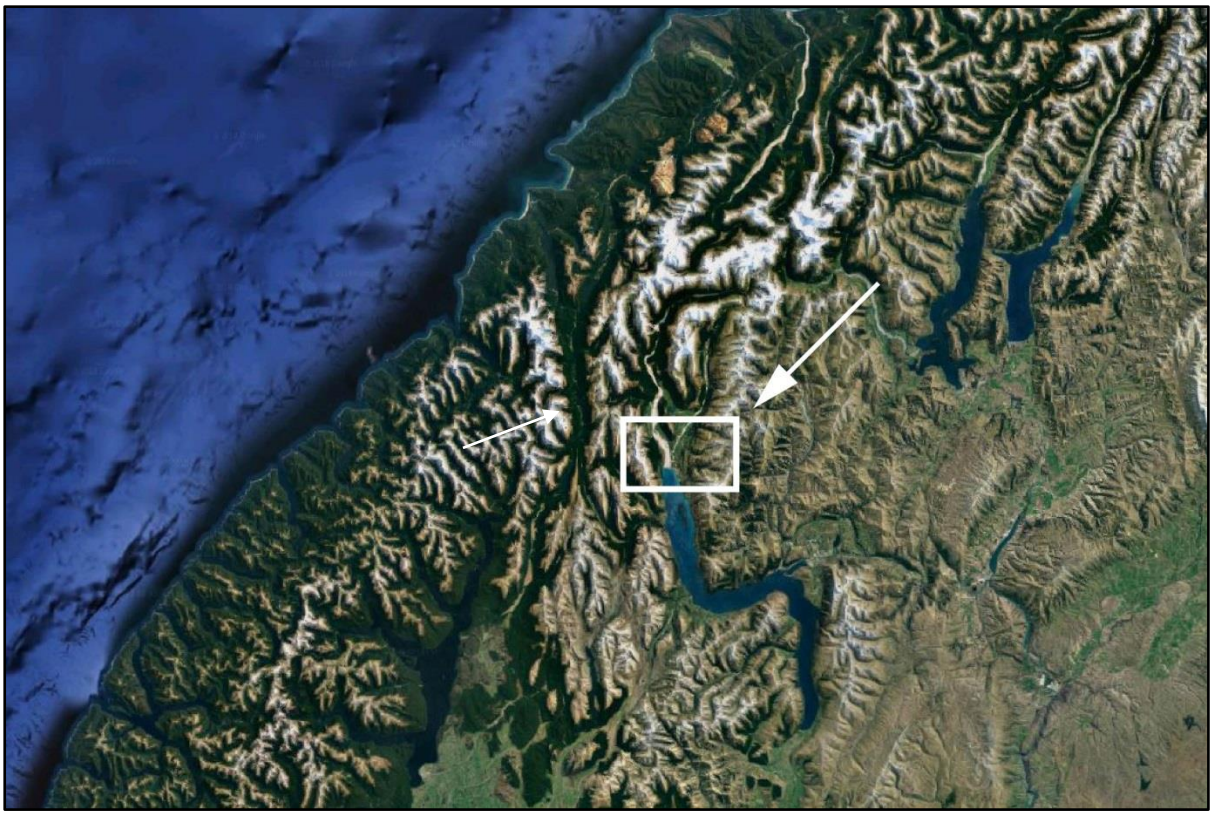


Figure 1. Location of the site at the head of the lake (Google Earth).

Figure 2. Site location on southeastern edge of town boundary (Google Earth).

Figure 3. Location of existing reservoir tanks with dirt access road from Oban Street (QLDC Webmaps).

Statutory Requirements

There are two main pieces of legislation in New Zealand that control work affecting archaeological sites. These are the Heritage New Zealand Pouhere Taonga Act 2014 ('HNZPT Act 2014') and the Resource Management Act 1991 (RMA).Heritage New Zealand Pouhere Taonga ('HNZPT') administers the HNZPT Act 2014.

Archaeological Sites

The Act contains a consent (authority) process for any work affecting archaeological sites, where an archaeological site is defined as:

a) any place in New Zealand, including any building or structure (or part of a building or structure), that—
   i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
   ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
b) includes a site for which a declaration is made under section 43(1)

Any persons who intend carrying out work that may damage, modify or destroy an archaeological site, or to investigate a site using invasive archaeological techniques, must first obtain an authority from HNZPT. The process applies to sites on land of all tenure including public, private and designated land. The HNZPT Act 2014 contains penalties for unauthorised site damage or destruction.

The archaeological authority process applies to all sites that fit the HNZPT Act 2014 definition, regardless of whether:

- the site is recorded in the NZ Archaeological Association Site Recording Scheme or registered by HNZPT;
- the site only becomes known about as a result of ground disturbance; and/ or
- the activity is permitted under a district or regional plan, or a resource or building consent has been granted.

Once an authority has been granted, modification of an archaeological site is only allowed following the expiration of the appeals period or after the Environment Court determines any appeals. Any directly affected party has the right to appeal the decision within 15 working days of receiving notice of the determination. HNZPT may impose conditions on the authority that must be adhered to by the authority holder (Section 52). Provision exists for a review of the conditions (see Section 53). The authority remains current for a period of up to 35 years, as specified in the authority. If no period is specified in the authority, it remains current for a period of five years from the commencement date.

The authority is tied to the land for which it applies, regardless of changes in the ownership of the land. Prior to any changes of ownership, the land owner must give notice to HNZPT and advise the succeeding land owner of the authority, its conditions, and terms of consent.

Historic Heritage

HNZPT also maintains the List of Historic Places, Historic Areas, Wāhi Tapu, Wāhi Tapu Areas, and Wāhi Tūpuna. The List can include archaeological sites. The purpose of the List is to inform members of the public about such places and to assist with their protection under the Resource Management Act (1991).

The RMA requires City, District and Regional Councils to manage the use, development, and protection of natural and physical resources in a way that provides for the wellbeing of today's communities while safeguarding the options of future generations. The protection of historic heritage from inappropriate subdivision, use, and development is identified as a matter of national importance (section 6f).

Historic heritage is defined as those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, derived from archaeological, architectural, cultural, historic, scientific, or technological qualities.

Historic heritage includes:

- historic sites, structures, places, and areas;
- archaeological sites;
- sites of significance to Māori, including Wāhi Tapu, Wāhi Tapu Areas, and Wāhi Tūpuna; and
- surroundings associated with the natural and physical resources (RMA section 2).

These categories are not mutually exclusive and some archaeological sites may include above ground structures or may also be places that are of significance to Manu whenua.

Where resource consent is required for any activity the assessment of effects is required to address cultural and historic heritage matters (RMA 4th Schedule and the District Plan assessment criteria).

Methodology

An archaeological assessment is required to accompany an application for an archaeological authority, as stipulated in the Heritage New Zealand Pouhere Taonga Act (2014). The archaeological assessment for this site was carried out using desk-top research methods and included a site visit to assess any current standing structures and site features.

The desk-top assessment methodology consulted a range of archival sources to try and determine the history of the area. The assessment used the following types of sources to trace the historic activity on the site:

- 19th century surveyors maps and section subdivision maps;
- Land titles and land transfer surveys (LINZ);
- Photographic and documentary archives (Hocken Library, Dunedin City Library Heritage Collections, family photograph albums, on-line archive repositories - Archives NZ, DigitalNZ, National Library of NZ, Museum of New Zealand/Te Papa Tongarewa; PapersPast, Appendix to the Journal of the House of Representatives, Lakes District Museum; Retrolens);
- Local histories and similar publications;
- NZAA ArchSite.

The site visit was undertaken to make a visual assessment which included an appraisal of:

- The approximate age and architectural style of any extant structures on the site.
- The environs within the site including spatial usage such as recent earthworks, topography, vegetation and any ground-level features of heritage relevance.

The visual assessment was supported by digital photographs that recorded the features of the site. The site visit was undertaken on the 25th of January, 2019 by Benjamin Teele.

Physical Environment or Setting

The site is part of the Glenorchy Township area and is situated between two parallel mountain ranges; the Humboldt Mountains to the west, and the Richardson Range to the east. To the north is the Rees River Valley, which combined with the Dart River has formed a large alluvial delta above Lake Wakatipu. The delta is sandwiched by lake terraces, which would have been favourable environments for settlement historically, being elevated above the wetter lower ground. The site itself is part of a geological feature identified as the Bible Terrace. This terrace has been named because from the air it looks like the page margins of a skewed book. The site is covered by a mixture of exotic pasture grass, exotic and native scrub, and a small number of exotic trees.

Historical Background to the Assessment Area

The earliest human occupation of the South Island and Otago region is considered to be by Polynesian settlers dating from around 1280AD who quickly spread across the region, developing different types of settlement sites dependent on the available local resources and environmental conditions (Wilmshurst, Anderson, Higham, & Worthy, 2008). These included settled village sites along the coast adjacent to rich and sustained food resources such as seals and moa; seasonal inland sites for collecting stone resources and hunting; and comparable seasonal coastal sites for 'fishing and moa processing' (Hamel, 2001). Such settlement and exploitation of the abundant resources was not without its impacts however, with much of the forest along the coastal region reduced in extent, changes in patterns of hunting and fishing, and the use of smaller, more mobile occupation sites by the 16th and 17th centuries. This was followed by further changes in subsistence, based on organised food gathering and processing that created settled village communities along the Otago coastline from the mid-18th century onwards (Hamel, 2001).

At the head of Lake Wakatipu, the Dart Valley was used by manu whenua as both a route to the West Coast to collect pounamu, and as an area to collect a more localised source known as inanga. Around Glenorchy and Kinloch, manu whenua had meeting or resting places on their inland journeys.

Kāi Tahu has a strong traditional association with Pikirakatahi (Mount Earnslaw). The following is taken from information provided for Crown Pastoral Review of the Earnslaw Station (Department of Conservation, 2012).

For Manu whenua, the creation of Pikirakatahi (Mt Earnslaw) relates in time to Te Waka o Airaki and the efforts of Tu Te Rakiwhanoa. It is said that during its formation a wedge of pounamu was inserted into this mountain, which is the highest and most prominent peak in this block of mountains. The mountain is also linked to travels of Rākaihautū, who dug out the great lakes of the interior with his kō (~spade), known as Tu Whakaroria and later renamed Tuhiraki at the conclusion of the expedition.

For Kāi Tahu, traditions such as this represent the links between the cosmological world of gods and present generations, these histories reinforce tribal identity and solidarity, and continuity between generations and document the events which shaped the environment of Te Wai Pounamu and Kāi Tahu as an iwi.

Pikirakatahi stands as guardian over the pounamu resource and marks the end of a trail, with the tohu (marker) to the pounamu resource sitting opposite on Koroka (Cosmos Peak). The tupuna (ancestors) had considerable knowledge of whakapapa, traditional trails, places for gathering kai (food) and other taonga, ways in which to use the resources of the land, the relationship of people with the land and their dependence on it, and tikanga for the proper and sustainable utilisation of resources. All these remain important to Kāi Tahu today.

The retrieval of large amounts of pounamu from this source, so far inland and over a range of physical barriers, attests to the importance of this resource to the economy and customs of the iwi over many generations. The people would also gather native birds for kai and firewood with which to cook and provide warmth, from the forests covering the lower flanks of Pikirakatahi. Strategic marriages between hapū strengthened the kupenga (net) of whakapapa and the rights to use the resources of the mountain. It is because of these patterns of activity that Pikirakatahi continues to be important to Rūnaka located in Otago, Murihiku and beyond. These Rūnaka

carry responsibilities of kaitiaki in relation to the area, and are represented by the tribal structure, Te Rūnaka o Kāi Tahu.

A variety of kai was hunted and cultivated around the lake. Weka were one of the main local hunting resources, with tuna, tuna, kererū, kea, and kākā also reputed to have been gathered. On Wāwahi Waka/Pigeon Island there is evidence for gardens as an additional food source. These were potentially used for the cultivation of kāuru and rīwai (Hale 2019).

Anderson (1982) describes the occupation of by different iwi of the interior of Otago in more detail:

> The traditions indicate that at the beginning of the 18th century, Waitaha and Ngatimamoe occupied settlements concentrated around the western lakes; Waitaha mainly at Ohau, Wanaka, Te Anau and Manapouri and Ngatimamoe in the Wakatipu district in particular. The conflicts between these groups, and within them, were turned into a three-way contest by the arrival of Ngaitahu. Waitaha, not as closely related to the other two groups as these were to each other, and seeming always to be victims rather than aggressors, were compelled to abandon the MacKenzie country and Wanaka by about 1720, and were driven from their last interior settlements in the south-west barely a generation later. Ngatimamoe, after the first Ngaitahu raids, retained a tenuous grip on Ohau and the Queenstown settlements, but by the mid-18th century seem to have retreated to areas south of Wakatipu. It is impossible to be more emphatic or precise about the course of events because of the uncertainties introduced by variations in the ascription of individuals to tribal groups, and of attributions of events to settlements. Moreover, given mobility in settlement patterns (below), the lack of a traditional encounter at any particular settlement need not mean that it had already been abandoned, only that it was empty when it came to the attention of a raiding party. But, despite these problems, it seems quite clear that Waitaha and Ngatimamoe had abandoned the interior as far south as Wakatipu by about 1780.

European Settlement

After the arrival of Europeans in New Zealand, an initial exploration of the basin was undertaken by Nathanial Chalmers in September 1853. By the end of the 1850s European pastoralists had begun to stake out claims to various runs in the area, taking up the depasturing licences on offer. In 1859 Rees built a homestead and woolshed on the lake shore in the location of present day Queenstown to act as the centre of his large pastoral holdings (Griffiths, 1971). He extended his holdings to include the flat land at the head of the lake which became his North Station Run (346).

This initial pastoral settlement by Rees was quickly followed by the Otago goldrushes of the early 1860s, which brought large numbers of miners to the area. After the Arrow and Shotover Rivers were opened up, prospectors travelled further afield, finding gold at the Buckler Burn near the head of the lake. Access to the area was limited to being ferried across in the steamer Wakatipu. Gold was not confined to the Buckler Burn, it was also found in small concentrations around the head of lake. Sheelite mining was also taken up in the 1880s, and continued into the 20th century. Kinloch was also the centre of an extensive sawmilling industry established in 1870. It continued to operate until 1896, when fires destroyed a significant amount of the surrounding bush. The larger pastoral runs were progressively broken up by the Government in the 1870s and 1880s, with smaller farms subsequently being established.

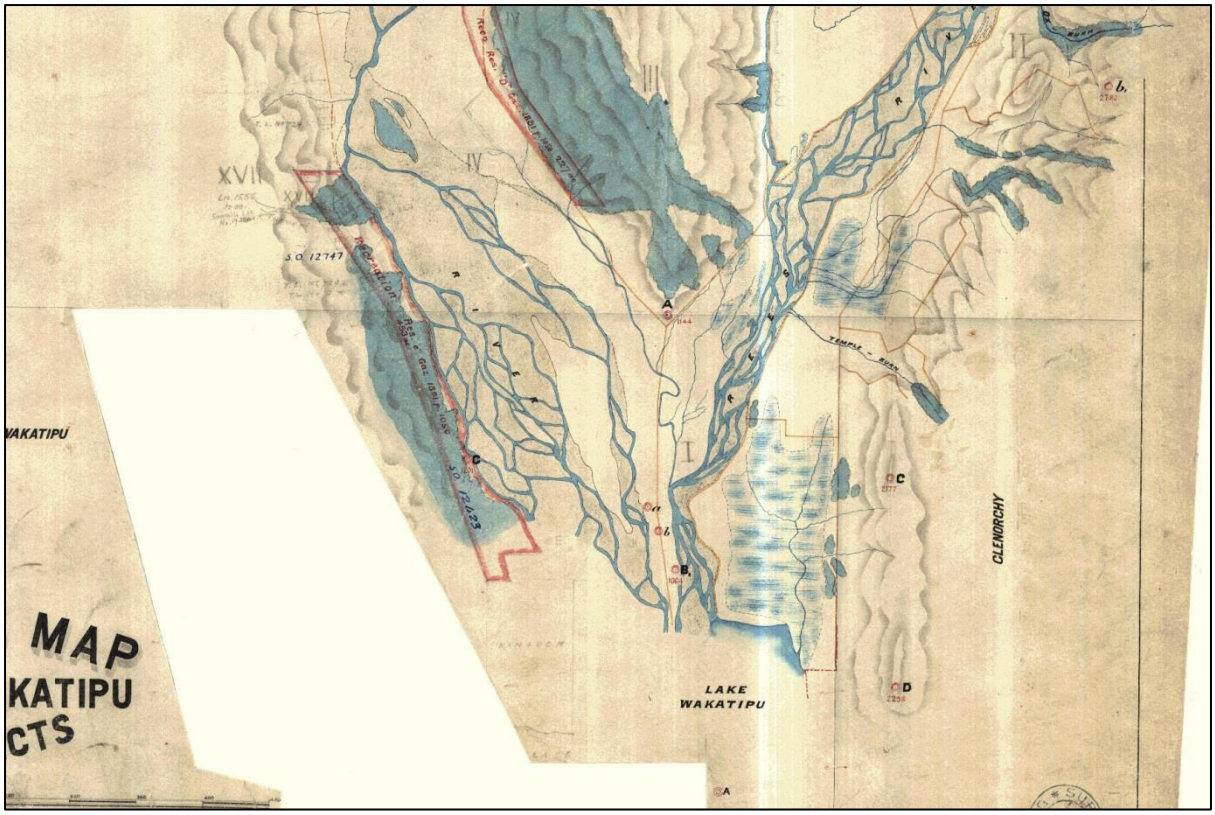


Figure 4. Topographical Map of part of the Dart, Earnslaw, Upper Wakatipu and Glenorchy Districts in 1881 (cropped)(SO 399).

Previous Archaeological Work

Reference to the NZAA site records indicates that there are no recorded sites on the site under assessment.

There are around thirty recorded manu whenua sites within a twenty kilometre radius of Glenorchy. This does not follow the usual pattern of Central Otago where sites are widely distributed but in low densities. The high density of sites around the head of the lake may be associated with the highly valued nephritic sources found in the Dart River and the Routeburn, as well as the area being part of the route used by manu whenua for travelling to the West Coast.

In 1919, Charles Haines, a long-term resident of the area presented a collection of artefacts to the Otago Museum that he had fossicked in the area. 24 pieces, mostly of nephrite, were said to come from one site situated on the west bank of the Dart River. The Dart Bridge site was first investigated using archaeological methods by David Simmons in 1967. Situated on the Routeburn Station, Simmons identified the site was a paved village with associated greenstone working. A small excavation was undertaken and the site was mapped, however part of these records have not been found (Anderson & Ritchie, 1986).

Ritchie undertook an archaeological survey of the area at the head of the lake in 1975. He relocated Simmons site, and gave it the site designation S122/1. Across the other side of the river, around the 'Māori Hillocks', Ritchie gave the area a temporary site number as S122/?, but did not record it on his maps. Further to the south along Kinloch Road, a nephrite adze and greywacke adze were located during roading works (S122/6). Ritchie determined that they had likely been cached (Ritchie, 1975).

Anderson and Ritchie further investigated the possible habitation site worked on by Simmons (S122/1) in 1981 (Anderson & Ritchie, 1986). They argued that it was not the local source of nephrite that was responsible for bringing people to the Dart Valley, but rather was part of a direct route between Central Southland and the West Coast. The advantage of the site was the abundance of *ti* on the river banks and islands close to the site. The site is argued to be a transit camp for manu whenua passing through between the West Coast and the interior via the Routeburn.

This site was later recorded on the Historic Places Trust register as an Archaic Phase Settlement Site, category 2 (no. 5600). It was described as containing two large raised-rim pits, another large pit associated with a low mount and several slight depressions; some four to seven areas of barely perceptible mound and depression features, and alignments of cobbles showing through the soil.

Additional find spots and potential oven sites used by manu whenua have been found to the north of the Glenorchy Township (E41/6, E41/7, E41/8, E41/11) These isolated find spots were identified in the site record forms as being damaged by cultivation/ploughing, and may no longer exist. A more concentrated area of finds was reputedly located near the edge of the township (E41/97). Nearby cave shelters used by manu whenua were recorded by Ritchie in 1975 (E41/9), and were the possible source of the Haines collection of textiles now held in the Otago Museum.

Recorded sites of European activity are clustered around the Buckler Burn to the south of the township where early gold mining activity was concentrated. Three sites are recorded near the road and all identified as gold workings (E41/203, E41/205, E41/206). Additional archaeological sites are located up the Buckler Burn, including those created by scheelite mining. Due to a lack of systematic survey of the area, many 19th century sites are likely to be missing from the ArchSite record. This includes mining areas as well as early urban sites associated with the early township of Glenorchy.

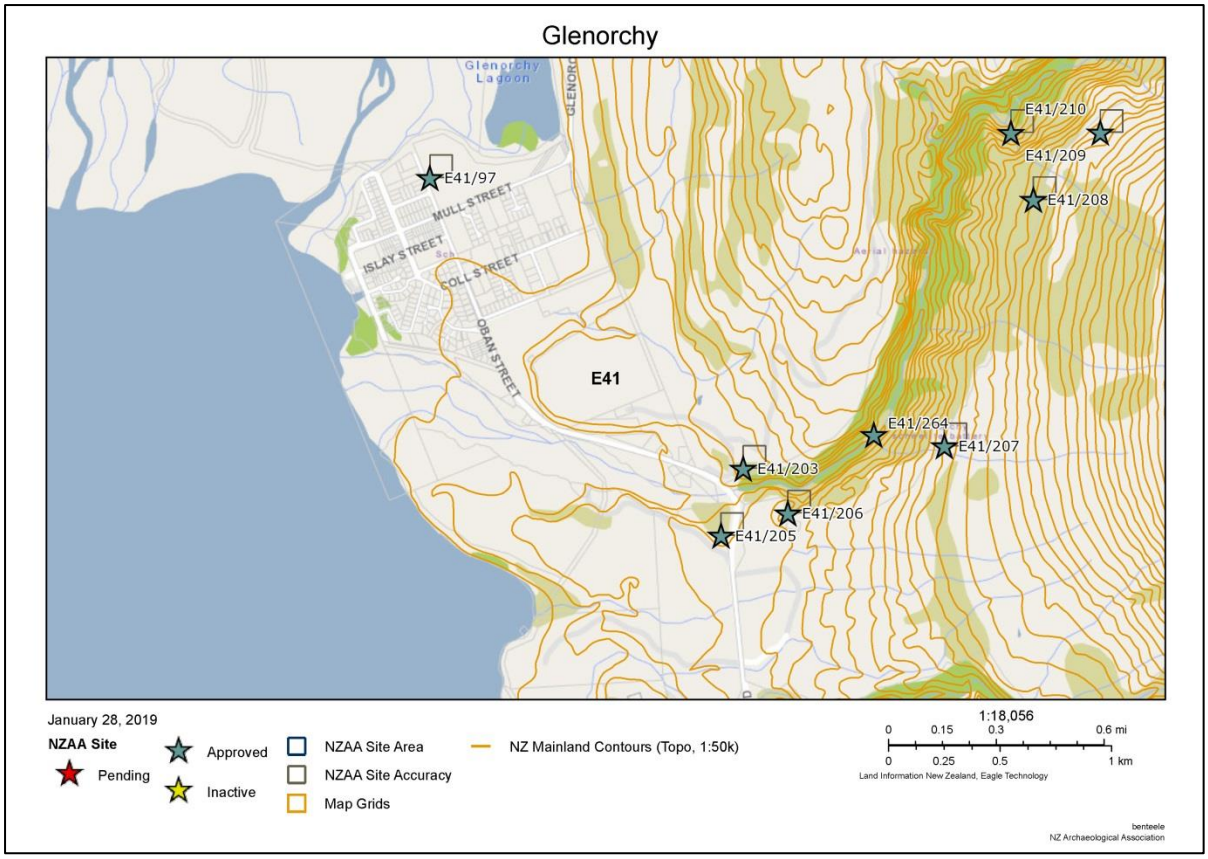


Figure 5. Map showing location of recorded archaeological sites in the area around Glenorchy (ArchSite 2019).

Constraints and Limitations

The key constraints and limitations on the archaeological assessment for the Glenorchy Reservoir Site are considered to be as follows:

- This assessment is based upon desk-based research and a visual inspection of the site – no intrusive or investigatory work into the site or its environs has been undertaken to confirm the results of the assessment.
- There is a lack of visual historic coverage of the site due to its location. There are limited historic surveys and 19th century photographs of the Glenorchy Township, and generally concentrated near the edge of the lake.
- The site is generally covered in a layer of scrub. This limits a clear determination of any potential small or discrete features that might be present.

Outcomes – Research Results

Historical Documentation

The site was historically on the southern margin of the Glenorchy Township, forming part of Block XIX, Town of Glenorchy (Figure 6). The survey of the town shows the concentration of town sections clustered towards the edge of Lake Wakatipu, with a cemetery reserve on the adjacent block to the north. Block XIX, which contained the Bible Terrace, was far less suitable for urban development. According to Miller, Block XIX included the extensive terrace formation over a mile in width was given the name by which it is known today, the Bible Terrace. The terrace is broken in the middle by the Kent Gully and it is this which gives it the appearance of an open Bible (Miller, 1949). This matches a description of the land from an 1863 account, which describes the area when it was still owned by William Rees. His North Run station was managed by F. Ellaby Esq and behind the station was the formation described as the "Bible Terraces". They were described as 'one of the grandest landmarks of the earth's antiquity that is discernible throughout our trip' (Lake Wakatip Mail, 1863).

The reason that a Crown Index Map was prepared was due to the gold rush that developed following the arrival of miners in the early 1860s. The land around Glenorchy was originally part of William Rees's northern run, and covered the land at the head of the lake. After the discovery of gold in the Arrow and Shotover Rivers from 1862, miners spread out looking for other sites bearing gold. The Buckler Burn, which runs just to the south of the township was one such site. Once the first miners arrived, it quickly became known that gold had been struck at the Twenty-Five Mile, which was named the Buckler Burn by Alfred Duncan, the man who had taken over Rees's northern run. Some coarse gold and nuggets were quickly washed up, and soon after a population of around 300 miners had settled on the banks of this river. The Buckler Burn did not have the same intensive exploration of alluvial mining compared to the fields at the Shotover and Arrow, but the whole area was covered in tents during this rush. More gold was found to north at Precipice Creek, and in small concentrations at other places around the head of lake. Following this initial rush, once the easily gold had been worked out, many miners moved onto the new fields opening up on the west coast (Miller, 1949). The township of Glenorchy was surveyed in 1865, and incorporated a number of urban blocks.

However, this survey appears to have been optimistic for Glenorchy's future growth in the 19th century. A description of Glenorchy in 1874 noted the postal town as having a store and hotel, and the houses and building composing the home station of Mt Butement, who ran sheep, the rest of the population consisted of station people, the European miners, and seven Chinese working up the Buckler Burn. The town was described as not possessing 'a single inviting feature beyond the surrounding scenery' (Otago Witness, 1874). Mining had continued following the rush, but was localised and small in scale. There had been a shift to working the exposed terraces by sluicing claims from the 1870s. One advertisement for the sale of a mining claim in 1877 listed tramway, truck, hose, boxes, and all necessary implements and a first class water race (Lake Wakatip Mail, 1877). Kent Gully may have been prospected during this time, as its exposed faces would have likely provided some returns on alluvial sluicing. However, the rest of the terrace appears to have remained untouched. By 1882 there were only a few European and Chinese miners left working the streams emptying into the eastern shore of the lake (Otago Witness, 1882).

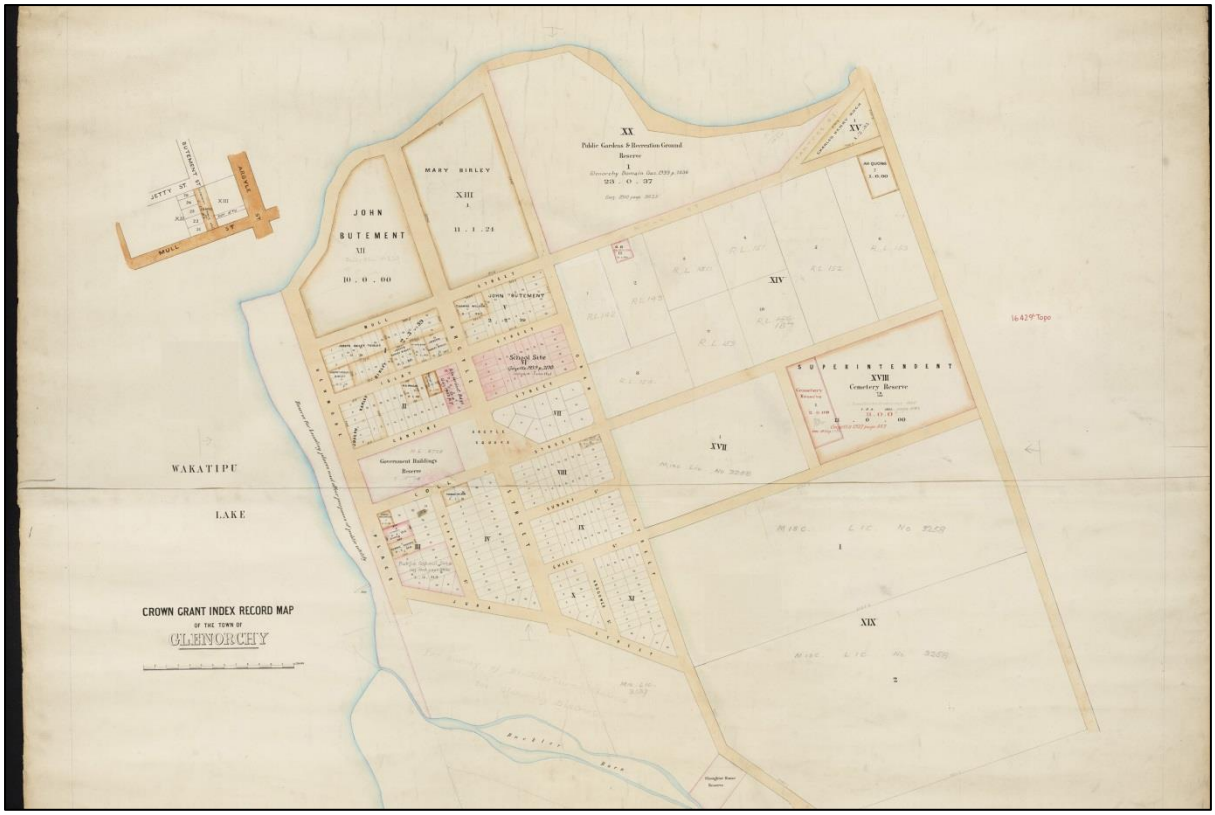


Figure 6. Glenorchy Crown Index Map from 1865 showing Block XIX in relation to main town centre (cropped) (Archives NZ -DAAK 9431 D450/128).

A subsequent survey from 1892 shows the terrace area covering Section 1 and 2 of Block XIX, and the Buckler Burn to the south (Figure 7). A pencil annotation on the 1865 Crown Index notes a miscellaneous license number for both sections within the block. Through the end of the 19th century and into the early 20th century Block XIX appears to have been kept under pastoral lease. Following the break-up of the North Station run, there are references in the newspapers from this period showing that it was leased for agricultural purposes, with Mary Birley applying for a grazing licence over Section 1, Block XIX in 1904 (Otago Witness, 1904). Section 2, Block XIX was taken over by Lewis Groves in 1908 (Otago Witness, 1908). The first Certificate of Title was not issued for the sections until 1937, and this was as a renewable lease (OT259/189). The title was issued to Alexander Watherston, and a new survey map of the sections was produced in the year prior showing the sections referred to in this title (Figure 8).

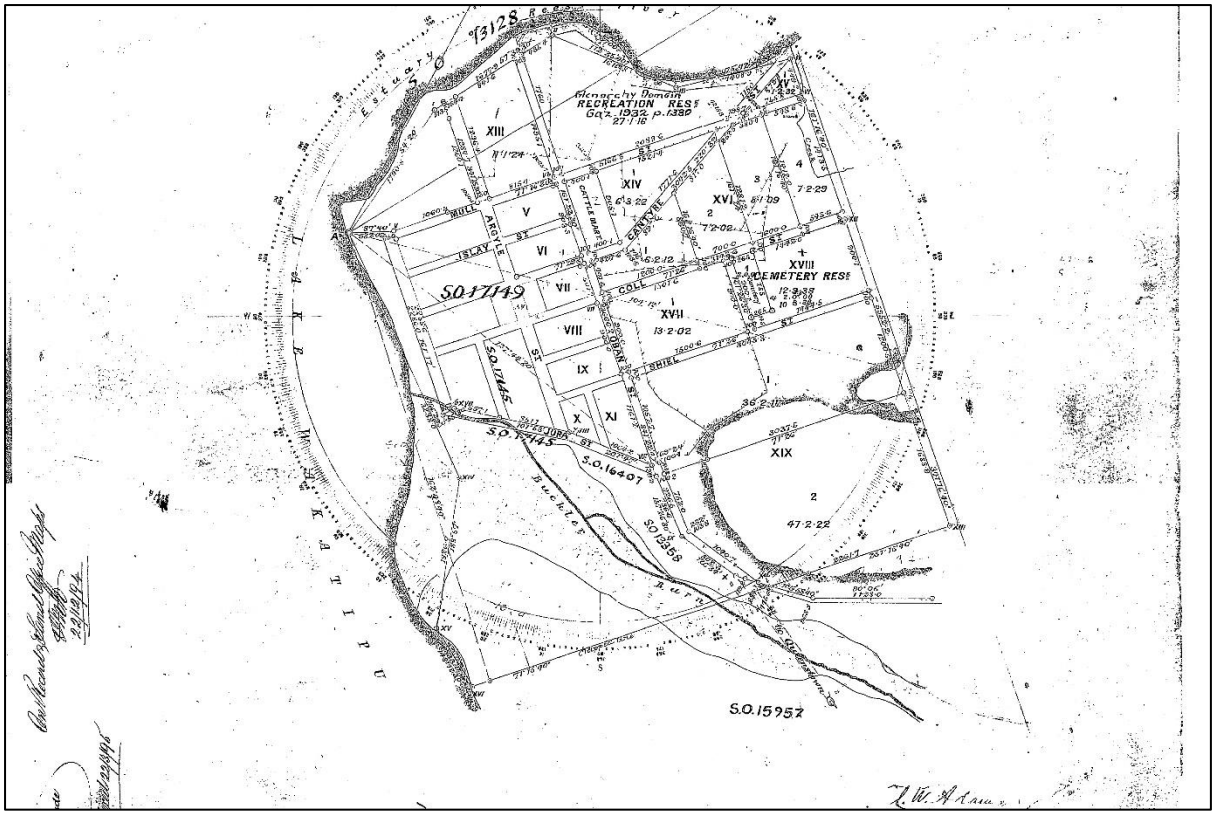


Figure 7. Survey map from 1892 showing terrain over Block XIX (cropped)(SO 14287).

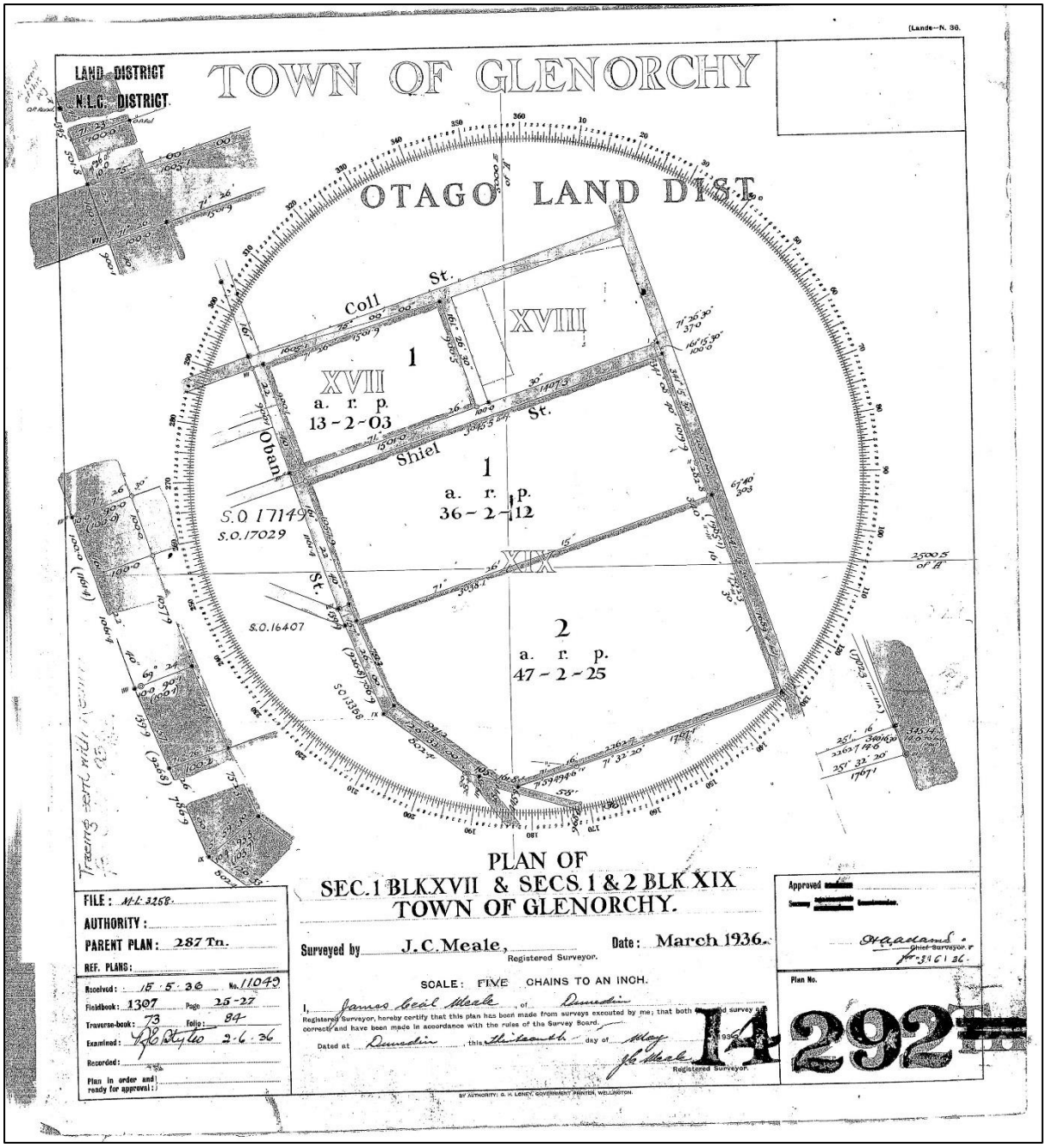


Figure 8. Survey map from 1936 which was undertaken in concert with the issuing of the first Certificate of Title for the sections of Block XIX (SO 14292).

Aerial imagery of the terrace from 1959 clearly shows that the geological feature is relatively unmodified. Kent's Gully, dissecting the terrace, has some exposed faces (Figure 9). These faces are situated to the north of the assessment site, and due to the proximity to Buckler Burn, may have been prospected and possibly the focus of alluvial sluicing by miners in the 19th century. Issues of water provision to the site may have prevented them from being worked extensively. A lack of water may have also spared the geological terrace formations from being mined further to the south where the assessment site is situated. Due to the sites proximity to the gold bearing Buckler Burn, it would be surprising if these faces weren't worked unless there were significant constraints, such as insufficient water to allow them to be worked. An overhead aerial image from 1966 shows the layout and proximity of the terrace to both the township and the Buckler Burn (Figure 10). The unmodified western terrace slopes can be clearly seen except for the area where it has been cut by Kent's Gully.

This geological feature remained under pastoral lease through the 20th century. A small area was subdivided from Section 1 to allow the construction of water tanks for the township, with access to the site via an easement. There is no clear documentation about when these tanks were built, but it is likely they were constructed sometime in the 1970s or 1980s. The small parcel of land now identified as Lot 4 Deposited Plan 394250 was created in 2008 and vested to QLDC as a local purpose reserve (OT13A/87) and a new title was issued (377050). The geological feature was also listed in the District Plan as a protected landscape feature by QLDC (Figure 11).

Figure 9. Aerial photograph from 1959 showing the Bible Terrace's cut by Kent's Gully and the sluiced faces above the Buckler Burn in behind. The township of Glenorchy is to the right of the image (cropped)(Whites Aviation).

Figure 10. Aerial imagery from 1966 showing the Bible Terrace's with the cut created by Kent's Gully visible. The Buckler Burn is clear to the right of the terrace and the township to the southwest (cropped)(Retrolens – SN2016).

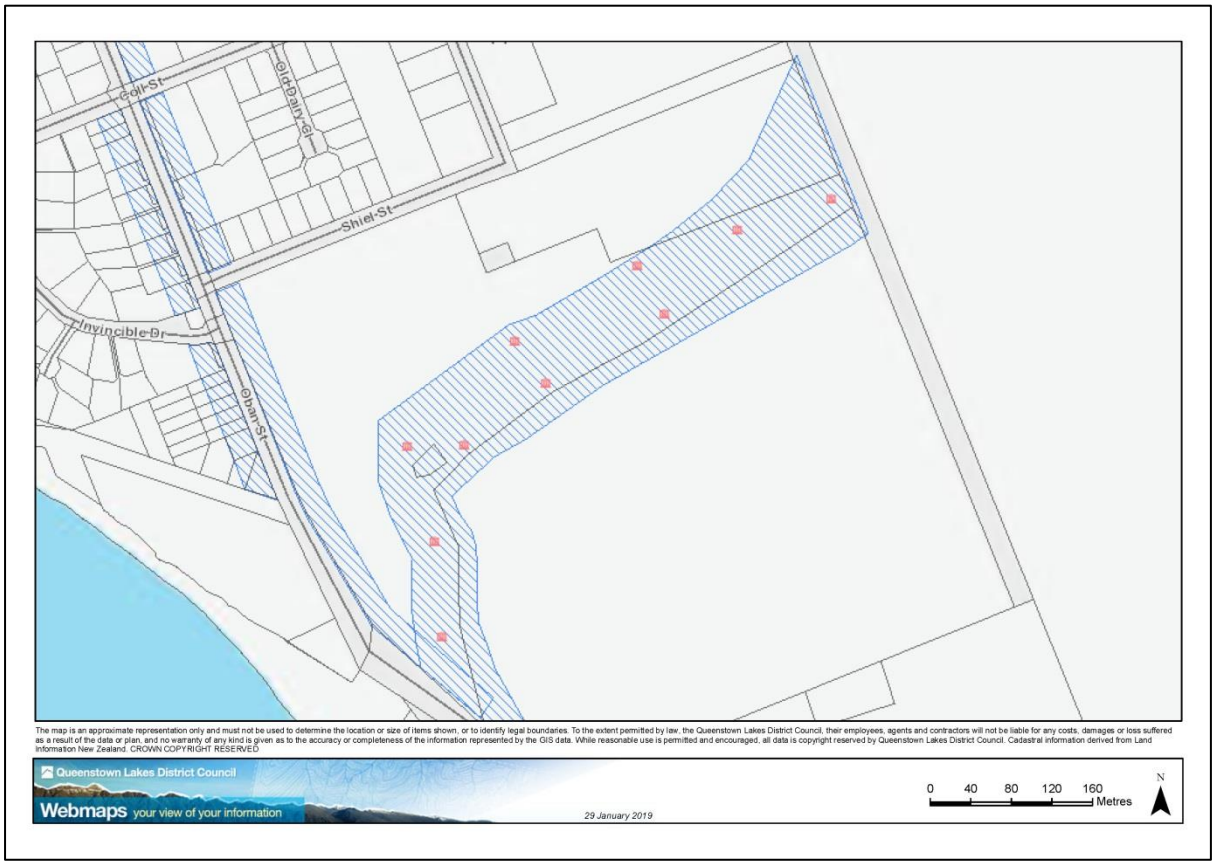


Figure 11. QLDC Webmaps showing the area identified as a protected landscape feature under the Operative District Plan, running along the exposed western and southern faces of Bible's Terrace (QLDC Webmaps 2019).

On-site Observations

A site visit was conducted by Benjamin Teele on the 25th of January, 2019. This was undertaken to investigate if there were any potential archaeological features visible and to place the site within the context of the surrounding area.

The site is situated on the north terrace face of the geological feature identified as the Bible Terrace (Figure 12). It is accessed via a dirt road running off Oban Street, and which switchbacks up the terrace face. Following the switch-back, the road runs along the flat part of the last terrace face before the top to the reserve (Figure 13). This area contains four concrete reservoir tanks and is fenced off (Figure 14). The surrounding area is kept mostly in grass with regeneration exotic broom on the hillsides above and below. The area to the north of the site is now covered in regenerating broom and exotic conifers (Figure 15). This has obscured most of the terrace landform. Part of the terrace is fenced, which runs parallel to the slope up onto the top terrace. This area is kept in grass (Figure 16). The Glenorchy Township is clearly visible from the top (Figure 17). During the site walkover survey, there were no observed features on the terrace face. The overall site and large geological feature appears almost completely unmodified except for the construction of fencelines and the four concrete tanks on the site itself.

Figure 12. View of site and Bible Terrace looking east from Oban Street with access road visible across face.

Figure 13. View of reservoir site from access road looking west.

Figure 14. Current reservoir site showing four concrete tanks and cleared area.

Figure 15. View of access road to reservoir site looking east.

Figure 16. View of upper terrace above reservoir site looking east.

Figure 17. View of Glenorchy Township looking north from above site.

Archaeological and Other Values

Because there was no documented evidence of clear pre-1900 activity at or near the assessment site, and because no features were observed during the site survey, there is no assessment of archaeological values.

Assessment of Effects

Because the site contains no known archaeological features or material, no assessment of effects has been undertaken.

Conclusion and Recommendations

Assessment Summary

This report provides an assessment of the Glenorchy Reservoir site and the proposed construction of a new reservoir system.

The site encompasses a small portion of land designated as local council reserve used for provision of water storage tanks for the town of Glenorchy. The site is situated on a terrace that is part of a protected landscape feature under QLDC's Operative District Plan, identified as the Bible Terrace. The first documented reference to this terrace is from 1865, when it was described as a significant landscape feature. The wider landscape was used by manu whenua moving through the area to access lithic and other resources on the West Coast and to the north of Lake Wakatipu. While the terrace's themselves are a prominent landscape feature, they appear to have remained undisturbed by Manu whenua. Subsequent development of the adjacent Glenorchy Township occurred from the 1860s, fed by the creation of the North Run Station and the initial gold rush to the Buckler Burn and other small creeks in the area. Works along the rivers and streams were in the form of alluvial mining, and concentrated where water was readily available to undertake various alluvial mining operations. Kent's Gully, which dissects the terrace to the north of the site, may have been prospected during this 19th century mining activity. However, it is clear based on historic documentation and site observations that the southern part of the terraces has remained effectively unaltered since their formation. Only minor 20th century activity in the form of fencing and water tank construction has occurred on the site.

Recommendations

Based on the conclusion that any works on the assessment site will not impact any archaeological values, Origin Consultants make the following recommendations:

- Due to the lack of documented and observed features within the assessment size and surrounding area, no archaeological authority is required for any site works.
- If any Māori material is discovered, NZHP will assist Aurora Energy in contacting all relevant parties, including HNZPT and mana whenua. If any Taoka Tūturu are uncovered, they will, prima facie, belong to the Crown. NZHP, in collaboration with mana whenua, shall submit them for custody until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.
- There are historic recordings of isolated Māori features and material culture in the wider area, but it has been assessed as very unlikely the proposed works will encounter any such items. If Māori material is encountered during works, then all work is to cease immediately with a 20m exclusion zone established around the find with damage to any material minimised or avoided. A mana whenua representative or archaeologist approved by Kā Rūnaka should be contacted and present should any archaeological finds of Māori origin be uncovered. Once the Regional Archaeologist has been

contacted, they will advise on the best way to proceed. If any Māori material is encountered, they will be, prima facie, property of the Crown and decision made regarding their management, including recording, analysis and custody will be made in collaboration with mana whenua.

References

Anderson, A. J., & Ritchie, N. (1986). Pavements, Pounamu and Ti: The Dart Bridge Site in Western Otago, New Zealand. *New Zealand Journal of Archaeology*, *8*, 115–141.

Department of Conservation. (2012). Earnslaw Crown Pastoral Land Tenure Reveiw.

Griffiths, G. J. (1971). *Queenstown's King Wakatip*. Dunedin: John McIndoe Limited.

Hamel, J. (2001). *The Archaeology of Otago*. Department of Conservation.

Lake Wakatip Mail. (1863). The Head of the Lake. LAKE WAKATIP MAIL, VOLUME I, ISSUE 25, 25 JULY 1863.

Lake Wakatip Mail. (1877). Page 2 Advertisments Column 1. LAKE WAKATIP MAIL, ISSUE 1048, 28 DECEMBER 1877.

Miller, F. W. G. (1949). *Golden Days of Lake County*. Whitcome & Tombs Ltd.

Otago Witness. (1874). Letters from the Goldfields. OTAGO WITNESS, ISSUE 1183, 1 AUGUST 1874.

Otago Witness. (1882). Our Resources. OTAGO WITNESS, ISSUE 1592, 27 MAY 1882.

Otago Witness. (1904). Otago Land Board. OTAGO WITNESS, ISSUE 2642, 2 NOVEMBER 1904.

Otago Witness. (1908). Otago Land Board. OTAGO WITNESS, ISSUE 2817, 11 MARCH 1908.

Ritchie, N. (1975). *Head of the Lake (Wakatipu) - Dart Archaeological Survey*.

Wilmshurst, J. M., Anderson, A. J., Higham, T. F. G., & Worthy, T. H. (2008). Dating the late prehistoric dispersal of Polynesians to New Zealand using the commensal Pacific rat. *Proceedings of the National Academy of Sciences* , *105*(22), 7676–7680. http://doi.org/10.1073/pnas.0801507105

Appendix A – Certificate of Title

CANCELLED

NEW ZEALAND.

Particulars entered in the Register-book, Vol. 259/189 fol.

the 30th day of August 1937, at 11-15 o'clock.

District Land Registrar.

OTAGO LAND DISTRICT.

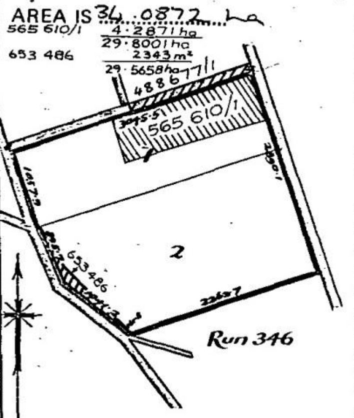
RENEWABLE LEASE UNDER PART III OF THE LAND ACT, 1924, AND THE MINING ACT, 1926.

No. 251.

259/189

This Deed, made the tenth day of February, 1937, between His Majesty the King (who, with his heirs and successors, is hereinafter termed "the Lessor") of the one part, and ALEXANDER WATHERSTON, ... of GLENORCHY, in the Land District of OTAGO, ... FARMER, in the Dominion of New Zealand (hereinafter, with his executors, administrators, and permitted assigns, referred to as and included in the term "the Lessee"), of the other part, Witnesseth that, in consideration of the rent hereinafter reserved, and of the covenants, conditions, and agreements herein contained and implied and on the part of the Lessee to be paid, observed, and performed, the Lessor doth hereby demise and lease unto the Lessee All that piece or parcel of land, containing by admeasurement ...... Eighty-four (84) .... acres .... roods and thirty-seven (37) ... perches, a little more or less, situated in the Land District of ... Otago ... aforesaid, and being Sections numbered One (1) and Two (2) .... Block Nineteen (XIX) ..., ~~Survey District of~~ Town of Glenorchy .... as the same is more particularly delineated and described in the plan drawn hereon, and therein coloured red in outline; together with the rights, easements, and appurtenances to the same belonging: To hold the said several premises intended to be hereby demised unto the Lessee for the term of sixty-six years, commencing from the 1st day of July, 1937, Yielding and paying therefor unto the Receiver of Land Revenue for the said District of Otago .... the annual rent of Four pounds .... (£ 4 : 0 : 0), payable half-yearly in advance on the 1st day of January and 1st day of July in each and every year during the said term, free from all deductions whatsoever.

Block XIX
Town of Glenorchy
84a 0r 37p
EQUIVALENT METRIC AREA IS 34.0872 ha
565 610/1 4.2871 ha
29.8001 ha
653 486 2343 m²
29.5658 ha



Scale: 10 chains to an inch.

And it is hereby declared and agreed that these presents are intended to take effect as a Renewable Lease under Part III of the Land Act, 1924 (hereinafter termed "the said Act"); and the provisions of the said Act applicable to such leases, so far as the same apply to the term, estate, or interest hereby granted or created, and to the relations between the Lessor and Lessee from time to time, shall, subject to the provisions of section 19 of the Mining Act, 1926, be binding in all respects upon the parties hereto in the same manner as if such provisions had been fully set out herein: And it is hereby further declared that if any dispute or disagreement shall arise between the parties hereto touching the construction of these presents, or in anywise relating hereto, such dispute or disagreement shall be referred to arbitration in the manner set forth in section 8d of the Land Act, 1924; and neither of the said parties shall take or cause to be taken any steps or proceedings to set aside or call in question any award or decision which may have been given upon any such reference as final: And it is hereby further declared that the Lessee shall have no right or claim to any of the minerals, metals, valuable stone, or coal under the surface of the land hereby demised, and the Lessee's rights are limited to the surface soil comprised in his lease: And also that all persons lawfully engaged in working such minerals, metals, stones, coal, &c., shall have the right to sink shafts under or through the said land, and to take watercourses over the same, and the right to ingress, egress, or regress.

This lease is issued subject to the provisions of Section 133 of the Land Act, 1924.

In Witness whereof the Commissioner of Crown Lands for the Land District of Otago .... on behalf of the Lessor, hath hereunto set his hand, and these presents have been also executed by the said Lessee.

Signed by the said Commissioner, on behalf of the Lessor, in the presence of—
J. A. Geaver
Chief Draughtsman, Lands Department, Dunedin.

F. H. Waters
Commissioner of Crown Lands.

Signed by the above-named ALEXANDER WATHERSTON, as Lessee, in the presence of—
J. G. McFarlane
Postmaster
Glenorchy

Alexander Watherston
Lessee.

Witness:
Occupation:
Address:

C.T. 259/189

565610/1 Surrender of the within lease as to Section 4 (4.2871 ha) Block XIX Town of Glenorchy (hatched black on the diagram hereon) - 13.11.1981 at 2.1 pm (with the consent of the Mortgagee in Mortgages 527434/5 527434/6 and 551669/2)

A.L.R.

578958 Variation of Mortgage 551669/2 - 9.7.1982 at 10.09 am

A.L.R.

582061 Variation of Mortgage 527434/5 - 2.9.1982 at 11.38 am

A.L.R.

593456 Variation of Mortgage 527434/5 - 21.4.1983 at 10.20 am

A.L.R.

605816 Variation of Mortgage 527434/5 - 22.11.1983 at 1.48 pm

A.L.R.

653486 Gazette Notice declaring part of the within land (2343 m^2) hatched black on the diagram hereon to be road vested in the Lake County Council - 4.4.1986 at 9.46 am.

A.L.R.

682063 Order vesting the within land in Peter Anton Lucas abovenamed (as to a 1/3rd share), Juliet Esther Lucas of Glenorchy, Married Woman (as to a 1/3rd share) and John Garth Lucas of Dunedin, Solicitor and Geoffrey Alexander Cook of Dunedin, Accountant (jointly interse as to a 1/3rd share) as tenants in common in the said shares - 6.7.1987 at 9.03am

A.L.R.

740185/1 Application pursuant to Section 25(1)(a) State Owned Enterprises Act 1986 whereby Landcorp Investments Limited is registered as the lessor under the within lease - 17.10.1989 at 9.55 am

A.L.R.

740185/2 Order for new Certificate of Title pursuant to Section 25(3) State Owned Enterprises Act 1986 C.T. 13A/87 issued for the fee simple

A.L.R.

Fee simple acquired new C.T. 13A/87 and Transfer 740185/3

A.L.R.

DUPLICATE DESTROYED
17/1/1990

DISTRICT LAND REGISTRAR
Cancelled
OTAGO
NEW ZEALAND

C.T. 259/189

Transmission ... to Charles Frederick Cornish ... Farmer produced 20th October 1939 at ...

Mortgage 107294 James Frederick Cornish to Charles Haines ... produced 20th December 1939 at 20 ...

DISCHARGED

Mortgage 120087 James Frederick Cornish to Joseph Reid produced ... November 1944 at 10-30 ...

DISCHARGED

Transfer 149813 James Frederick Cornish to William Alexander Grant of Glenorchy Farmer produced 31 October 1950 at 2.55 o'c

Transmission 35983 to William Alexander Grant as Executor Entered 15th March 1954 at 2.45 o'c

Transfer 187346 William Alexander Grant to Rose Frances Grant of Glenorchy Spinster produced 15th March 1954 at 2.48 o'c

Transfer No 200781 Rose Frances Grant to Robert Paulin of Glenorchy Miner produced 18th October 1956 at 12 ...

303455 Transfer to the Trustees Executors and Agency Company of New Zealand Limited 3.8.1966 at 10.43 am.

DISCHARGED ... A.L.R.

303246 Mortgage to ... Investment Company Limited ... 1966 at 11.25 am

DISCHARGED ... A.L.R.

318161 Mortgage to State Advances Corporation of New Zealand 30/5/1967 at 12.10 pm

A.L.R.

THIS REPRODUCTION (ON A REDUCED SCALE) CERTIFIED TO BE A TRUE COPY OF THE ORIGINAL REGISTER FOR THE PURPOSES OF SECTION 215A LAND TRANSFER ACT 1952.

A.L.R.

366086 Transfer of Mortgage 303246 to Trustees Executors and Agency Company of New Zealand Limited — 3.2.1971 at 9.23 a.m.

D.L.R.

422835 Certificate of Alteration varying the terms of the within Lease - 15.4.1974 at 10.25 am

A.L.R.

422836 Transfer to Timburn Estate Limited - 15.5.1974 at 10.27 am

A.L.R.

422838 Mortgage to The State Advances Corporation of New Zealand - 15.5.1974 at ...

DISCHARGED ... 1979

A.L.R.

259/189

437906 Mortgage to The Rural Banking and Finance Corporation of New Zealand - ... at 2.40 pm

DISCHARGED

A.L.R.

488677 Notice stopping that part of Shiel Street adjoining the within land (hatched black on the diagram) which is now known as Section 3 Block XIX Town of Glenorchy ($5846m^2$) - 30.11.1977 at 12 noon

7B/592 issued.

A.L.R.

500463 Certificate vesting Mortgage 422838 in The Rural Banking and Finance Corporation of New Zealand - 27.7.1978 at 10.58 am

A.L.R.

522058 Mining Licence under the Mining Act 1971 affecting part of the within land (4.2871ha) in favour of the Lake County Council for a term of 21 years from the 27th August 1979 - 31.8.1979 at 1.55 pm

See Volume 5D folio 101

A.L.R.

527434/4 Transfer to Peter Anton Lucas of Glenorchy Farmer - 7.12.1979 at 2.01 pm

A.L.R.

527434/5 Mortgage to The Rural Banking and Finance Corporation of New Zealand - 7.12.1979 at 2.01 pm

A.L.R.

527434/6 Mortgage to The Rural Banking and Finance Corporation of New Zealand - 7.12.1979 at 2.01 pm

DISCHARGED

A.L.R.

Part of Section 1 Block XIX Town of Glenorchy is now known as Section 4 Block XIX Town of Glenorchy - 2.9.1980 at 1.40 pm

See Re Appellation 540799/1

A.L.R.

551669/1 Variation of Mortgage 527434/5 - 27.3.1981 at 10.16 am

A.L.R.

551669/2 Mortgage to the Rural Banking and Finance Corporation of New Zealand - 27.3.1981 at 10.16 am

A.L.R.

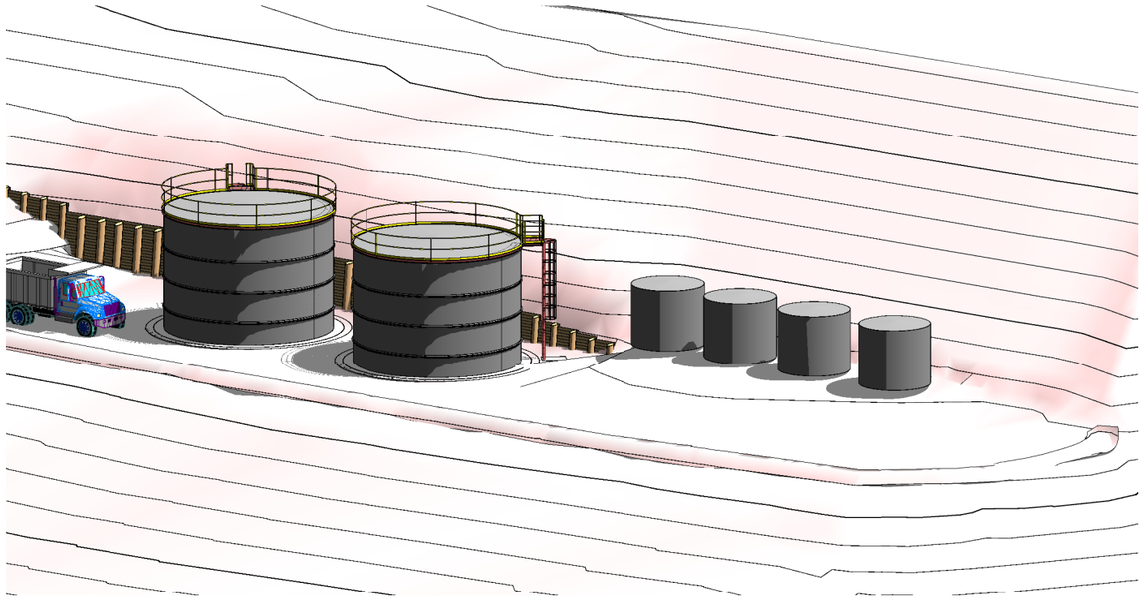
558353 Variation of Mortgage 551669/2 - 23.7.1981 at 10.51 am

A.L.R.

OVER....

STRUCTURAL DRAWING LIST		
DRG. No.	**Rev**	**DRAWING NAME**
GENERAL		
ZA-0000	0	COVER SHEET
ZA-1001	0	LOCATION AND SITE PLAN
ZA-1101	0	RESERVOIR SITE PLAN
ZA-1301	0	SITE SECTION
MECHANICAL		
MA-3001	0	GENERAL SITE ARRANGEMENT PLAN
MA-3501	0	INLET PIPE SECTION AND DETAILS
MA-3502	0	OUTLET AND VENT PIPE SECTION AND DETAILS
MA-3503	0	SCOUR AND OVERFLOW PIPE SECTION AND DETAILS
STRUCTURAL		
SE-3502	0	RETAINING WALL SECTIONS AND DETAILS
CIVIL		
CA-1401	0	EXISTING ACCESS TRACK PLAN VIEW
CA-1402	0	EXISTING ACCESS TRACK LONG SECTION
CIVIL & DRAINAGE		
CD-1301	0	SCOUR AND OVERFLOW LINE PLAN AND LONG SECTION
CD-1302	0	PROPOSED RESERVOIR INFLOW AND SERVICES PLAN
CD-1311	0	SCOUR PIPE TRENCH DETAIL
CD-1501	0	SCOUR AND OVERFLOW SECTIONS AND DETAILS
POWER AND SERVICES		
UA-1001	0	SITE POWER CONNECTION PLAN AND DETAILS

REFERENCE DRAWINGS		
DRG. No.	**DRAWING NAME**	**DESIGNER**
1914.TOPO.S01	GLENORCHY RESERVOIRS TOPOGRAPHIC PLAN	CONSTRUCTION SURVEY
019116-T1-APP	MODEL 2825 PERMASTORE IND TANK T1	PERMASTORE TANKS & SILOS
019116-T2-APP	MODEL 2825 PERMASTORE IND TANK T2	PERMASTORE TANKS & SILOS
DR400 & DR423	SHIEL STREET, SUBDIVISION GLENORCHY	AR & ASSOCIATES
S01-S02	TANK FOUNDATION BASE AND PIPE LAYOUT FOR 250kL STORAGE TANKS (2-OFF)	CALIBRE



Beca

Project No. 3334040
Contract No. C-19-010

GLENORCHY RESERVOIR UPGRADES

FOR TENDER

Prepared for

QUEENSTOWN LAKES DISTRICT COUNCIL

By
Beca

5 May 2021

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

Drawing No.	Rev.
3334040-ZA-0000	0

Drawing Plotted: 5/05/2021 3:20:13 PM

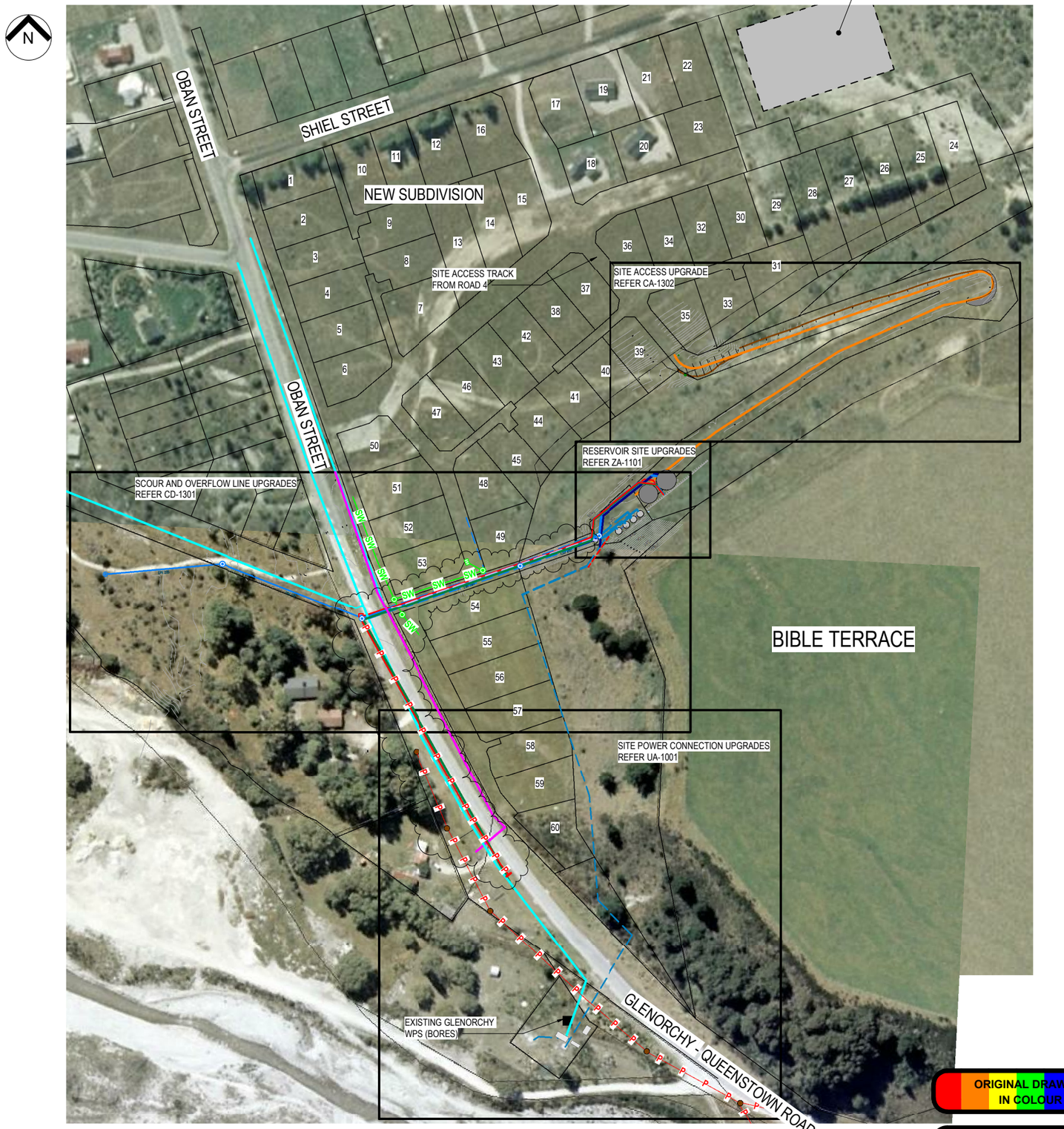
www.beca.com

LOCATION PLAN
NTS

LEGEND

- PROPOSED OVERLAND DRAIN
- PROPOSED SITE ACCESS
- FUTURE PIPE
- EXISTING wMAIN (RISING)
- EXISTING wMAIN (FALLING)
- PE PIPEWORK
- SS PIPEWORK
- SCOUR / OVERFLOW PIPEWORK
- PROPOSED POWER SUPPLY
- FIBRE DUCT
- EXISTING POWER SUPPLY (OVERHEAD)
- EXISTING CHORUS LINE
- STORMWATER

EXISTING RESERVOIRS



SOURCE: QLDC ARCGIS ONLINE & AR & ASSOCIATES SUBDIVISION PLAN

SITE PLAN
1 : 1200

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER - FIBRE DUCT EXTENDED; POWER DEMARCATION ADDED	JJ	JD	JW	04.21

Drawing Originator: Beca

Original Scale (A1)	Design	J. Washbrooke 10.20
As indicated	Drawn	J. Jack 10.20
Reduced Scale (A3)	Dsg Verifier	J. Dabkowski 10.20
	Dwg Check	J. Dabkowski 10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: LOCATION AND SITE PLAN

Discipline: GENERAL

Drawing No.: 3334040-ZA-1001

Rev.: 0

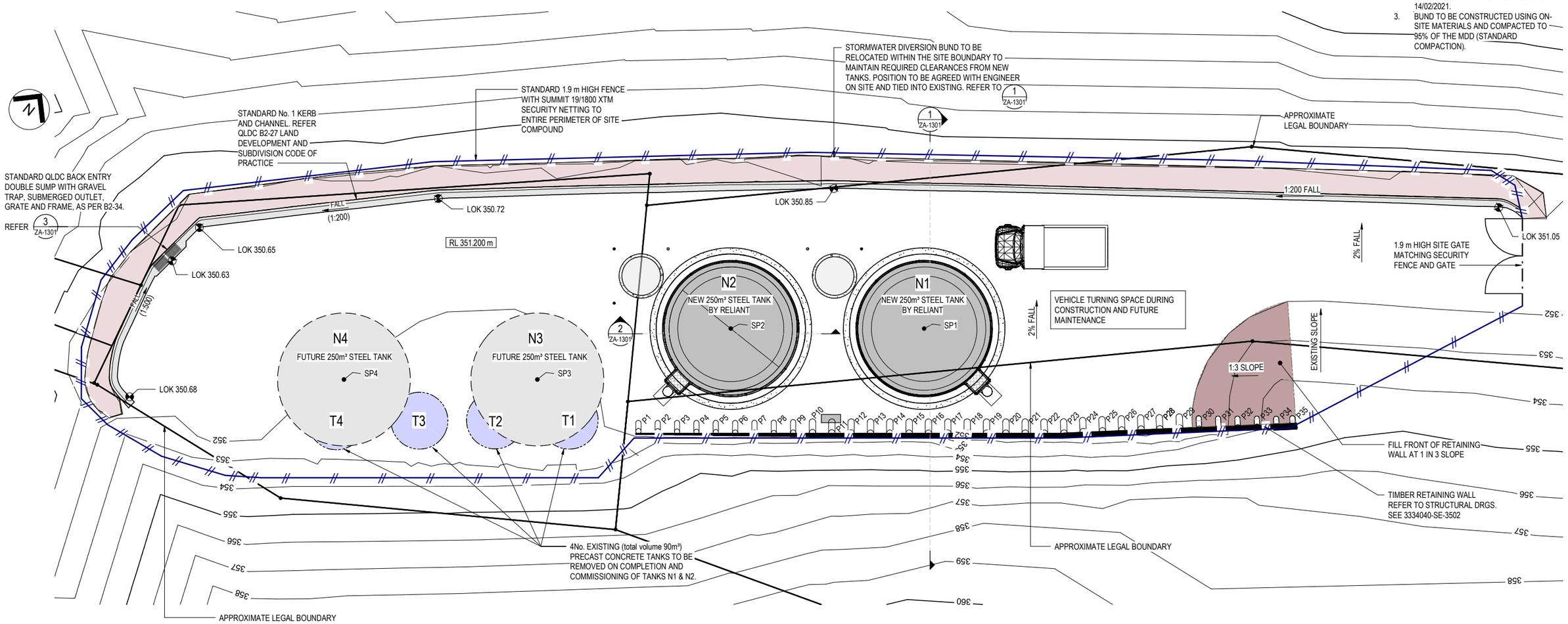
Document No. BIM 360://3334040 - Glenorchy Reservoir/3334040-SE-R18 GLENORCHY RESERVOIR.rvt

DO NOT SCALE

IF IN DOUBT ASK.

NOTE:

1. TANK SIZE SHOWN INDICATIVE ONLY. REFER TO MANUFACTURERS DRAWING FOR DIMENSIONS.
2. STORMWATER DIVERSION BUND DETAIL REFERENCED FROM PROPOSED SUBDIVISION DRAWINGS. BY A.R. ASSOCIATES P17-059 DR423 RECEIVED ON 14/02/2021.
3. BUND TO BE CONSTRUCTED USING ON-SITE MATERIALS AND COMPACTED TO 95% OF THE MDD (STANDARD COMPACTION).



OVERALL SITE PLAN
1 : 125

EARTHWORK VOLUMES		
CUT	FILL	NET CUT/FILL
1609.67 m³	73.92 m³	-1535.75 m³

NOTES

1. LEVELS IN TERMS OF MEAN SEA LEVELS (DUNEDIN VERTICAL DATUM 1958)
2. ORIGIN OF LEVELS IS WAR MEMORIAL POST (RL = 313.444)
3. HORIZONTAL COORDINATES ARE IN TERMS OF MT. NICHOLAS 2000.

RETAINING WALL SETOUT			
PILE NUMBER	APPROX. HT. ABOVE GL mm	COORDINATES NORTHING (Y)	COORDINATES EASTING (X)
P1	600	830863.577	399513.887
P2	700		
P3	900		
P4	1100		
P5	1300	830866.521	399517.678
P6	1500		
P7	1600		
P8	1800		
P9	1900		
P10	2000	830870.235	399522.39
P11	2100		
P12	2200		
P13	2300		
P14	2300		
P15	2300	830873.955	399527.098
P16	2300		
P17	2300		
P18	2300		

RETAINING WALL SETOUT			
PILE NUMBER	APPROX. HT. ABOVE GL mm	COORDINATES NORTHING (Y)	COORDINATES EASTING (X)
P19	2300		
P20	2300	830877.699	399531.787
P21	2300		
P22	2300		
P23	1980	830879.953	399534.605
P24	2300		
P25	2300		
P26	2300		
P27	2300		
P28	2300	830883.866	399539.083
P29	2300		
P30	1700		
P31	1400		
P32	900		
P33	500		
P34	400		
P35	400	830889.148	399545.419

LEGEND

- LOK = LIP OF KERB LEVEL
- PLANTED BUND
- NEW FENCE
- NEW GATE
- STORMWATER MANHOLE DN1050 - REFER TO CA-1303 FOR TYPICAL DETAIL
- SUMP
- SUBSOIL RODDING EYE IN SURFACE BOX
- BOLLARD

Reservoir Setout Table			
RESERVOIR NUMBER	SETOUT POINT	COORDINATES NORTHING (Y)	COORDINATES EASTING (X)
N1	SP1	830879.613	399523.771
N2	SP2	830872.126	399514.393
N3	SP3	830862.173	399506.984
N4	SP4	830854.687	399497.606

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	JJ	AJ	JD	03.21

Drawing Originator: Beca

Original Scale (A1) As indicated Reduced Scale (A3)

Design	J. Washbrooke	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: RESERVOIR SITE PLAN

Discipline: GENERAL

Drawing No.: 3334040-ZA-1101

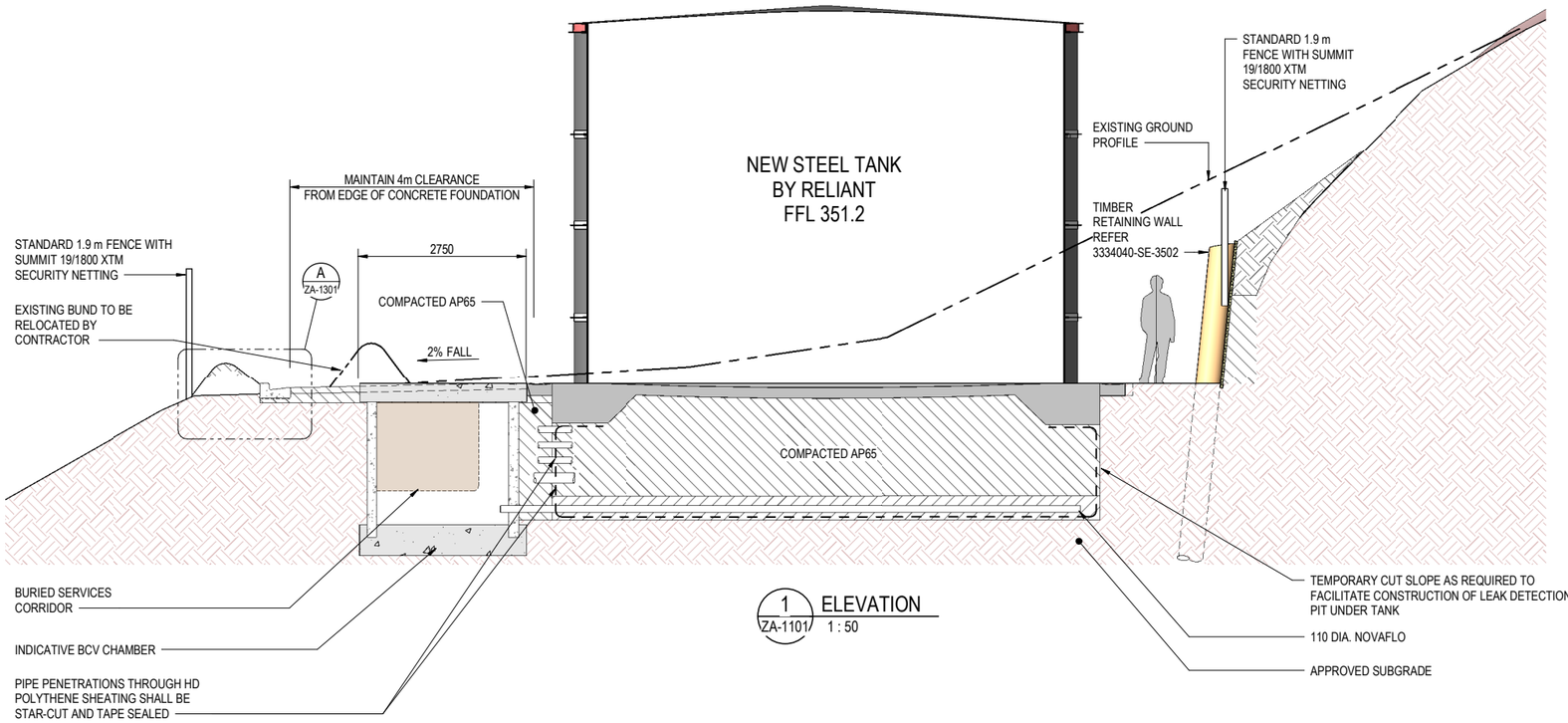
Rev.: 0

DO NOT SCALE

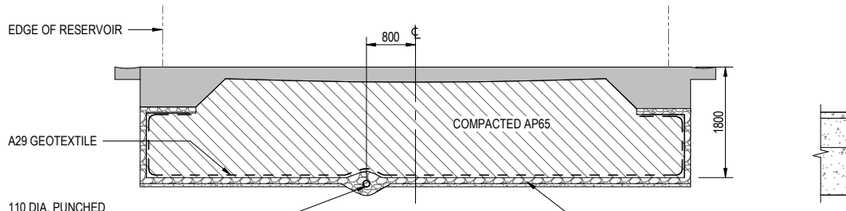
IF IN DOUBT ASK.

NOTE:

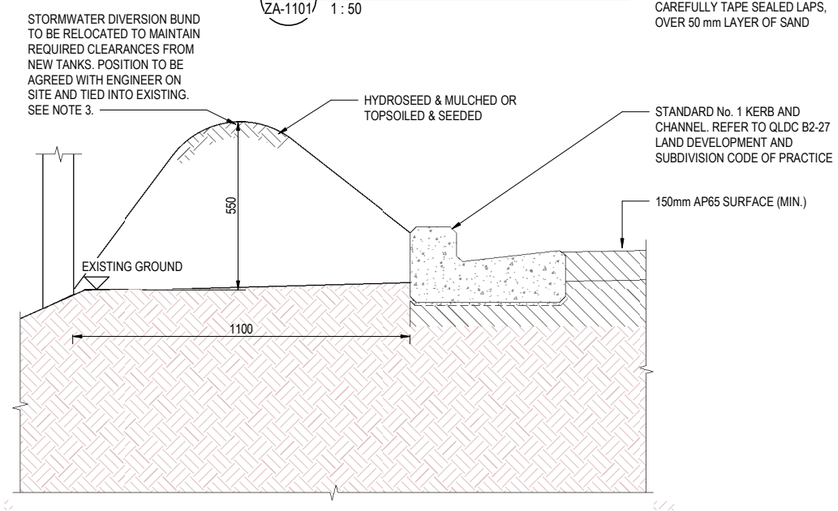
1. TANK SIZE SHOWN INDICATIVE ONLY. REFER TO MANUFACTURERS DRAWING FOR DIMENSIONS.
2. STORMWATER DIVERSION BUND DETAIL REFERENCED FROM PROPOSED SUBDIVISION DRAWINGS. BY A.R. ASSOCIATES P17-059 DR423 RECEIVED ON 14/02/2021.
3. BUND TO BE CONSTRUCTED USING ON-SITE MATERIALS AND COMPACTED TO 95% OF THE MDD (STANDARD COMPACTION).



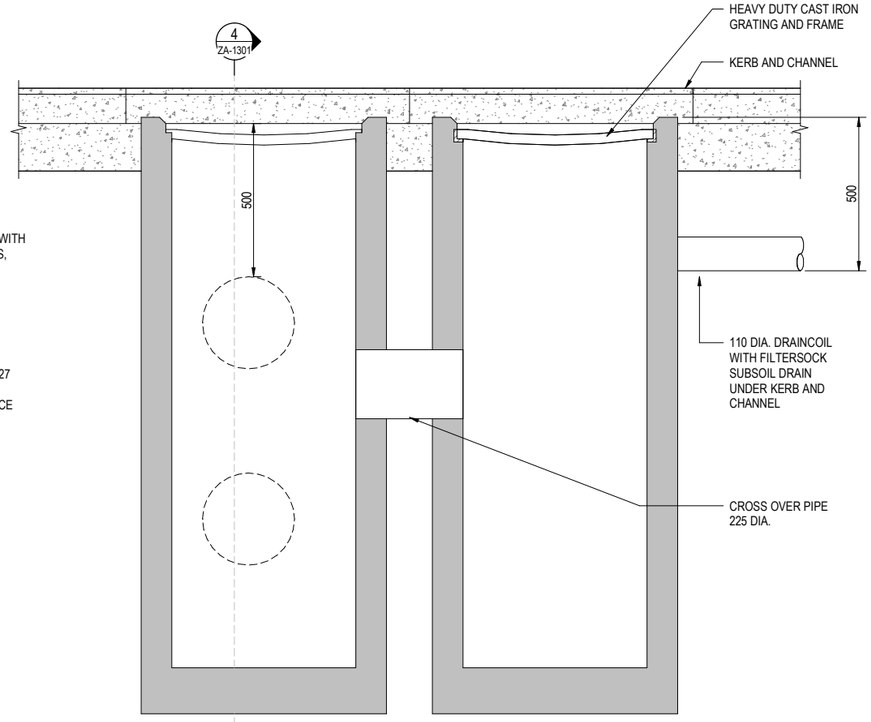
1 ZA-1101 ELEVATION 1 : 50



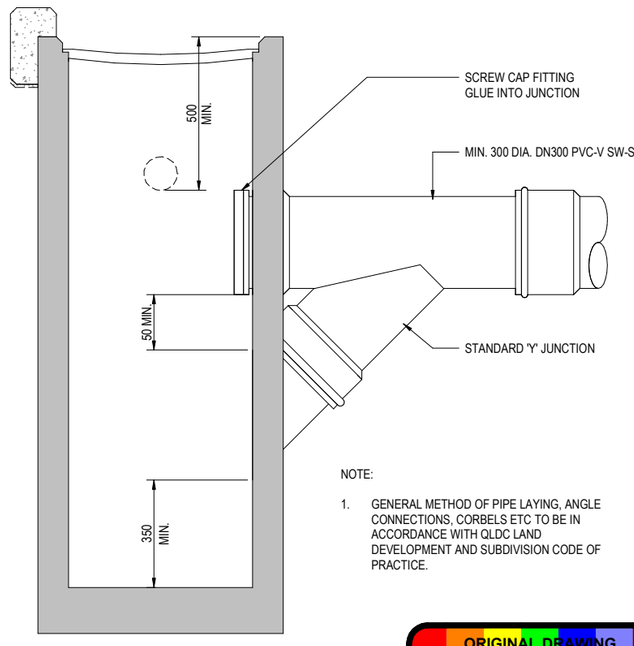
2 ZA-1101 LEAK DETECTION PIPE SECTION 1 : 50



A - BUND DETAIL 1 : 10



3 ZA-1101 DOUBLE SUMP DETAIL 1 : 10



NOTE:

1. GENERAL METHOD OF PIPE LAYING, ANGLE CONNECTIONS, CORBELS ETC TO BE IN ACCORDANCE WITH QLDC LAND DEVELOPMENT AND SUBDIVISION CODE OF PRACTICE.

4 - SECTION 1 : 10

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	JJ	AJ	JD	03.21

Drawing Originator: Beca

Original Scale (A1) As indicated Reduced Scale (A3)

Design	G. Wells	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: SITE SECTION

Discipline: GENERAL

Drawing No.: 3334040-ZA-1301

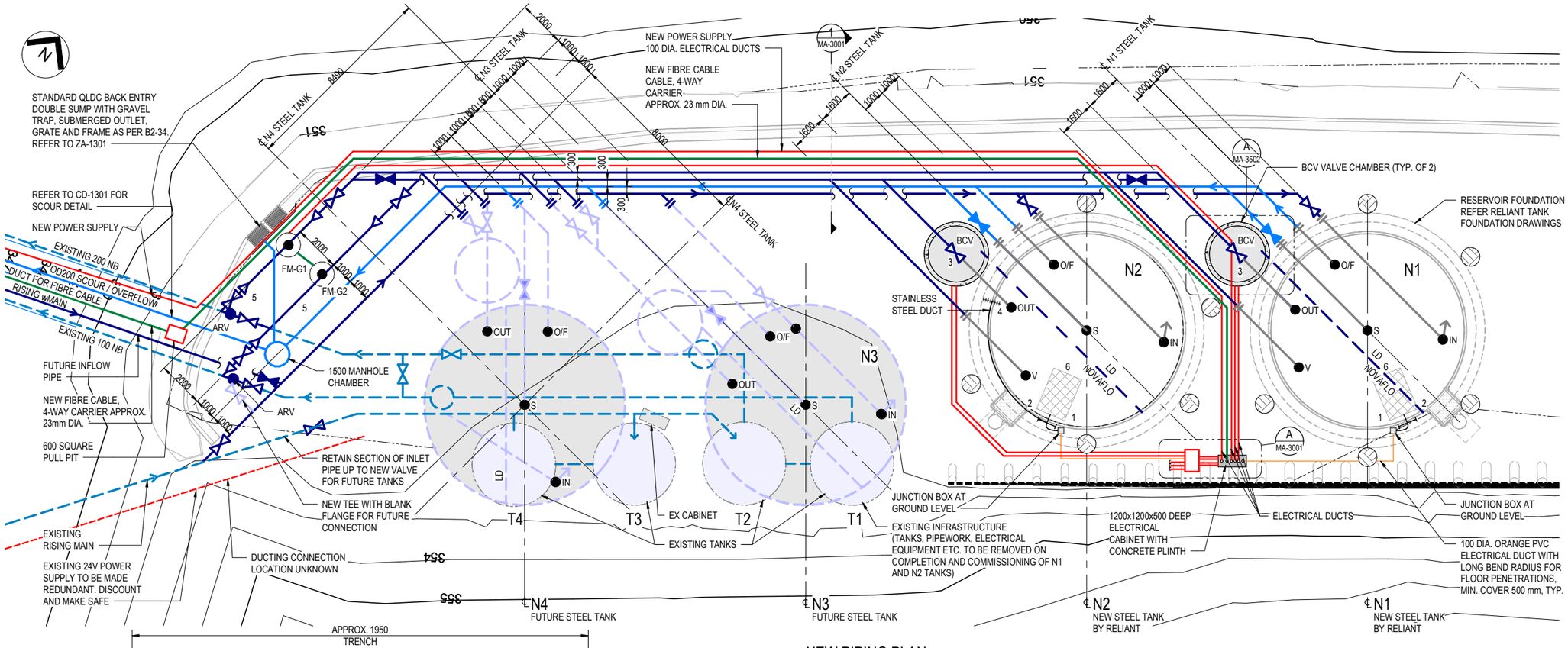
Rev.: 0

DO NOT SCALE

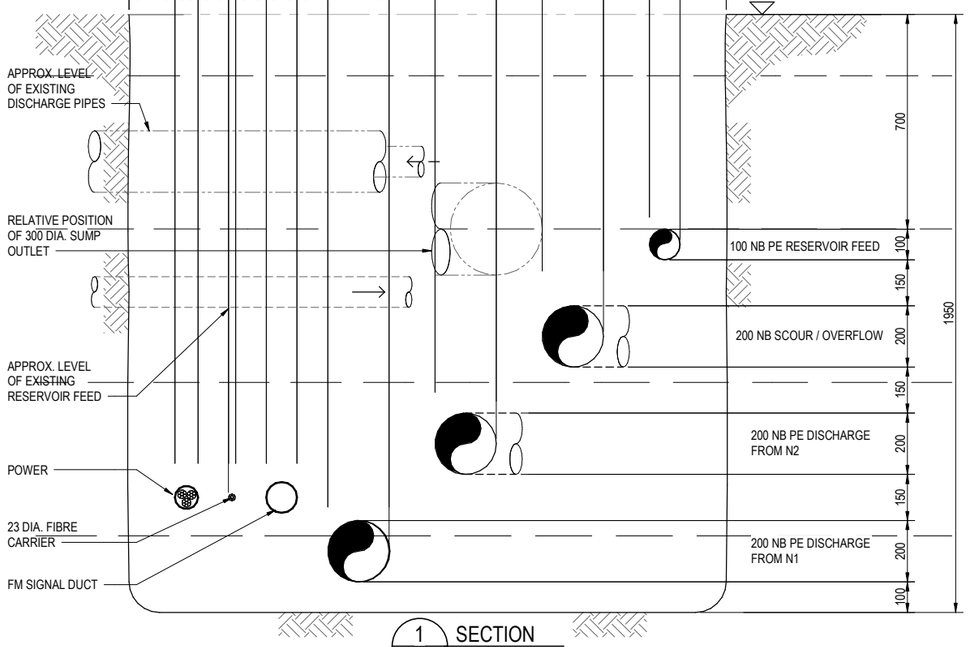
IF IN DOUBT ASK.

Drawing Plotted: 5/05/2021 3:20:02 PM

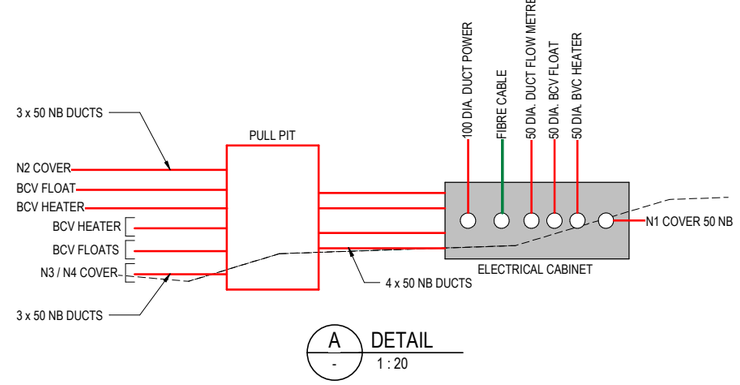
www.beca.com



NEW PIPING PLAN
1 : 100



1 - SECTION
1 : 10



A - DETAIL
1 : 20

ELECTRICAL LEGEND

1	-	LEVEL TRANSDUCER
2	-	FLOAT SWITCHES
3	-	BCV HEATER / FLOOD SWITCH
4	-	TELECOM ANTENNA
5	-	FLOW METERS
6	-	HATCH COVER SWITCHES

PIPING LEGEND

IN	-	INLET
S	-	SCOUR
O/F	-	OVERFLOW
OUT	-	OUTLET
V	-	VENT
LD	-	LEAK DETECTION
FM	-	BURIED FLOW METER 150NB 1050 DIA. MH CHAMBER
BCV	-	BURST CONTROL VALVE
ARV	-	AIR RELEASE VALVE
	-	AVK SLUICE GATE VALVE NC
	-	AVK SLUICE GATE VALVE NO
	-	REDUCER
	-	FUTURE PIPE
	-	EXISTING PIPE
	-	PE PIPEWORK
	-	SS PIPEWORK
	-	SCOUR / OVERFLOW PIPEWORK
	-	POWER SUPPLY
	-	DUCT FOR FIBRE
	-	PROPOSED LOCATIONS FOR EARTH STAKES

NOTE:

1. TANK SIZE SHOWN INDICATIVE ONLY. REFER TO MANUFACTURERS DRAWING FOR DIMENSIONS.
2. STORMWATER DIVERSION BUND DETAIL REFERENCED FROM PROPOSED SUBDIVISION DRAWINGS. BY A.R. ASSOCIATES P17-059 DR423 RECEIVED ON 14/02/2021.
3. BUND TO BE CONSTRUCTED USING ON-SITE MATERIALS AND COMPACTED TO 95% OF THE MDD (STANDARD COMPACTION).

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER - NEW FIBRE INCLUSION	JJ	JD	JW	04.21

Drawing Originator: Beca

Original Scale (A1) As indicated Reduced Scale (A3)

Design	G. Wells	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: GENERAL SITE ARRANGEMENT PLAN

Discipline: MECHANICAL

Drawing No.: 3334040-MA-3001

Rev.: 0

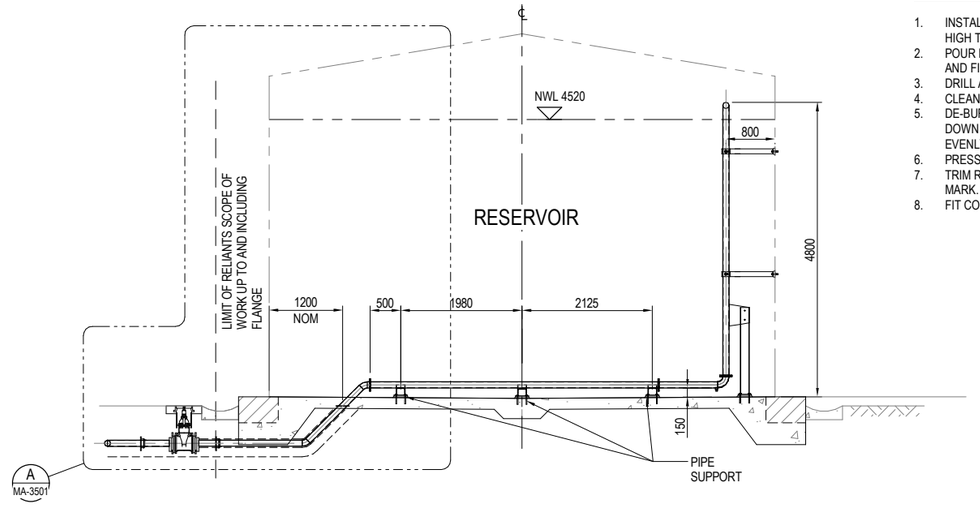
Document No.: BIM 360/3334040 - Glenorchy Reservoir/3334040-SE-R18 GLENORCHY RESERVOIR.rvt

DO NOT SCALE

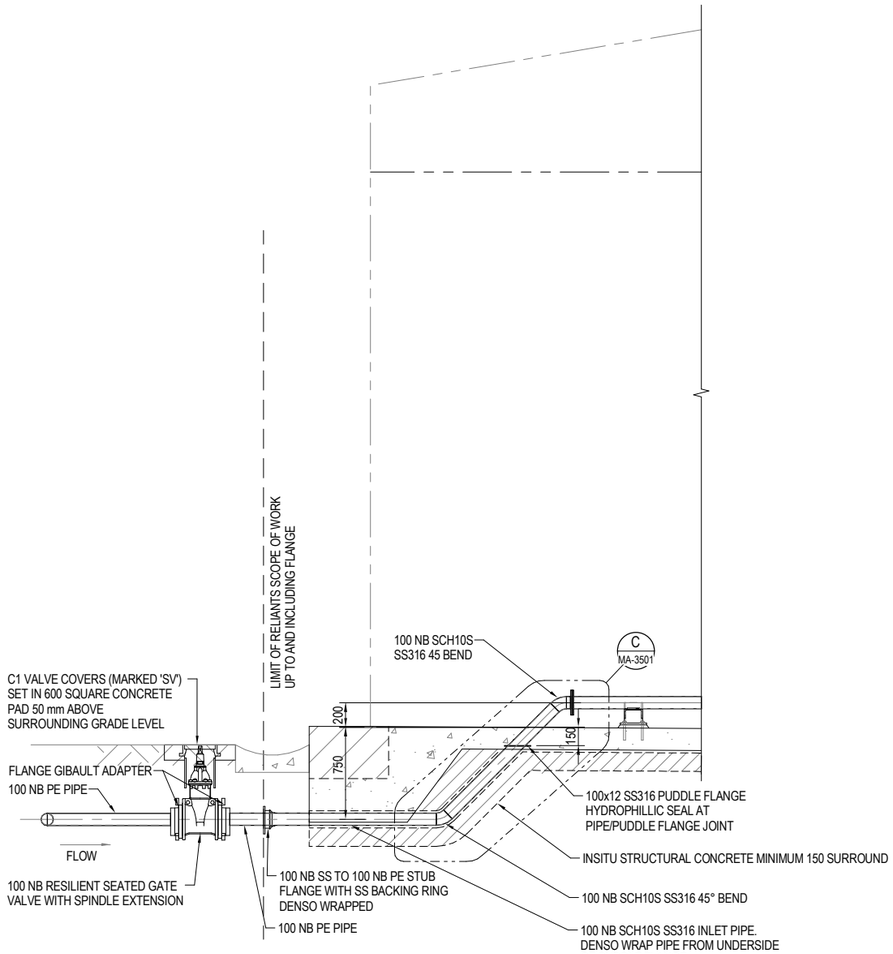
IF IN DOUBT ASK.

ANTICIPATED INSTALLATION SEQUENCE:

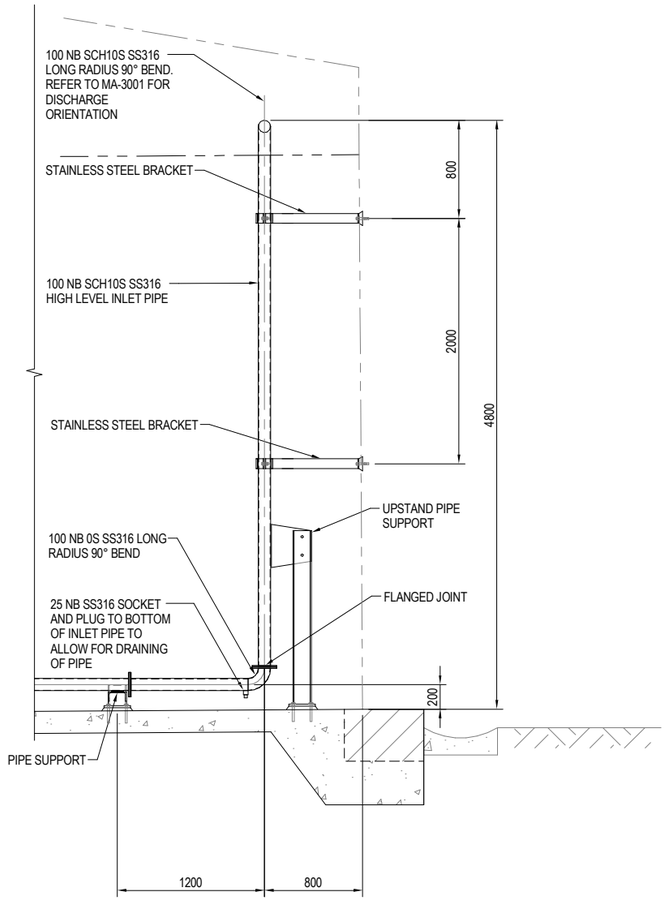
1. INSTALL BURIED PIPEWORK WITH RISER EXTENDING HIGH TO ALLOW FOR TRIMMING BACK LATER.
2. POUR FLOOR SLAB CONCRETE c/w 250 OD PVC SLEEVE AND FILL WITH 6 mm CLEAN PEA-GRAVEL.
3. DRILL AND CHEMSET THREADED ROD STUDS.
4. CLEAN FLOOR AND PLACE GASKET
5. DE-BURR TOP OF RISER AND SLIDE FLANGE ADAPTOR DOWN ONTO GASKET AND TIGHTEN FLANGE BOLTS EVENLY TO SAME TORQUE.
6. PRESS CRIMP FLANGE ADAPTOR TO RISER.
7. TRIM RISER TO HEIGHT, DEBURR AND MARK WITNESS MARK.
8. FIT CONCENTRIC REDUCER ASSEMBLY.



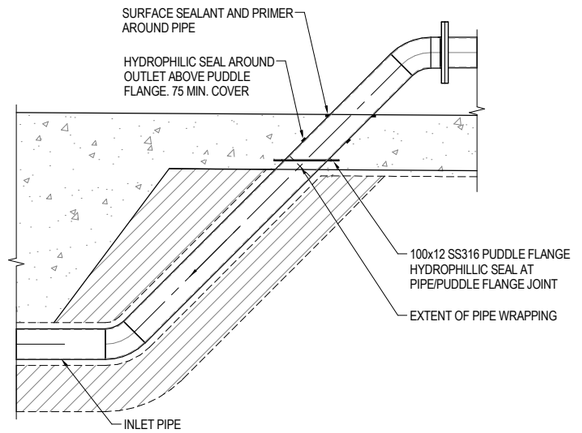
INLET PIPE SECTION
1 : 50



A - INLET PIPE DETAIL
1 : 25



B - INLET PIPE DETAIL
1 : 25



C - DETAIL
1 : 10

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	JJ	JD	JW	10.20

Drawing Originator: Beca

Original Scale (A1): As indicated
Reduced Scale (A3):

Design	G. Wells	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: INLET PIPE SECTION AND DETAILS

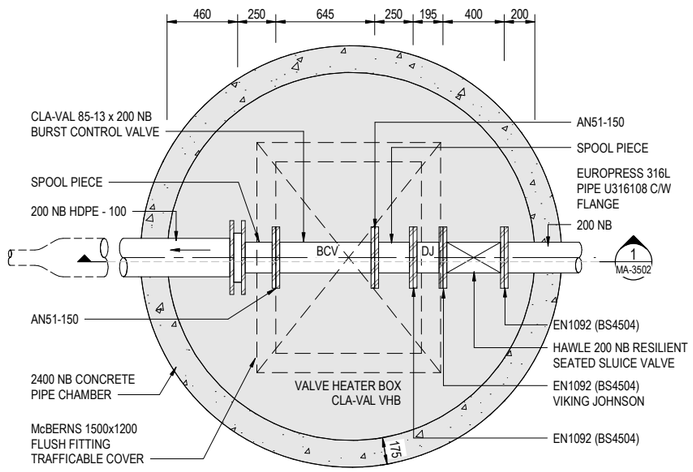
Discipline: MECHANICAL

Drawing No.: 3334040-MA-3501

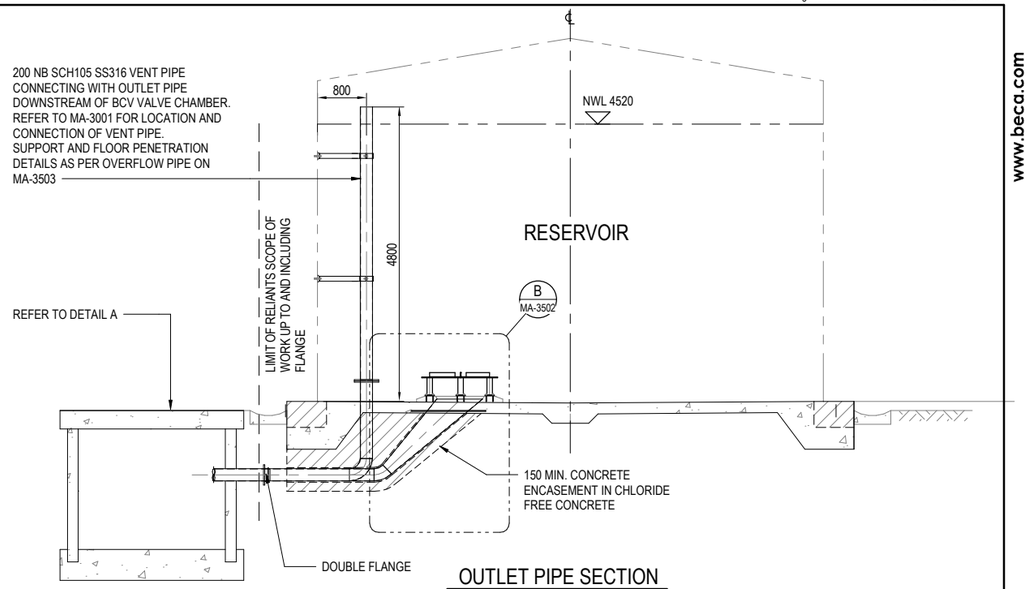
Rev.: 0

DO NOT SCALE

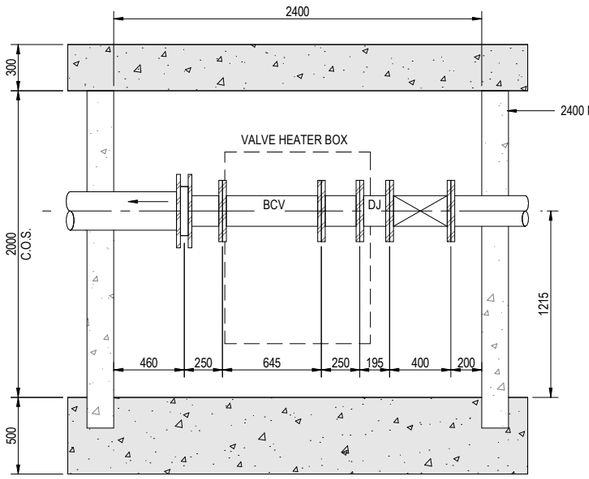
IF IN DOUBT ASK.



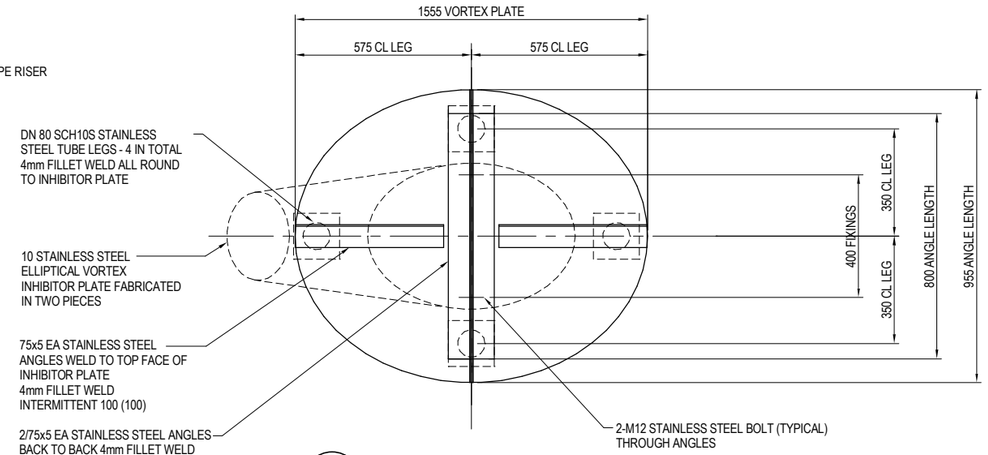
A MA-3001 BCV VALVE CHAMBER PLAN
1 : 20



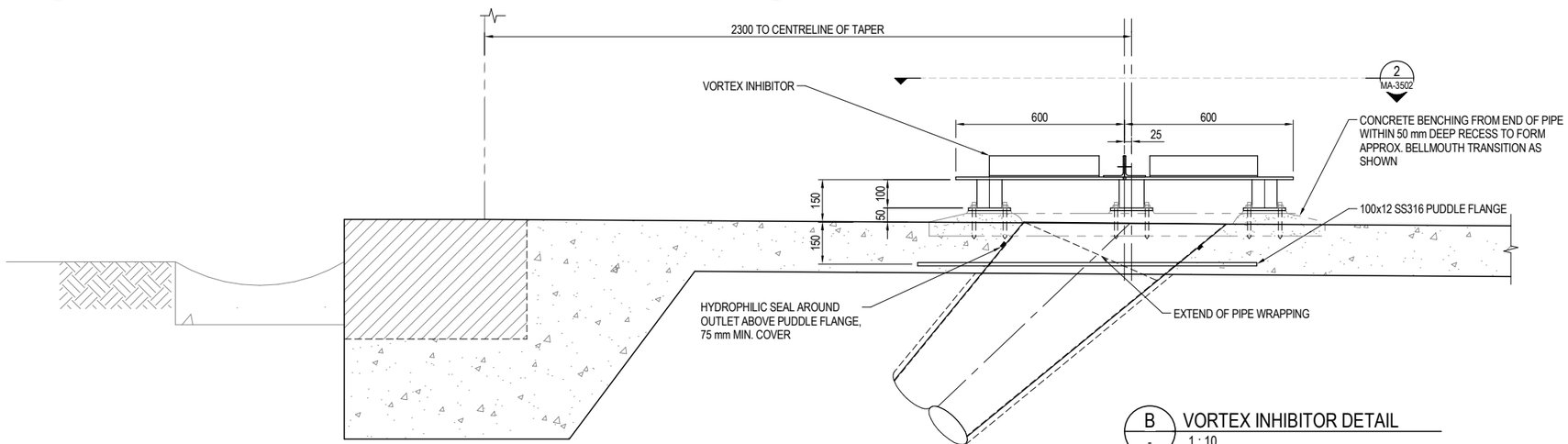
OUTLET PIPE SECTION
1 : 50



1 - SECTION
1 : 20



2 - VORTEX INHIBITOR PLAN
1 : 10



B - VORTEX INHIBITOR DETAIL
1 : 10

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	JJ	JD	JW	10.20

Drawing Originator: Beca

Original Scale (A1) As indicated Reduced Scale (A3)

Design	G. Wells	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: OUTLET AND VENT PIPE SECTION AND DETAILS

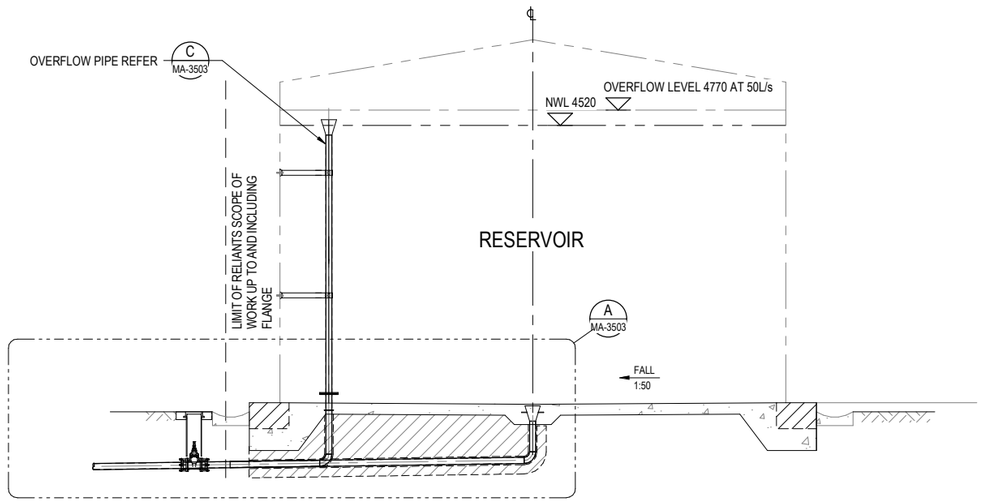
Discipline: MECHANICAL

Drawing No.: 3334040-MA-3502

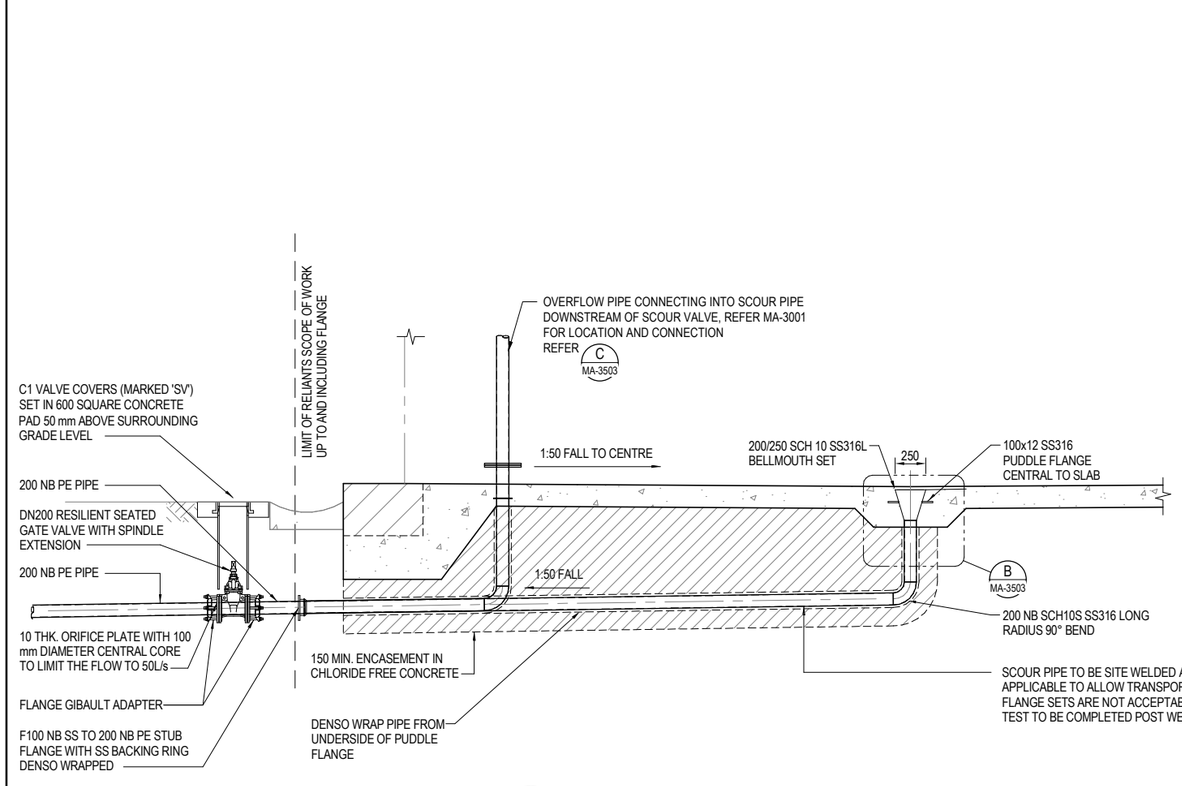
Rev.: 0

DO NOT SCALE

IF IN DOUBT ASK.

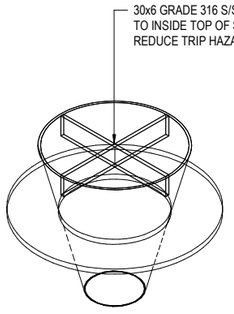


OVERFLOW AND SCOUR PIPE SECTION
1 : 50

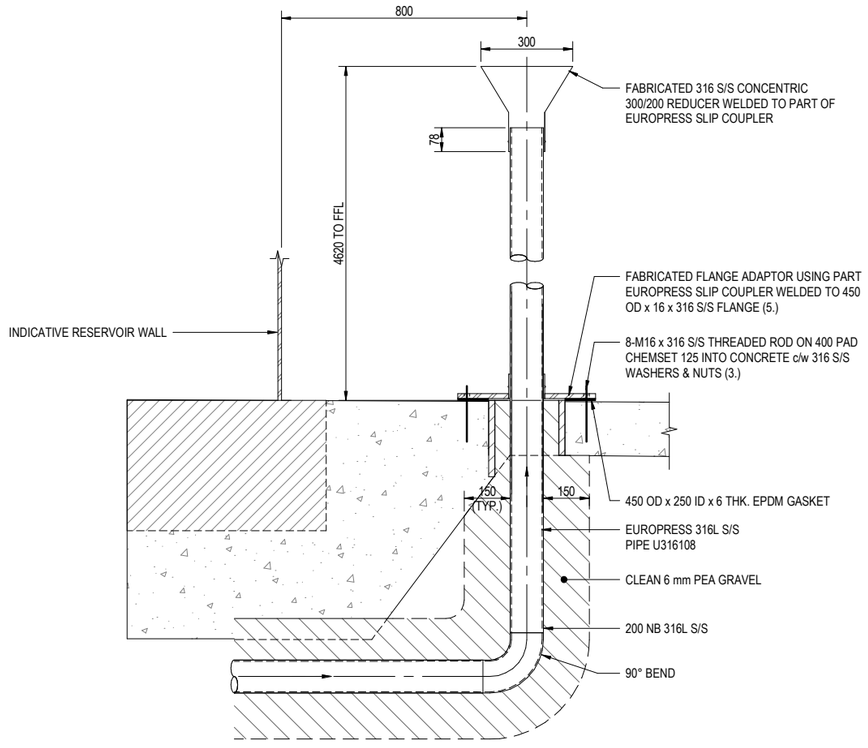


NOTE:
EXPECTED TIME TO DRAIN RESERVOIR FROM NORMAL WATER LEVEL IS 2 HOURS

A - OVERFLOW AND SCOUR PIPE DETAIL
1 : 25



B - SCOUR PIPE INLET DETAIL
1 : 5



C - DETAIL
1 : 10

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	JJ	JD	JW	10.20

Drawing Originator: Beca

Original Scale (A1) As indicated Reduced Scale (A3)

Design	G. Wells	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: Queenstown Lakes District Council

Project: GLENORCHY RESERVOIR UPGRADES

Title: SCOUR AND OVERFLOW PIPE SECTION AND DETAILS

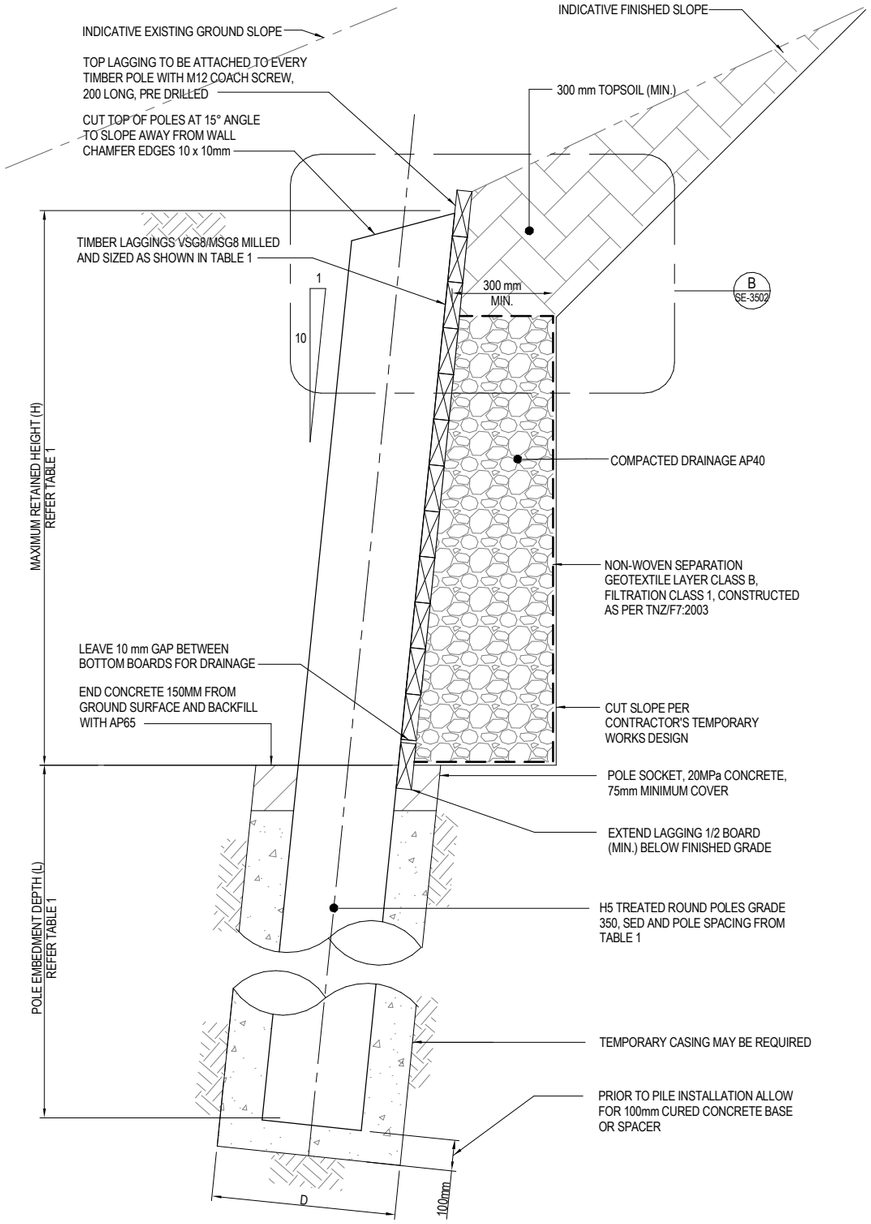
Discipline: MECHANICAL

Drawing No.: 3334040-MA-3503

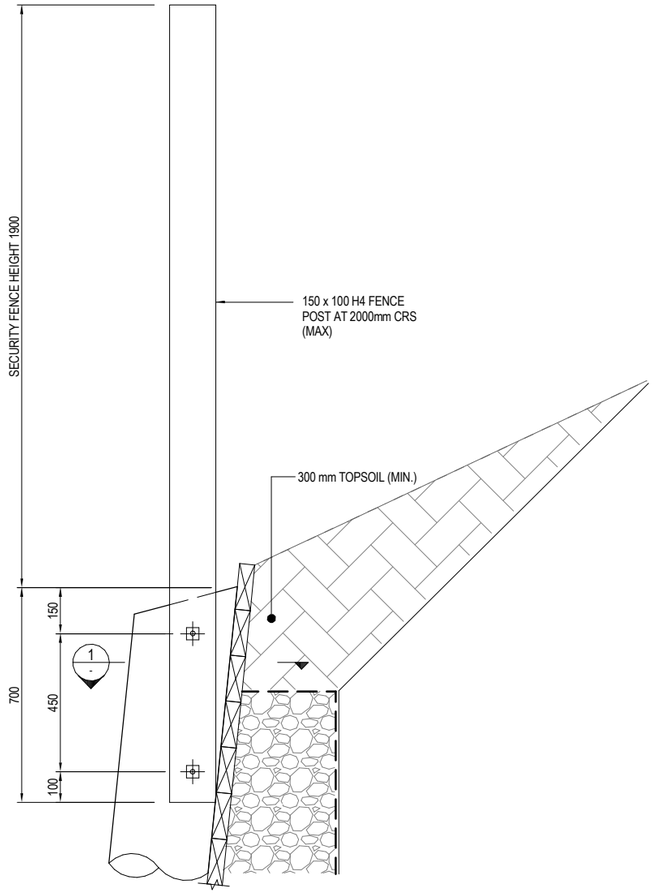
Rev.: 0

DO NOT SCALE

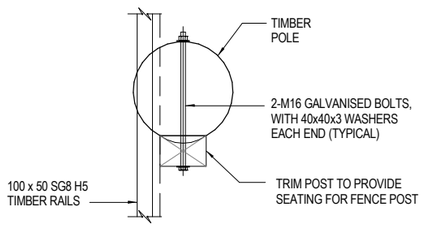
IF IN DOUBT ASK.



A - MC50 RETAINING WALL TYPICAL CROSS SECTION
SCALE 1:10



B - PATH FENCE ON RETAINING WALL
SCALE 1:10



1 - SECTION
1:10

TABLE 1: ROUND POLE RETAINING WALL DETAILS

MAX. RETAINED HEIGHT (H)	1.5m	1.9m	2.3m
POLE DIAMETER	325mm	325mm	400mm
MIN. HOLE DIAMETER (D)	600mm	600mm	600mm
POLE EMBEDMENT (L)	4.5m	4.6m	4.7m
NOMINAL POLE LENGTH	6.0m	6.5m	7.0m
POLE SPACING (CENTRES)	1.2m	1.2m	1.2m
MIN. LAGGING DIMENSIONS	150mm x 50mm	150mm x 50mm	150mm x 50mm

NOTES

DESIGN:

1. CROSS SECTIONS ARE BASED ON INTERPOLATION OF DISCRETE INFORMATION. IF CONDITION AT THESE SECTIONS DIFFERS FROM THAT NOTED THIS SHOULD BE ADDRESSED WITH THE ENGINEER.
2. EXPECTED SUBSURFACE GROUND CONDITIONS: MED DENSE SILT/SAND AND GRAVEL.

CONSTRUCTION:

1. DURING ALL PHASES OF WORK, THE ENGINEER SHALL BE INFORMED ON A DAILY BASIS OF THE WORK ANTICIPATED TO BE CARRIED OUT TO ENABLE CONSTRUCTION MONITORING TO BE UNDERTAKEN.
2. ENGINEER TO CONFIRM FOUNDATION CONDITIONS PRIOR TO PLACING POLE OR CONCRETE IN HOLE.
3. THE CONTRACTOR SHALL LOCATE AND PROTECT ALL SERVICES PRIOR TO COMMENCING WORK AND SHALL INFORM THE ENGINEER SHOULD ANY CONFLICTS ARISE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO SERVICES CAUSED BY THEIR ACTIVITIES.
4. ALL TIMBER SHALL BE TREATED TO NZS 3604 HAZARD CLASS H5 AS SPECIFIED. TIMBER POLES AND POSTS SHALL BE RADIATA PINE OR CORSICAN PINE. THE POLES AND RAILS SHALL BE STRAIGHT AND FREE OF DECAY, KNOTS, SPLITS, CHECKS OR ANY OTHER DEFECT THAT MAY AFFECT THE STRENGTH OF THE POLE.
5. ALL CUT TIMBER SHALL BE TREATED VIA SITE APPLICATION OF A SUITABLE PRODUCT TO THE SUPPLIERS SPECIFICATION TO ACHIEVE A LEVEL OF TREATMENT EQUAL TO OR GREATER THAN THE MEMBER'S ORIGINAL LEVEL OF TREATMENT.
6. ALL POLES SHALL BE PLACED LARGE END INTO THE BASE OF THE HOLE.
7. BORED HOLES SHALL NOT REMAIN OPEN OVER NIGHT. HOLES MUST BE THOROUGHLY CLEANED OUT BEFORE PLACING CONCRETE. POLES SHALL BE INSTALLED AND CONCRETED IN A HIT AND MISS PATTERN WITHIN THE SAME DAY AS BORING.
8. POLES SHALL BE BRACED (WHERE NECESSARY) DURING AND AFTER CONCRETING SUCH THAT THE REQUIRED ALIGNMENT IS MAINTAINED.
9. ALL STEEL COMPONENTS SHALL BE HOT DIPPED GALVANISED IN ACCORDANCE WITH AS/NZS 4680, TO HDG 900 IN ACCORDANCE WITH AS/NZS 2312.
10. LAGGING JOINTS SHALL OCCUR AT POSTS ONLY. LAGGING JOINTS SHALL BE STAGGERED. LAGGING TO BE SECURED TO POSTS WITH Ø4.0mm, 200mm LONG NAILS.
11. MATERIAL FOR BACKFILLING BEHIND THE WALL SHALL BE DRAINAGE AP40 IN ACCORDANCE WITH THE SPECIFICATION. COMPACTION TO CONSIST OF MAX. 120kg PLATE COMPACTOR WITHIN 2.0m OF WALL. BACKFILL TO BE PLACED AND COMPACTED IN HORIZONTAL LAYERS OF MAX. 200mm LAYER DEPTH. COMPACT TO 95% OF THE MAXIMUM DRY DENSITY OF THE MATERIAL.

POST CONSTRUCTION:

1. THE FOLLOWING LIMITATIONS APPLY TO TRENCHING NEXT TO RETAINING WALLS POST CONSTRUCTION:

- MAXIMUM 3m LENGTH OF TRENCH OPEN AT ANY GIVEN TIME.
- TRENCH SECTIONS TO BE EXCAVATED AND BACKFILLED ON THE SAME DAY.
- NO TRENCHING OR EXCAVATION ALLOWED WITHIN 2m IN FRONT OF WALL.
- TRENCHING OR EXCAVATION GREATER THAN 0.5m DEEP WILL REQUIRE CONSULTATION WITH THE ENGINEER.

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	JJ	JD	JW	10.20

Drawing Originator: Beca

Original Scale (A1) 1 : 10 Reduced Scale (A3)

Design	J. Washbrooke	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: RETAINING WALL SECTIONS AND DETAILS

Discipline: STRUCTURAL

Drawing No.: 3334040-SE-3502

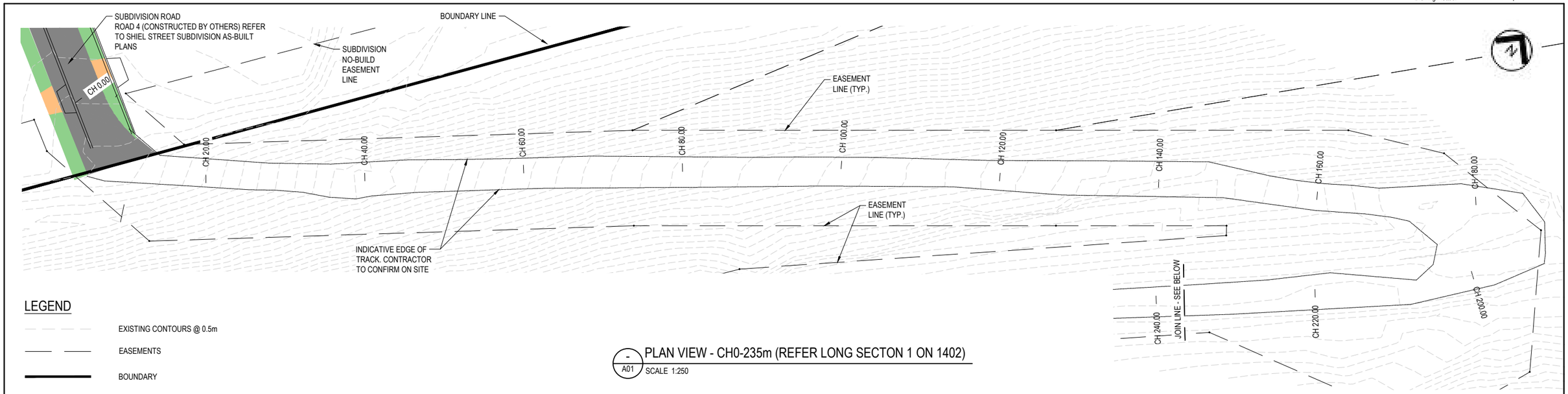
Rev.: 0

Document No. BIM 360://3334040 - Glenorchy Reservoir/3334040-SE-R18 GLENORCHY RESERVOIR.rvt

DO NOT SCALE

IF IN DOUBT ASK.

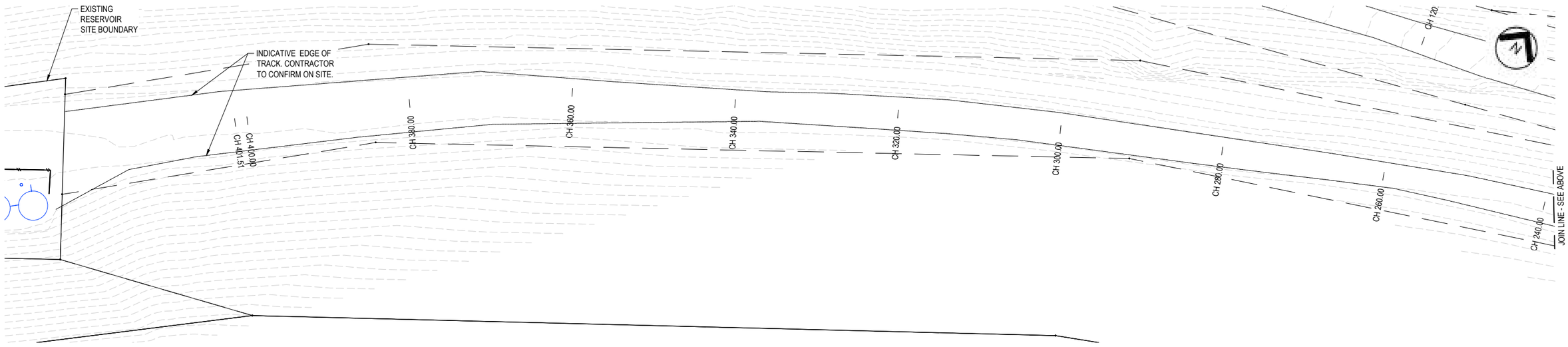
www.beca.com



LEGEND

- EXISTING CONTOURS @ 0.5m
- EASEMENTS
- BOUNDARY

- / A01 PLAN VIEW - CH0-235m (REFER LONG SECTON 1 ON 1402)
SCALE 1:250



- / A01 PLAN VIEW - CH235-401.51m (REFER LONG SECTION 2 ON 1402)
SCALE 1:250

NOTES:

1. CONTRACTOR TO CONFIRM EXISTING ACCESS TRACK GRADES AND WIDTHS ON SITE PRIOR TO THE START OF WORK.
2. CONTRACTOR TO PROVIDE A PLAN FOR UPGRADE ACCESS TRACK SUITABLE FOR CONSTRUCTION INCLUDING, BUT NOT LIMITED TO: WIDENING, GRADE CHANGES, STORMWATER DRAINAGE, AND SURFACING TO THE ENGINEER PRIOR TO THE START OF WORK.
3. A COMPETENT PERSON SHALL ASSESS SLOPE CUTS AND BATTERS FOR STABILITY IN ACCORDANCE WITH WORKSAFE GUIDANCE.
4. ACCESS TRACK TO BE SURFACE WITH 150 TO 200mm OF AP65 AT THE COMPLETION OF THE WORK.
5. UNSUITABLE MATERIAL TO BE DISPOSED OF OFF SITE.
6. MAINTENANCE OF STORMWATER CONVEYANCE AND SEDIMENT AND EROSION CONTROL MEASURES DURING CONSTRUCTION IS THE CONTRACTOR'S RESPONSIBILITY.
7. CONTRACTOR TO MAINTAIN ACCESS TO EXISTING TANKS FOR MAINTENANCE PERSONNEL DURING CONSTRUCTION.
8. ACCESS TRACK UPGRADES TO BE RETAINED AT THE COMPLETION OF THE WORK IN GOOD CONDITION WITH THE REQUIRED SURFACING.

REFER TO DRAWING
3334040-CA-1402 FOR NOTES

FOR TENDER
NOT FOR CONSTRUCTION

ORIGINAL DRAWING IN COLOUR

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	IRB1	JD	JW	10.20

Drawing Originator: Beca

Original Scale (A1) 1:250	Design	I. Berliner	10.20
	Drawn	I. Berliner	10.20
Reduced Scale (A3) 1:500	Dsg Verifier	J.Dabkowski	10.20
	Dwg Check	N.Egan	10.20

Approved For Construction* Date
* Refer to Revision 1 for Original Signature

Client: Queenstown Lakes District Council

Project: GLENORCHY RESERVOIR UPGRADES

Title: EXISTING ACCESS TRACK PLAN VIEW

Discipline: CIVIL ENGINEERING

Drawing No.: 3334040-CA-1401

Rev.: 0

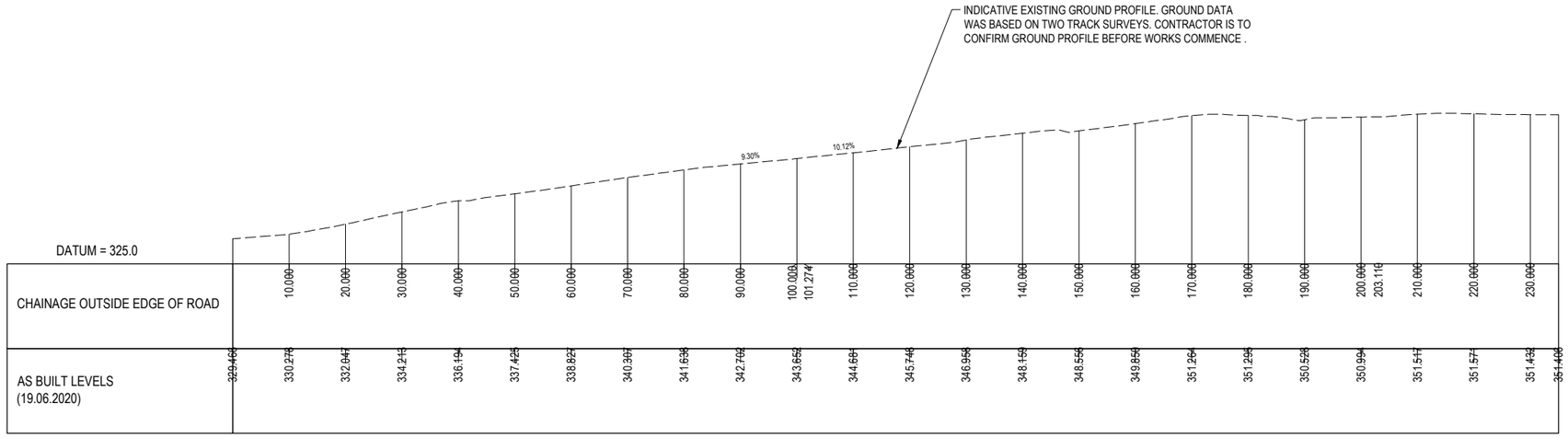
Document No. 3334040-CA-1401-1402.DWG

DO NOT SCALE

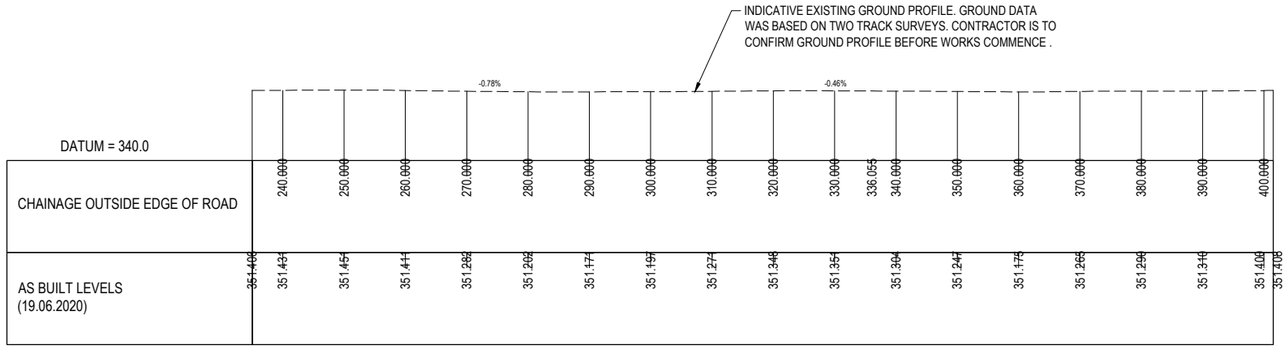
IF IN DOUBT ASK.

GENERAL NOTES

1. ROAD 4, BUND TO BE CONSTRUCTED BY OTHERS. REFER TO SHIEL STREET SUBDIVISION PLANS. CONTRACTOR TO COORDINATE WITH SHIEL ST CONTRACTOR AROUND TIE-INS AND SUBDIVISION WORKS WITHIN RESERVOIR SITE.
2. ALL WORKS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE QLDC LAND DEVELOPMENT AND SUBDIVISON CODE OF PRACTICE.
3. SHIEL ST SUBDIVISION SITE TO BE PROTECTED FROM SEDIMENT AND RUNOFF FROM RESERVOIR AND ROADING SITE WORKS.
4. EXISTING GROUND LEVEL IS BASED ON SURVEY COMPLETED ON 19.06.2020. CONTRACTOR TO CONFIRM TIE IN LEVELS ONSITE.
6. AP65: NOT LESS THAN 50% BY WEIGHT OF EACH FRACTION RETAINED ON THE 37, 19, 9.5 AND 4.75mm SIEVES SHALL HAVE 2 OR MORE BROKEN FACES.
7. THE CONTRACTOR SHALL SUPPLY ASBUILTS PRIOR TO COMPLETION SUFFICIENT TO SATISFY THE BUILDING AUTHORITY. IN THE MINIMUM THESE SHOULD BE IN THE FORM OF TIDILY MARKED UP CONSTRUCTION DRAWINGS SHOWING CHNAGES TO LINE, LEVEL OR OTHER DETAILS.



1 / 1401 RESERVOIR TRACK LONG SECTION CH0-235M
SCALE 1:500



2 / 1401 RESERVOIR TRACK LONG SECTION CH235-401.51
SCALE 1:500

FOR TENDER
NOT FOR CONSTRUCTION

ORIGINAL DRAWING IN COLOUR

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	IRB1	JD	JW	10.20

Drawing Originator: Beca

Original Scale (A1) 1:500	Design	I. Berliner	10.20
	Drawn	I. Berliner	10.20
Reduced Scale (A3) 1:1000	Dsg Verifier	J.Dabkowski	10.20
	Dwg Check	N.Egan	10.20

Approved For Construction* Date
* Refer to Revision 1 for Original Signature

Client: Queenstown Lakes District Council

Project: GLENORCHY RESERVOIR UPGRADES

Title: EXISTING ACCESS TRACK LONG SECTION

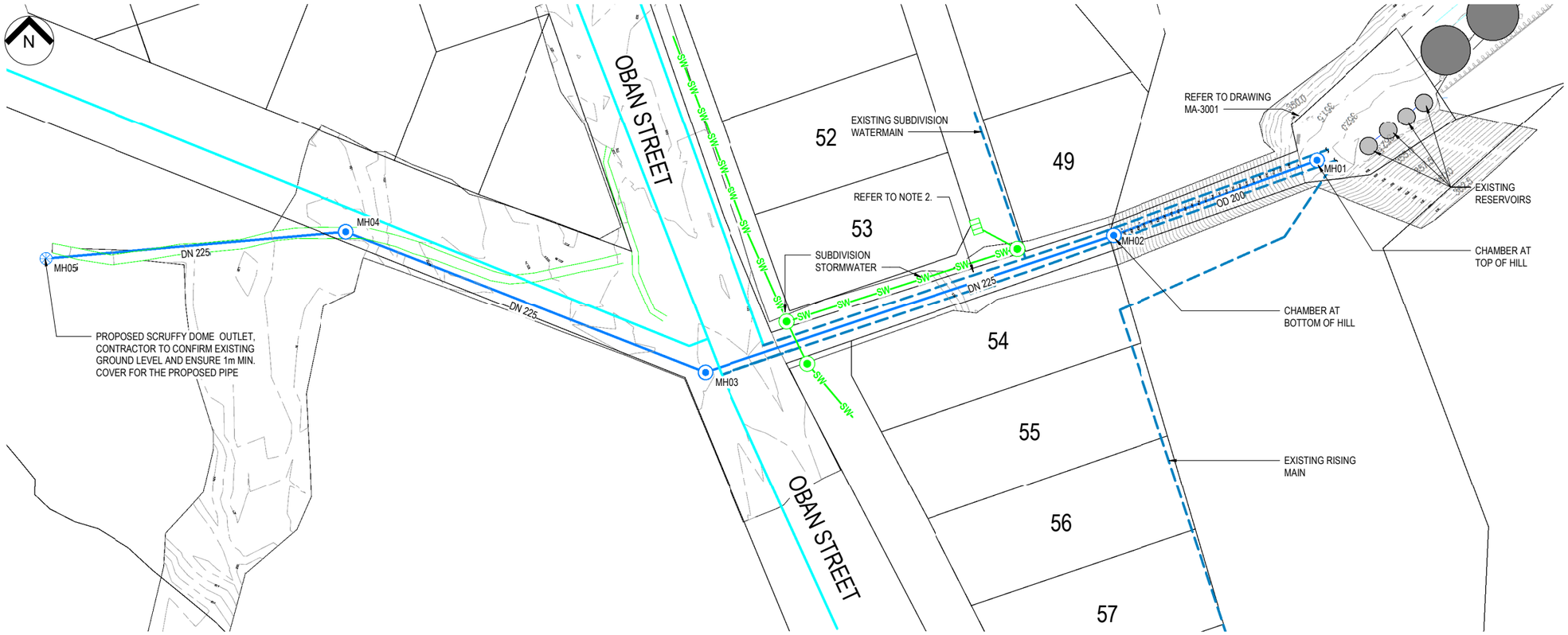
Discipline: CIVIL ENGINEERING

Drawing No.: 3334040-CA-1402 Rev.: 0

Document No. 3334040-CA-1401-1402.DWG

DO NOT SCALE

IF IN DOUBT ASK.



SCOUR / OVERFLOW PIPE PLAN LAYOUT

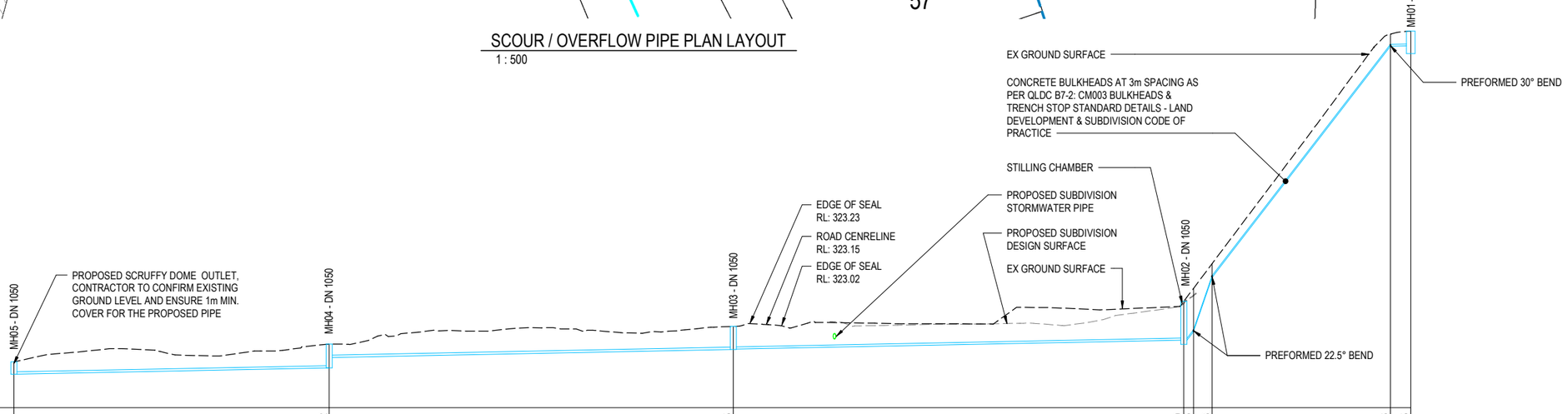
1 : 500

LEGEND

▬ ▬ ▬	-	EXISTING wMAIN (RISING)
▬▬▬	-	SCOUR / OVERFLOW PIPEWORK
⟵	-	PROPOSED OVERLAND DRAIN
◉	-	PROPOSED WATER MANHOLE
◎	-	SUBDIVISION STORMWATER MANHOLE
—SW—	-	SUBDIVISION STORMWATER
▥	-	SUBDIVISION STORMWATER CATCHPIT SUMP
▬▬▬	-	EXISTING wMAIN (FALLING)
⊛	-	SCRUFFY DOME OUTLET

NOTES

1. ITEMS NOTED AS PART OF THE 'PROPOSED SUBDIVISION' ARE BASED ON THE DESIGN DRAWINGS AND C.A.D. FILES RECEIVED FROM A.R. & ASSOCIATES (P17-059-S2 MAY 2019) RECEIVED ON 16/2/2021.
2. LOCATION OF EXISTING WATERMAIN BASED ON C.A.D. FILE RECEIVED FROM A.R. & ASSOCIATES ON 09/03/2021.



DATUM 315.00

EXISTING SURFACE LEVEL			321.22		322.95		325.40		321.20 326.66		329.08		351.56		351.85
PIPE INVERT LEVEL	318.27		318.88 319.90		320.70 320.72		321.60		322.42		322.43 327.74 327.74		350.37		350.37 350.41
PIPE COVER	-0.15		2.07 1.06		1.99 1.97		3.54		4.01 4.04		4.03 1.15 1.15		1.00		1.00 1.25
PIPE SIZE AND CLASS		DN 225 RCP CLASS 4		DN 225 RCP CLASS 4		DN 225 RCP CLASS 4		OD 200 PE100 SDR 13.6		OD 200 PE100 SDR 13.6		OD 200 PE100 SDR 13.6		OD 200 PE100 SDR 13.6	
PIPE GRADE		1:100 (1.00%)		1:99 (1.01%)		1:100 (1.00%)		1:2 (65.00%)		1:1 (145.62%)		1:2 (64.84%)		1:100 (1.00%)	
DISTANCE AND CHAINAGE	0.00	61.67	61.67	79.10	140.77	88.13	228.90	1.88	230.78	3.65	234.43	34.89	269.32	3.97	273.29

SCOUR PIPE LONGITUDINAL SECTION

SCALE: HOR 1:500 VER 1:250

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	TW	AM	JD	03.21

Drawing Originator: Beca

Original Scale (A1) As indicated
Reduced Scale (A3)

Design	A. Murphy	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: SCOUR AND OVERFLOW LINE PLAN AND LONG SECTION

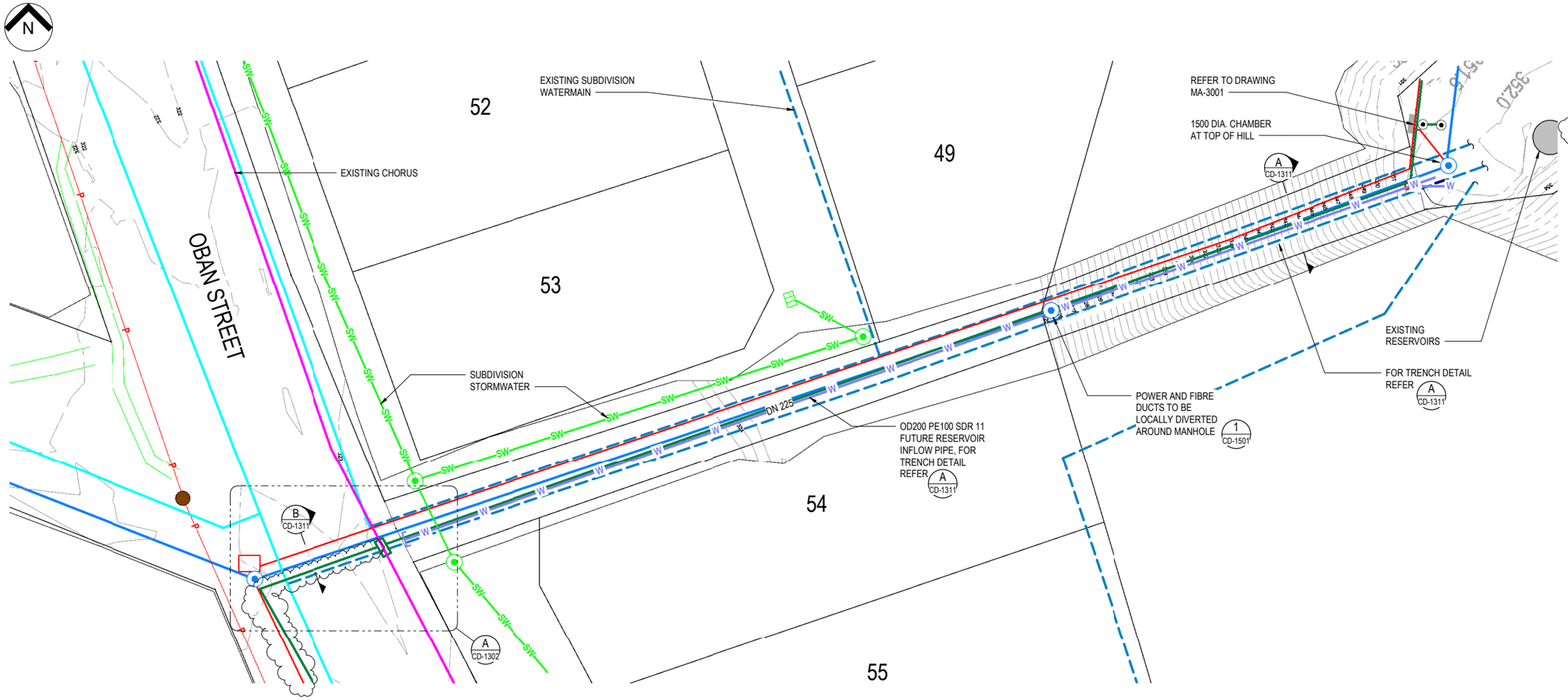
Discipline: CIVIL & DRAINAGE

Drawing No. 3334040-CD-1301

Rev. 0

DO NOT SCALE

IF IN DOUBT ASK.

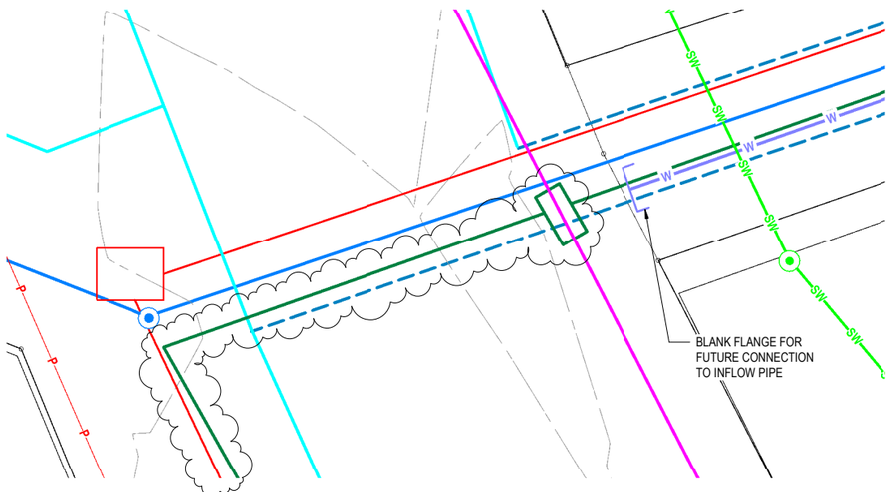


PROPOSED RESERVOIR INFLOW AND SERVICES PLAN
1 : 250

LEGEND

- EXISTING WATER MAIN PIPE
- PE PIPEWORK
- SS PIPEWORK
- SCOUR / OVERFLOW PIPEWORK
- POWER SUPPLY
- FIBRE DUCT
- PROPOSED OVERLAND DRAIN
- PROPOSED WATER MANHOLE
- SUBDIVISION STORMWATER MANHOLE
- SUBDIVISION STORMWATER
- SUBDIVISION STORMWATER CATCHPIT SUMP
- OD200 PE RESERVOIR INFLOW

NOTE
ITEMS NOTED AS PART OF THE 'PROPOSED SUBDIVISION' ARE BASED ON THE DESIGN DRAWINGS AND C.A.D. FILES RECEIVED FROM A.R. & ASSOCIATES (P17-059-S2 MAY 2019) RECEIVED ON 16/2/2021



A PROPOSED RESERVOIR INFLOW AND SERVICES PLAN
1 : 100

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER - NEW FIBRE INCLUSION	TW	AM	JD	04.21

Drawing Originator: Beca

Original Scale (A1): As indicated
Reduced Scale (A3)

Design	A. Murphy	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: PROPOSED RESERVOIR INFLOW AND SERVICES PLAN

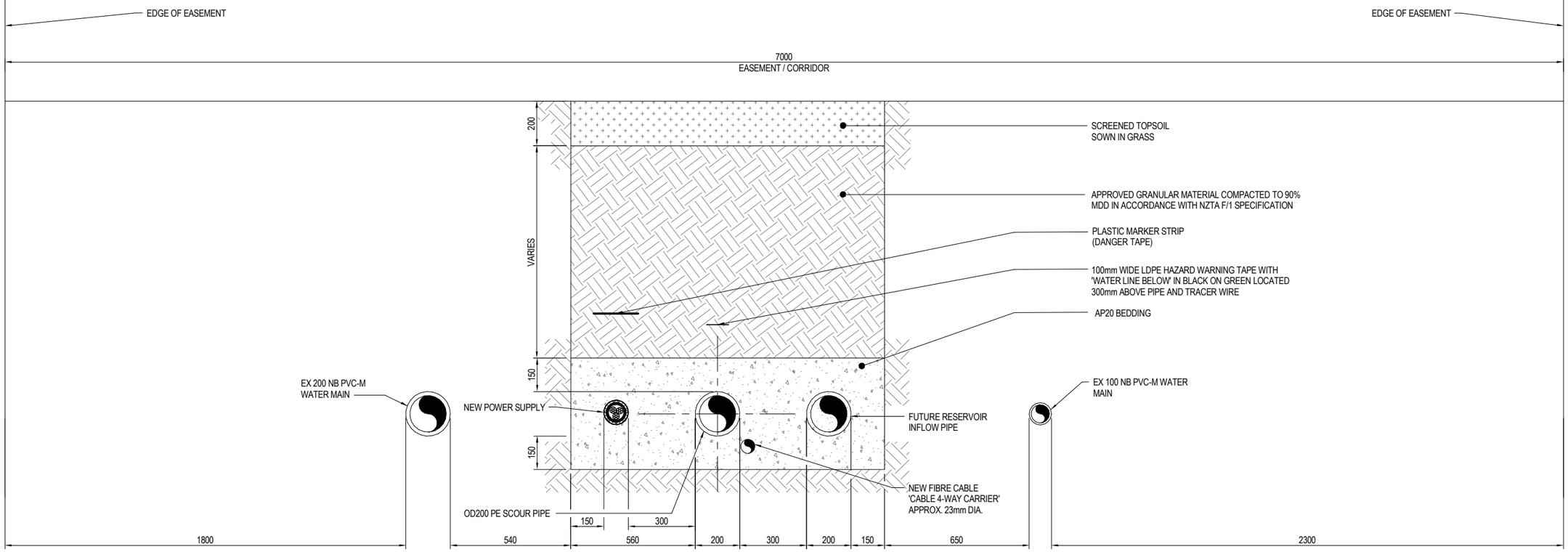
Discipline: CIVIL & DRAINAGE
Drawing No.: 3334040-CD-1302
Rev.: 0

DO NOT SCALE

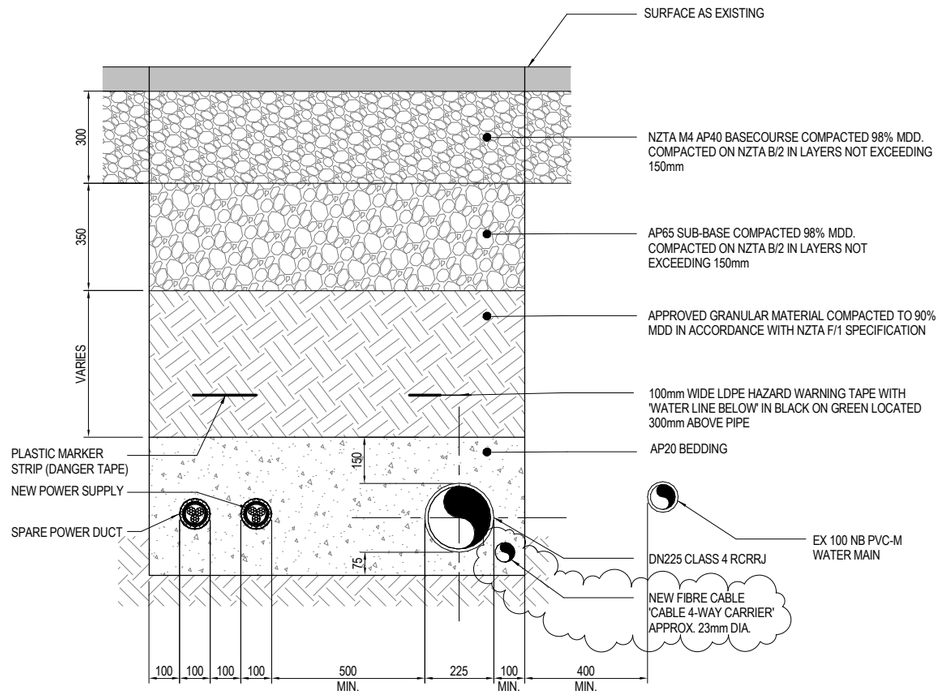
IF IN DOUBT ASK.

www.beca.com

Document No. BIM 360://3334040 - Glenorchy Reservoir/3334040-SE-R18 GLENORCHY RESERVOIR.rvt



A CD-1302 TRENCH DETAIL
1 : 10



B CD-1302 OBAN STREET ROAD TRENCH DETAIL
1 : 10

NOTE:

1. REQUIRED QLDC LAND DEVELOPMENT AND SUBDIVISION CODE OF PRACTICE PIPE CLEARANCES TO BE MAINTAINED TO EXISTING INFRASTRUCTURE.
2. NEW FIBRE DUCT TO MAINTAIN 150mm MIN. OFFSET TO POWER CABLE AS PER TCF TELECOMMUNICATIONS CARRIER FORUM DOCUMENT 'PREMISES WIRING CODE OF PRACTICE' V4.0 31 MAY 2011.

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER - NEW FIBRE INCLUSION	JJ	JD	JW	04.21

Drawing Originator: Beca

Original Scale (A1) 1 : 10
Reduced Scale (A3)

Design	A. Murphy	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

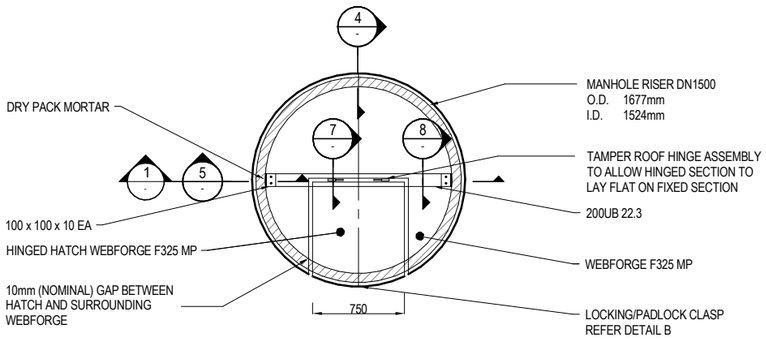
Title: SCOUR PIPE TRENCH DETAIL

Discipline: CIVIL & DRAINAGE

Drawing No.: 3334040-CD-1311

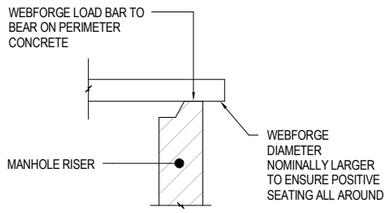
Rev.: 0

Document No. BIM 360://3334040 - Glenorchy Reservoir/3334040-SE-R18 GLENORCHY RESERVOIR.rvt

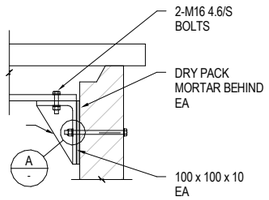


STILLING CHAMBER PLAN

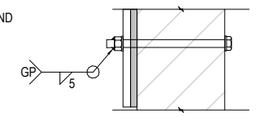
SCALE 1:25



4 SECTION
NOT TO SCALE

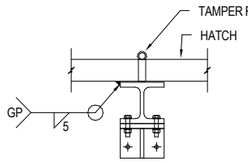


5 SECTION
NOT TO SCALE



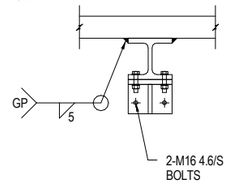
* TO PREVENT BOLTS FROM BEING LOOSENED

A DETAIL
NOT TO SCALE

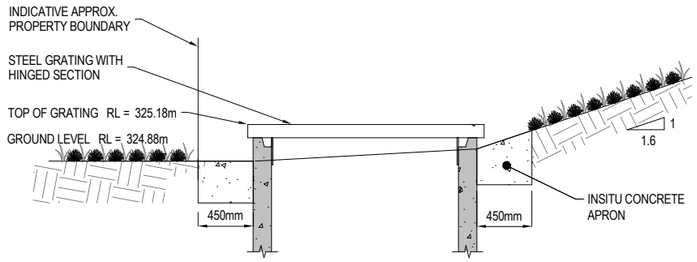


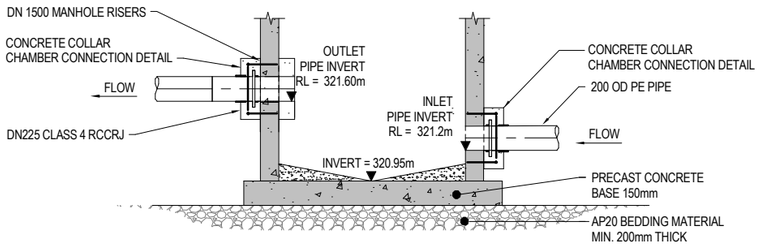
* APPLY WELD ON EVERY OTHER LOAD BAR ON NON-HATCH WEBFORGE ONLY

7 SECTION
NOT TO SCALE



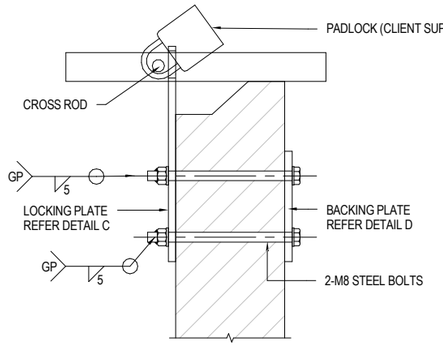
8 SECTION
NOT TO SCALE



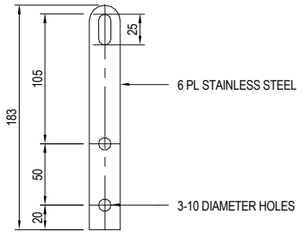


CHAMBER CONNECTION DETAIL

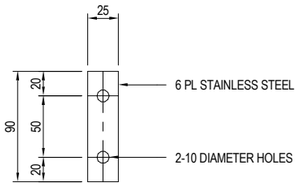
SCALE 1:10



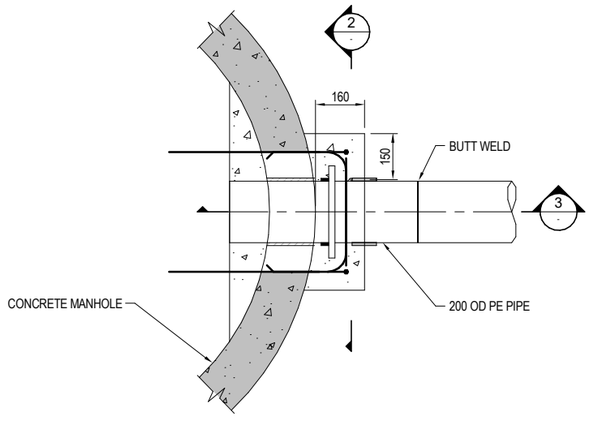
B CHAMBER LID LOCK DETAIL
SCALE: 1:10

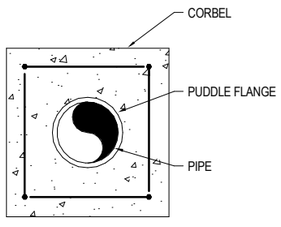


C LOCKING PLATE
SCALE: 1:10



D BACKING PLATE
SCALE: 1:10

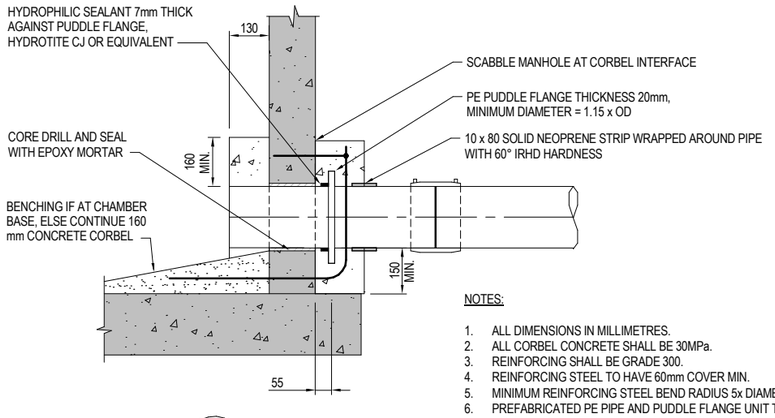




CHAMBER CONNECTION DETAIL

SCALE 1:10

2 SECTION
1:10



3 SECTION
1:10

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. ALL CORBEL CONCRETE SHALL BE 30MPa.
3. REINFORCING SHALL BE GRADE 300.
4. REINFORCING STEEL TO HAVE 60mm COVER MIN.
5. MINIMUM REINFORCING STEEL BEND RADIUS 5x DIAMETER.
6. PREFABRICATED PE PIPE AND PUDDLE FLANGE UNIT TO BE SAME NOMINAL DIAMETER AND SDR AS PRESSURE PIPE.

NOTES:

1. ALL STEEL TO BE GALVANISED.
2. WELD TO BE TOUCHED UP WITH GALVANIC-RICH PAINT.
3. LOCKING PLATE DIMENSIONS AND INSTALLATION CONFIRMED ON SITE TO SUIT WEBFORGE INSTALLATION.

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	JJ	JD	JW	10.20

Drawing Originator: Beca

Original Scale (A1) As indicated
Reduced Scale (A3)

Design	A. Murphy	10.20
Drawn	J. Jack	10.20
Dsg Verifier	J. Dabkowski	10.20
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: SCOUR AND OVERFLOW SECTIONS AND DETAILS

Discipline: CIVIL & DRAINAGE
Drawing No.: 3334040-CD-1501
Rev.: 0

DO NOT SCALE

IF IN DOUBT ASK.

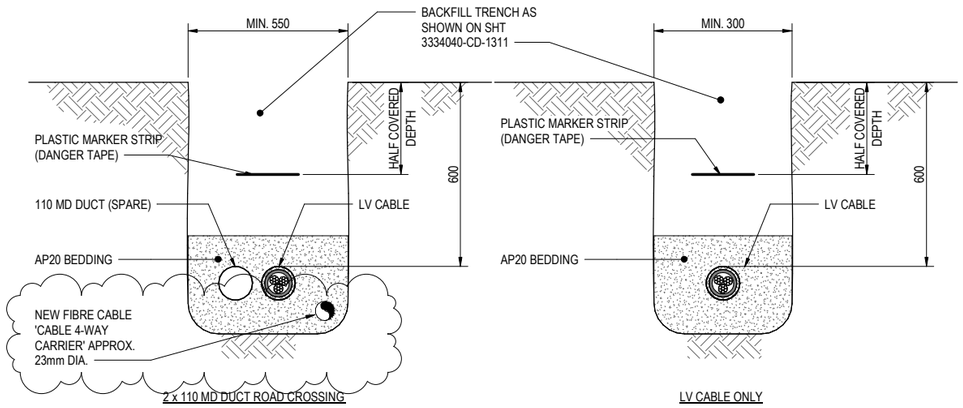
Document No. BIM 360://3334040 - Glenorchy Reservoir/3334040-SE-R18 GLENORCHY RESERVOIR.rvt

www.beca.com

NOTES:

1. LOCATIONS OF SERVICES INDICATIVE ONLY. CONTRACTOR TO VERIFY LOCATIONS DURING CONSTRUCTION.
2. NEW POWER SUPPLY TO MAINTAIN 500mm (MIN) OFFSET TO EXISTING FALLING WATER MAIN AND OTHER SERVICES AS PER QLDC LAND DEVELOPMENT AND SUBDIVISION CODE OF PRACTICE, APPENDIX B, DRAWING B1-1.
3. NEW FIBRE DUCT TO MAINTAIN 150mm (MIN.) OFFSET TO POWER CABLE AS PER TCF COMMUNICATIONS CARRIER FORUM DOCUMENT 'PREMISES WIRING CODE OF PRACTICE' V4.0 31 MAY 2011.

POWER AND SERVICES PLAN
1 : 500



TYPICAL ELECTRICAL TRENCH PROFILES
1 : 10

LEGEND

- EXISTING RISING WATER MAIN
- EXISTING FALLING WATER MAIN
- PROPOSED POWER SUPPLY
- EXISTING POWER (OVERHEAD)
- EXISTING POWER POLE
- EXISTING CHORUS LINE
- FIBRE OPTIC IN DUCT

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER - DEMARCATION POINT ADDED	JJ	AD	JD	04.21

Drawing Originator: Beca

Original Scale (A1): As indicated
Reduced Scale (A3)

Design	A. Dann	10.20
Drawn	J. Jack	10.20
Dsg Verifier	N. Smith	04.21
Dwg Check	J. Dabkowski	10.20

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: SITE POWER CONNECTION PLAN AND DETAILS

Discipline: POWER AND SERVICES
Drawing No.: 3334040-UA-1001
Rev.: 0

DO NOT SCALE

IF IN DOUBT ASK.

28 October 2020

RCP

Attention: Douglas Minty

Resource Consent – Queenstown Lakes District Council

Application

Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga understand that Queenstown Lakes District Council. are applying for resource consents associated with the upgrade of 4 existing reservoirs for town water supply, earthworks and discharge of potable water to land where it may enter a watercourse – Glenorchy (as specified in the information provided).

The Affected Party

Aukaha writes this reply on behalf of Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga (Kā Rūnaka), three of the kaitiaki Rūnaka whose takiwā (area) includes the site the application relates to.

The representatives have received the full application provided.

This reply is specific to the above proposal and any changes to the application will require further consultation and written approval from the Rūnaka.

I have the authority to sign on behalf of the Rūnaka and I have read the full application provided.

Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga are rakatira and kaitiaki of all natural resources within the area to which the application relates.

Decision

Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga provide their written approval. In signing this written approval, Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga understand that the consent authority must decide that Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga are no longer an affected person, and the consent authority must not have regard to any adverse effects on Kāti Huirapa Rūnaka ki Puketeraki, Te Rūnanga o Ōtākou, and Hokonui Rūnanga.

Kā Rūnaka understand that they may withdraw written approval by giving written notice to the consent authority if there is a hearing, or if not, then before the application is determined.

Nāku noa, nā

Richardson

Tania Richardson
Consents Officer

cc Kāti Huirapa Rūnaka ki Puketeraki
Te Rūnanga o Ōtākou
Hokonui Rūnanga

Aukaha
Level 1, 258 Stuart Street, P O Box 446, Dunedin 9054, New Zealand
Phone - 03 477 0071
info@aukaha.co.nz www.aukaha.co.nz

TE AO MARAMA INC.

Friday 11 November 2020

Queenstown Lakes District Council
Email: dminty@rcp.co.nz

Tēnā Koe,

Attention: Douglas Minty – Upgrade to water reservoirs in Glenorchy

Thank you for forwarding a copy of the application to upgrade the reservoirs in Glenorchy. It is understood these are to be in the same location as the existing reservoirs on Bible Face. The purpose of the upgrade is to meet the growing demand and to replace the deteriorating existing reservoirs.

Te Ao Marama Inc. write this letter on behalf of the kaitiaki rūnanga whose takiwā includes the site the application is within. Rūnanga representatives have been informed and accept the proposal outlined in the application received June 24 2020.

It is considered that the application is not inconsistent with Te Tangi a Tauira, 2008 (Ngāi Tahu ki Murihiku Natural Resource Management Plan). Please be advised that rūnanga do not oppose the application proceeding through the non-notified resource consent process.

This reply is specific to the above application and any changes to the application will require further consultation.

We trust the information contained within this letter is sufficient; however, should you wish to discuss any aspect further, please do not hesitate to contact me.

Nāhaku noa nā,

Stevie-Rae Blair
Iwi Environmental Advisor
Te Ao Marama Inc.

Cc Te Rūnanga o Oraka Aparima

Te Ao Marama Inc.
408 Tramway Road
PO Box 7078
South Invercargill 9812
Phone: (03) 9311242
office@tami.maori.nz

AFFECTED PERSON'S APPROVAL

FORM 8A

QUEENSTOWN LAKES DISTRICT COUNCIL

Resource Management Act 1991 Section 95

RESOURCE CONSENT APPLICANT'S NAME AND/OR RM

Queenstown Lakes District Council

AFFECTED PERSON'S DETAILS

I/We Glenorchy Trustee Limited

Are the owners/occupiers of

Lots 12-15, 35, 37-48, 101-102, 200, 201 and 203 being a Subdivision of Lot 1 DP 430468

DETAILS OF PROPOSAL

I/We hereby give written approval for the proposal to:

The project for the Glenorchy Reservoir Upgrades and Supporting Infrastructure as set out in the attached drawings. Drawing register provided on Beca drawing 3334040-ZA-0000 dated 10/11/2020. Marked up drawing 3334040-CA-1401 for upgrades to access track.

at the following subject site(s):

Lot 202 Deposited plan 544220

☑ PLEASE TICK I/We understand that by signing this form Council, when considering this application, will not consider any effects of the proposal upon me/us.

☑ PLEASE TICK I/We understand that if the consent authority determines 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.

WHAT INFORMATION/PLANS HAVE YOU SIGHTED

☑ PLEASE TICK I/We have sighted and initialled ALL plans dated and approve them.

AFFECTED PERSON'S APPROVAL

FORM 8A

QUEENSTOWN LAKES DISTRICT COUNCIL

Resource Management Act 1991 Section 95

RESOURCE CONSENT APPLICANT'S NAME AND/OR RM

Queenstown Lakes District Council

AFFECTED PERSON'S DETAILS

I/We Glenorchy Trustee Limited as trustee for Pisidia Holdings Limited and Cabo Limited

Are the owners/occupiers of

Lots 12-15, 35, 37-48, 101-102, 200, 201 and 203 being a Subdivision of Lot 1 DP 430468

DETAILS OF PROPOSAL

I/We hereby give written approval for the proposal to:

The project for the Glenorchy Reservoir Upgrades and Supporting Infrastructure as set out in the attached drawings. Drawing register provided on Beca drawing 3334040-ZA-0000 dated 10/11/2020. Marked up drawing 3334040-CA-1401 for upgrades to access track.

at the following subject site(s):

Lot 202 Deposited plan 544220

☑ PLEASE TICK I/We understand that by signing this form Council, when considering this application, will not consider any effects of the proposal upon me/us.

☑ PLEASE TICK I/We understand that if the consent authority determines 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.

WHAT INFORMATION/PLANS HAVE YOU SIGHTED

☑ PLEASE TICK I/We have sighted and initialled ALL plans dated and approve them.

APPROVAL OF AFFECTED PERSON(S)

The written consent of all owners / occupiers who are affected. If the site that is affected is jointly owned, the written consent of all co-owners (names detailed on the title for the site) are required.

A

Name (PRINT): JOHN GERARD DARBY.

Contact Phone / Email address: 021 620309. johne@darbypartners.co.nz

Signature:

Date: 31/3/2021

B

Name (PRINT):

Contact Phone / Email address:

Signature:

Date:

C

Name (PRINT):

Contact Phone / Email address:

Signature:

Date:

D

Name (PRINT):

Contact Phone / Email address:

Signature:

Date:

Note to person signing written approval

Conditional written approvals cannot be accepted.
There is no obligation to sign this form, and no reasons need to be given.
If this form is not signed, the application may be notified with an opportunity for submissions.
If signing on behalf of a trust or company, please provide additional written evidence that you have signing authority.

APPROVAL OF AFFECTED PERSON(S)

The written consent of all owners / occupiers who are affected. If the site that is affected is jointly owned, the written consent of all co-owners (names detailed on the title for the site) are required.

A

Name (PRINT)

Contact Phone / Email address

Signature | Date

B

Name (PRINT) GLENORCHY TRUSTEE LIMITED

Contact Phone / Email address

Signature Director. | Date 26/1/2021

C

Name (PRINT)

Contact Phone / Email address

Signature | Date

D

Name (PRINT)

Contact Phone / Email address

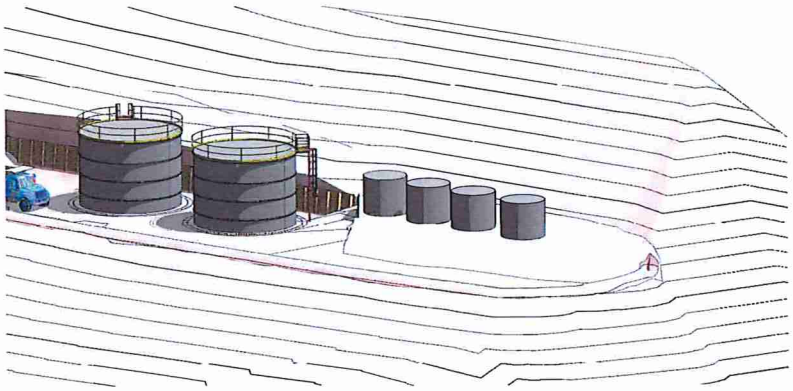
Signature | Date

Note to person signing written approval

Conditional written approvals cannot be accepted.
There is no obligation to sign this form, and no reasons need to be given.
If this form is not signed, the application may be notified with an opportunity for submissions.
If signing on behalf of a trust or company, please provide additional written evidence that you have signing authority.

STRUCTURAL DRAWING LIST		
DRG. No.	Rev	DRAWING NAME
GENERAL		
ZA-0002	0	COVER SHEET
ZA-1301	0	LOCATION AND SITE PLAN
ZA-1151	0	RESERVOIR SITE PLAN
ZA-1351	0	SITE SECTION
MECHANICAL		
MA-3301	0	GENERAL SITE ARRANGEMENT PLAN
MA-3501	0	INLET PIPE SECTION AND DETAILS
MA-3502	0	OUTLET AND VENT PIPE SECTION AND DETAILS
MA-3503	0	SCOUR AND OVERFLOW PIPE SECTION AND DETAILS
STRUCTURAL		
SS-3502	0	RETAINING WALL SECTIONS AND DETAILS
CIVIL		
CA-1401	0	EXISTING ACCESS TRACK PLAN VIEW
CA-1402	0	EXISTING ACCESS TRACK LONG SECTION
CIVIL & DRAINAGE		
CD-1301	0	SCOUR AND OVERFLOW LINE PLAN AND LONG SECTION
CD-1302	0	PROPOSED RESERVOIR INFLOW AND SERVICES PLAN
CD-1311	0	SCOUR PIPE TRENCH DETAIL
CD-1321	0	SCOUR AND OVERFLOW SECTIONS AND DETAILS
POWER AND SERVICES		
UA-1101	0	SITE POWER CONNECTION PLAN AND DETAILS

REFERENCE DRAWINGS		
DRG. No.	DRAWING NAME	DESIGNER
1314.TOPO.S11	GLENORCHY RESERVOIRS TOPOGRAPHIC PLAN	CONSTRUCTION SURVEY
015115-T1-APP	MODEL 2625 PERMASTORE INTO TANK T1	PERMASTORE TANKS & SILOS
015115-T2-APP	MODEL 2625 PERMASTORE INTO TANK T2	PERMASTORE TANKS & SILOS
DR400	SHEL STREET SUBDIVISION	AR & ASSOCIATES
521-952	TANK FILLING STATION BASE AND PIPE LAYOUT (FOR 250kL STORAGE TANKS (2OFF))	CALIBRE



Drawing Plotted 10/11/2020 4:35:00 PM

www.beca.com

Project No. 3334040
Contract No. C-19-010

GLENORCHY RESERVOIR UPGRADES

FOR TENDER

www.beca.com

Prepared for

QUEENSTOWN LAKES DISTRICT COUNCIL

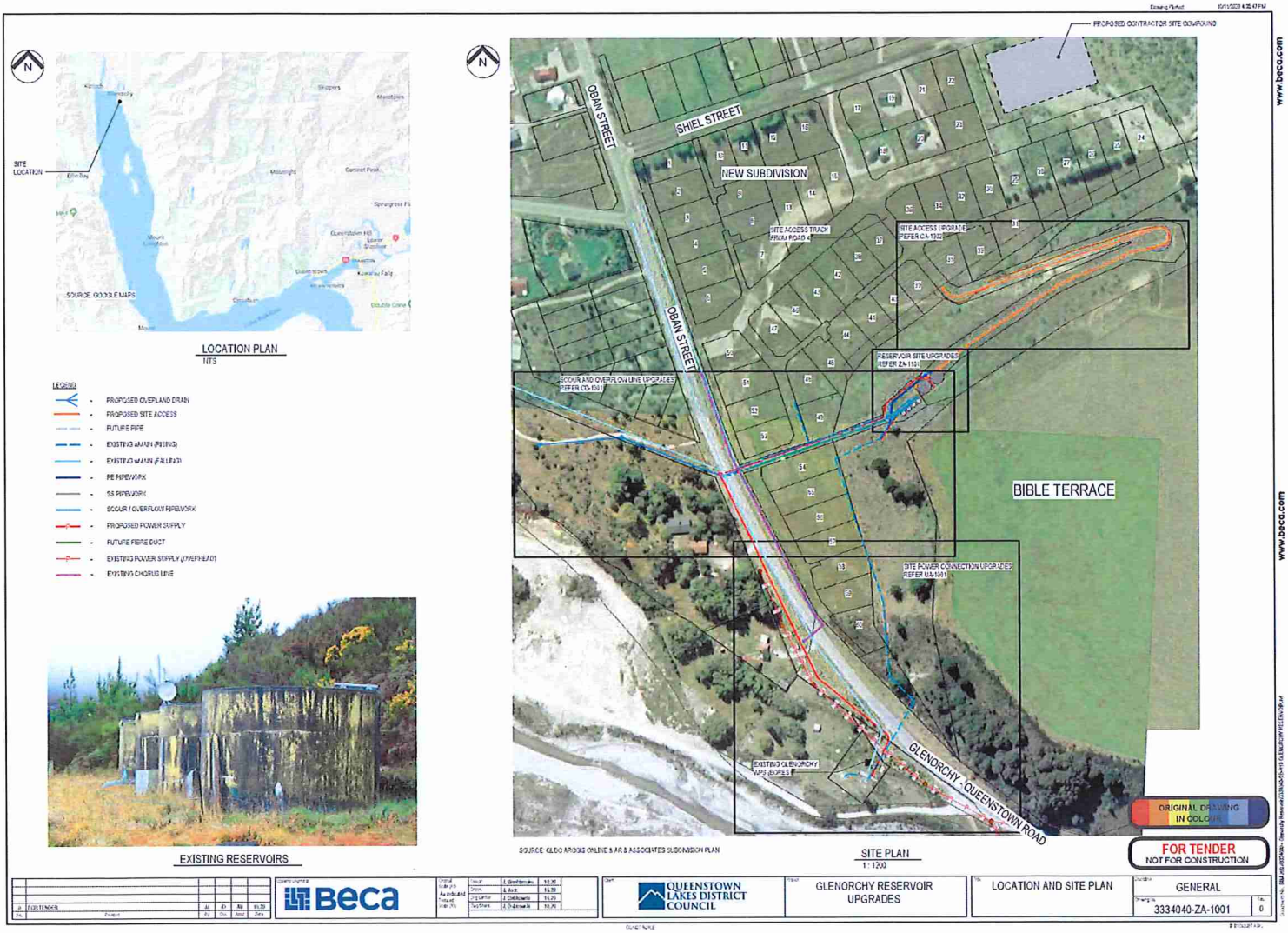
By
Beca

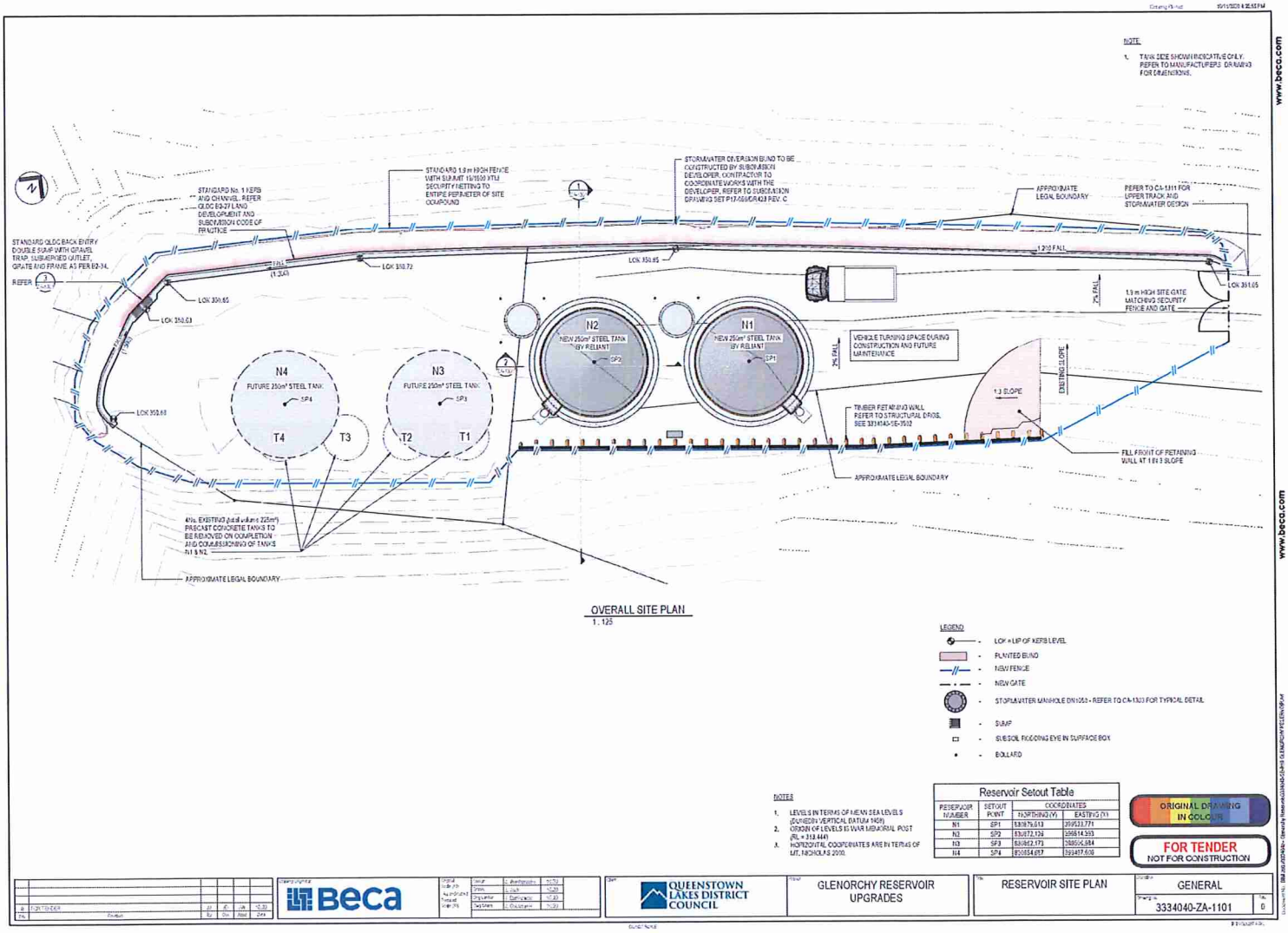
10 November 2020

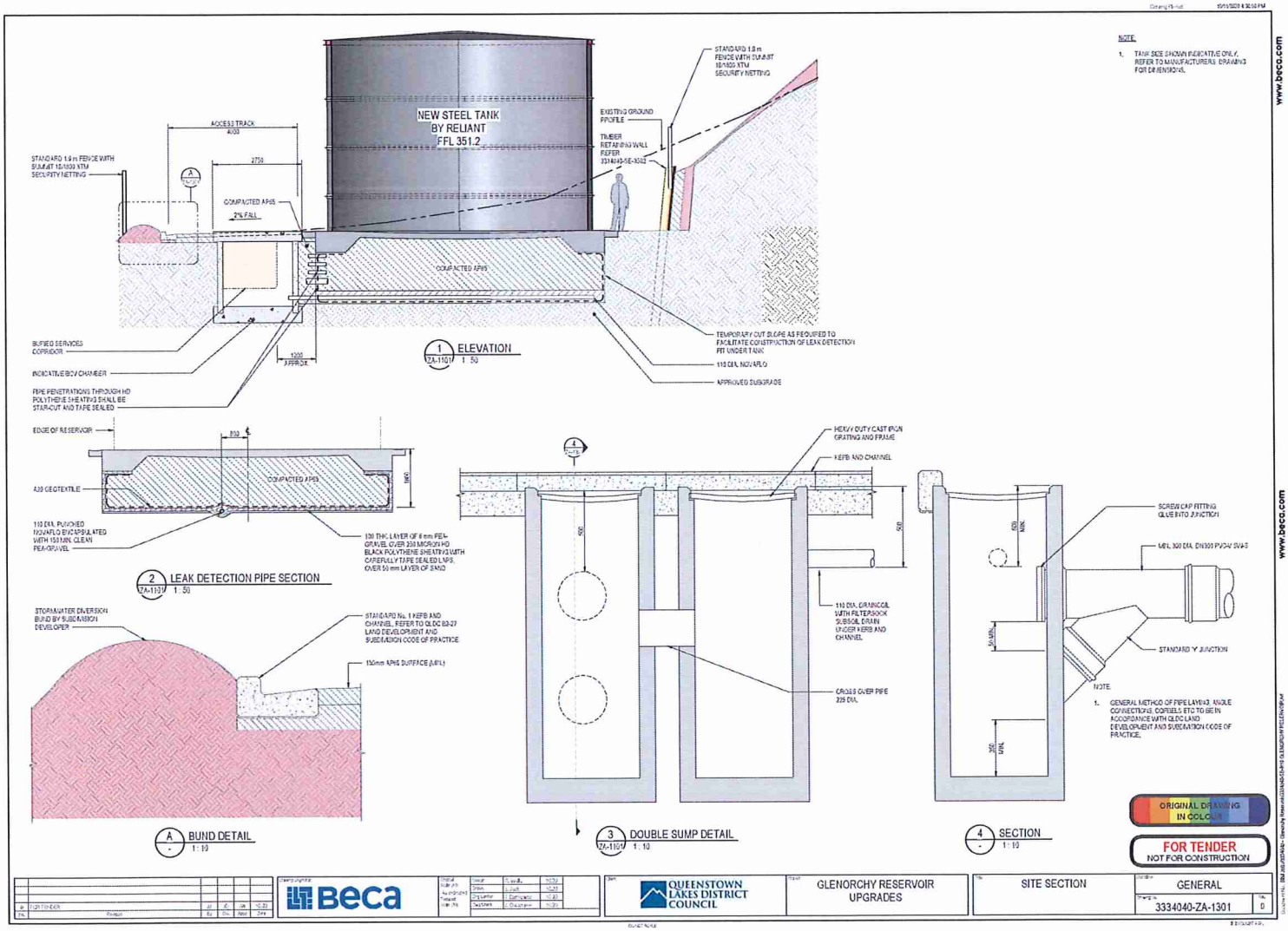
ORIGINAL DRAWING IN COLOUR

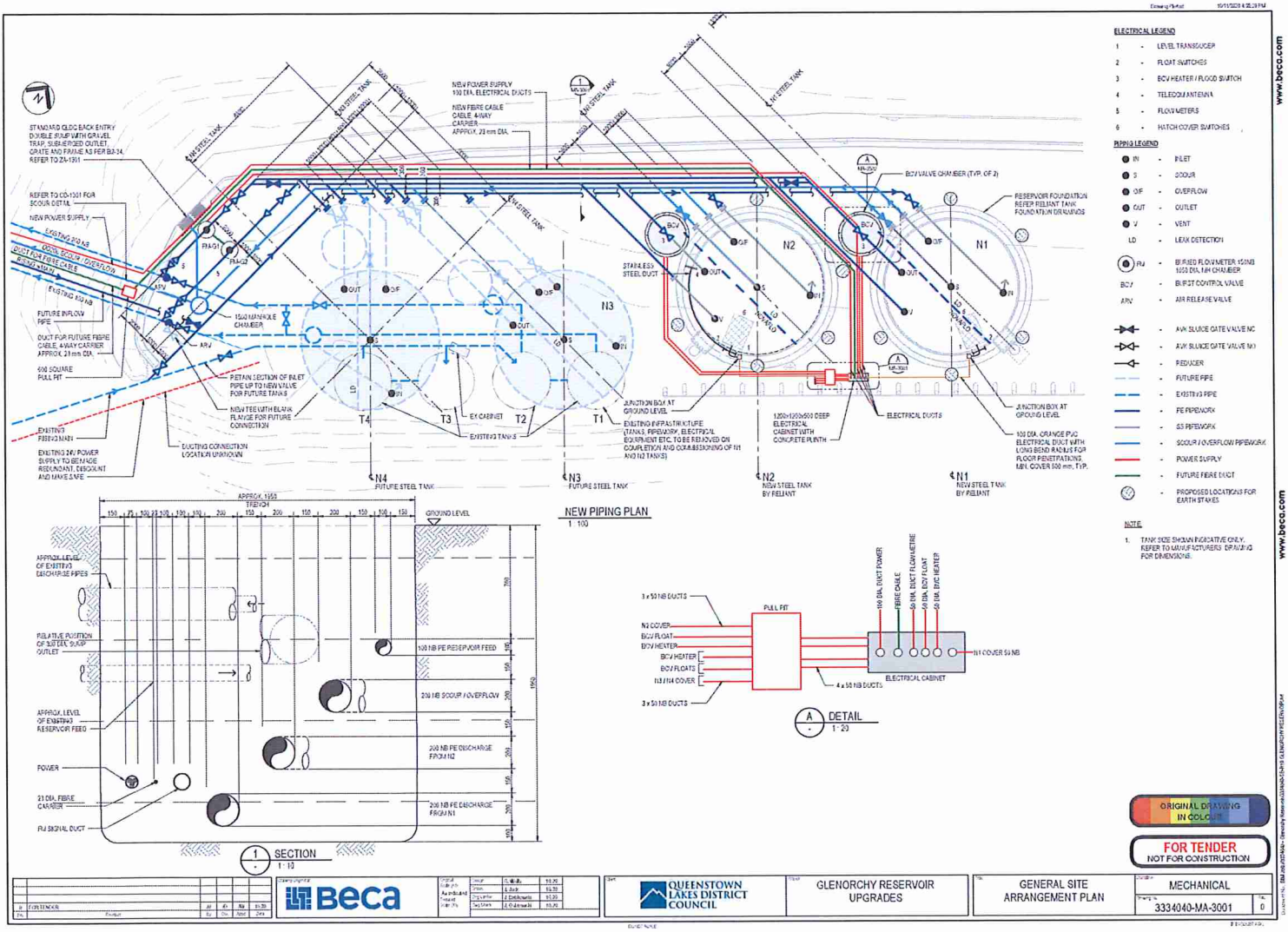
FOR TENDER
NOT FOR CONSTRUCTION

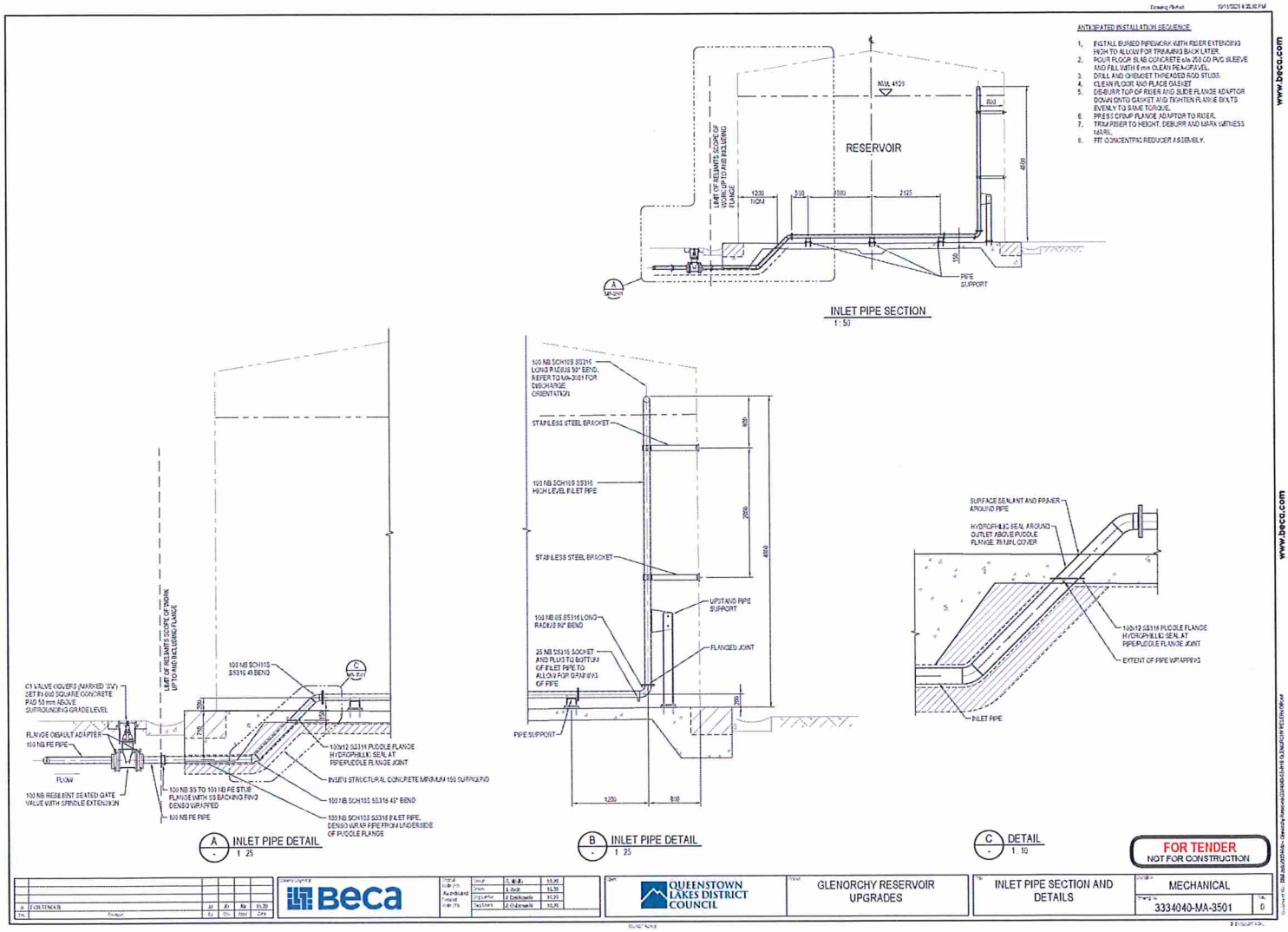
Drawing No. 3334040-ZA-0000 Rev 0

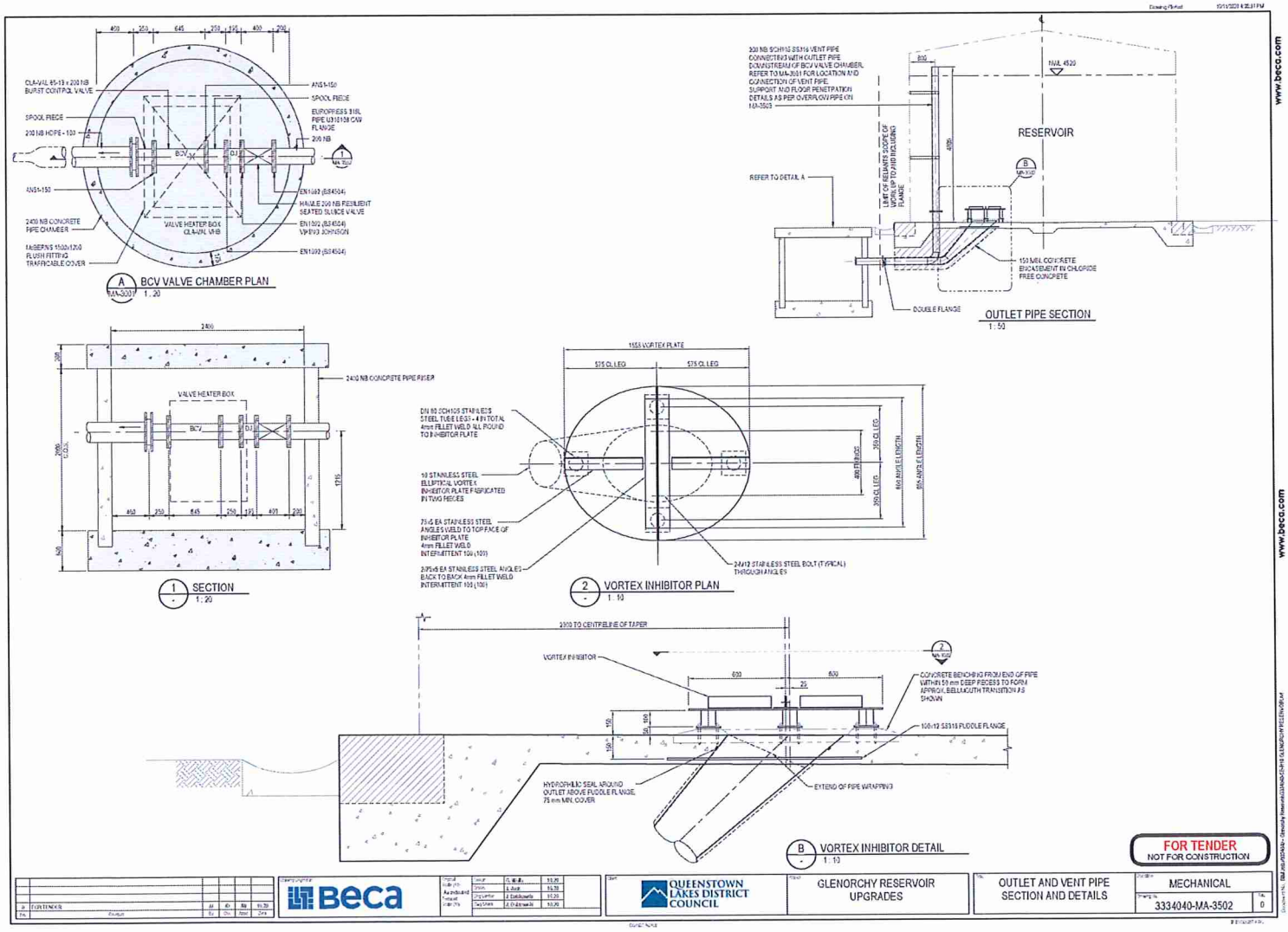


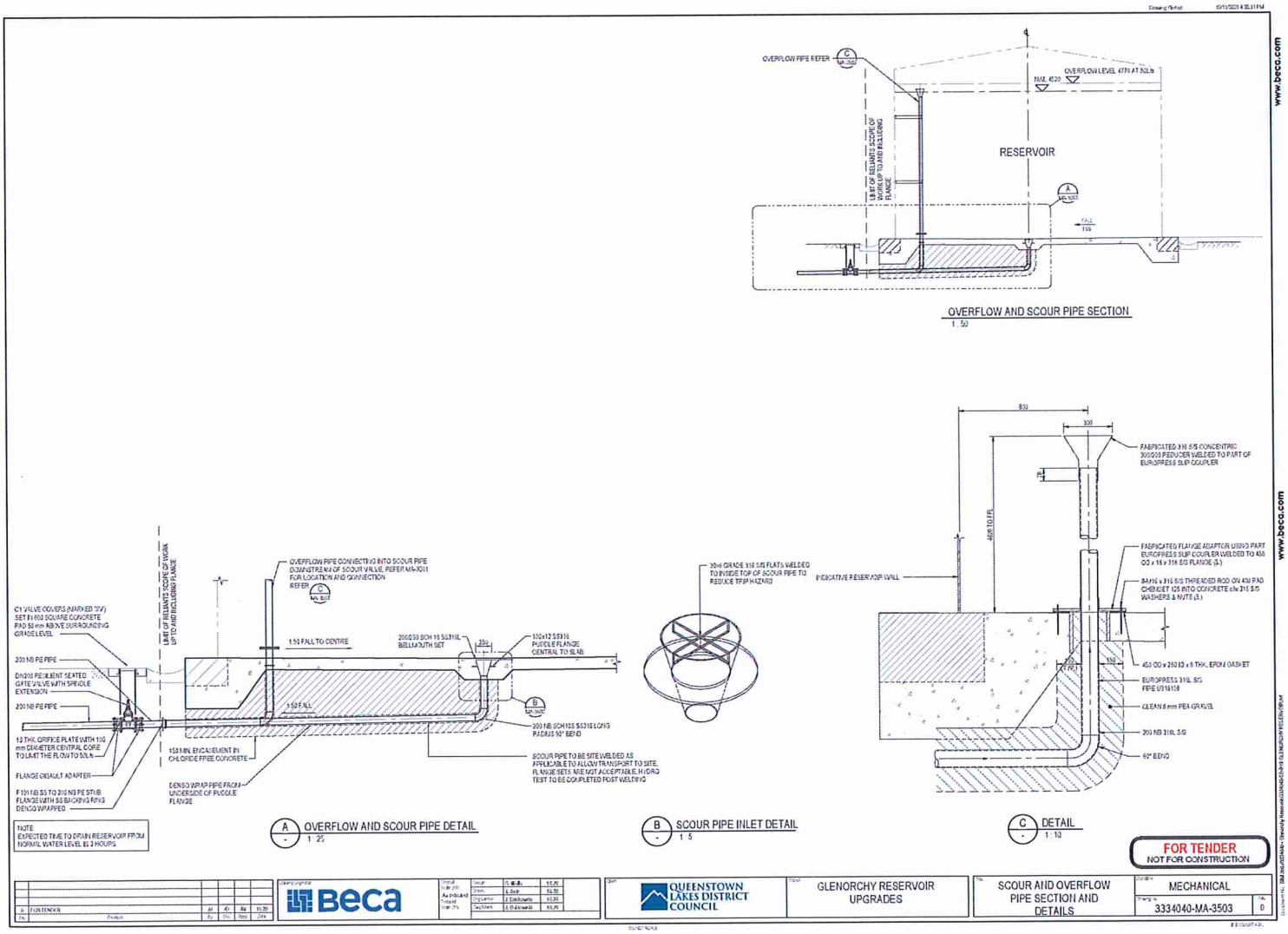


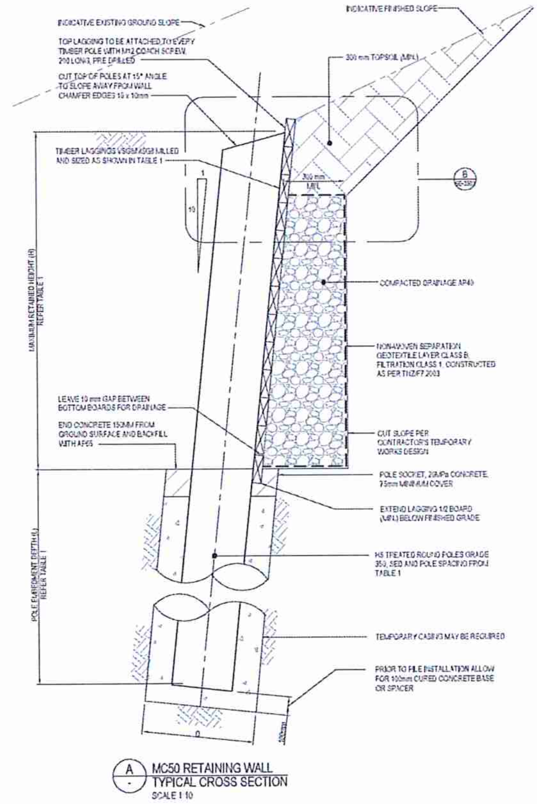




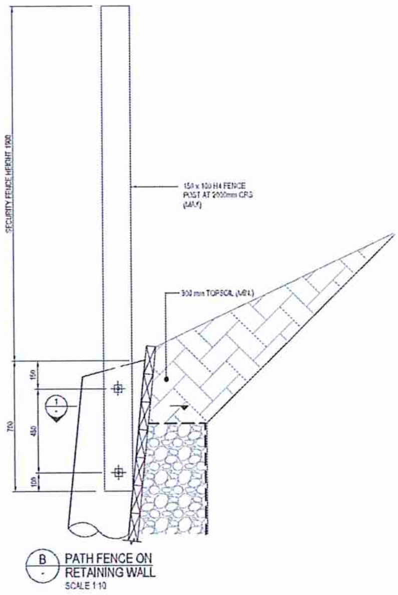




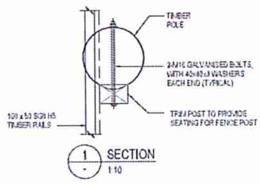




A — MC50 RETAINING WALL TYPICAL CROSS SECTION
SCALE 1:10



B — PATH FENCE ON RETAINING WALL
SCALE 1:10



1 — SECTION
1:10

TABLE 1: ROUND POLE RETAINING WALL DETAILS

MAX. RETAINED HEIGHT (H)	1.5m	1.9m	2.3m
POLE DIAMETER	325mm	325mm	400mm
MIN. HOLE DIAMETER (D)	600mm	600mm	800mm
POLE EMBEDMENT (L)	4.5m	4.6m	4.7m
NOMINAL POLE LENGTH	6.0m	6.5m	7.0m
POLE SPACING (CENTRES)	1.2m	1.2m	1.2m
MIN. LAGGING DIMENSIONS	150mm x 50mm	150mm x 50mm	150mm x 50mm

NOTES

DESIGN:

1. CROSS SECTIONS ARE BASED ON INTERPOLATION OF DISCRETE INFORMATION. IF CONDITION AT THESE SECTIONS DIFFERS FROM THAT NOTED THIS SHOULD BE ADDRESSED WITH THE ENGINEER.
2. EXPECTED SUBSURFACE GROUND CONDITIONS: MED DENSE SILT/SAND AND GRAVEL.

CONSTRUCTION:

1. DURING ALL PHASES OF WORK THE ENGINEER SHALL BE INFORMED ON A DAILY BASIS OF THE WORK ANTICIPATED TO BE CARRIED OUT TO ENABLE CONSTRUCTION MONITORING TO BE UNDERTAKEN.
2. ENGINEER TO CONFIRM FOUNDATION CONDITIONS PRIOR TO PLACING POLE OR CONCRETE IN HOLE.
3. THE CONTRACTOR SHALL LOCATE AND PROTECT ALL SERVICES PRIOR TO COMMENCING WORK AND SHALL INFORM THE ENGINEER SHOULD ANY CONFLICTS ARISE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO SERVICES CAUSED BY THEIR ACTIVITIES.
4. ALL TIMBER SHALL BE TREATED TO NZS 3604 HAZARD CLASS H5 AS SPECIFIED. TIMBER POLES AND POSTS SHALL BE RADIATA PINE OR CORSICAN PINE. THE POLES AND RAILS SHALL BE STRAIGHT AND FREE OF DECAY, KNOTS, SPLITS, CHECKS OR ANY OTHER DEFECT THAT MAY AFFECT THE STRENGTH OF THE POLE.
5. ALL CUT TIMBER SHALL BE TREATED VIA SITE APPLICATION OF A SUITABLE PRODUCT TO THE SUPPLIERS SPECIFICATION TO ACHIEVE A LEVEL OF TREATMENT EQUAL TO OR GREATER THAN THE MEMBER'S ORIGINAL LEVEL OF TREATMENT.
6. ALL POLES SHALL BE PLACED LARGE END INTO THE BASE OF THE HOLE.
7. BORED HOLES SHALL NOT REMAIN OPEN OVER NIGHT. HOLES MUST BE THOROUGHLY CLEANED OUT BEFORE PLACING CONCRETE. POLES SHALL BE INSTALLED AND CONCRETED IN A HIT AND MISS PATTERN WITHIN THE SAME DAY AS BORING.
8. POLES SHALL BE BRACED (WHERE NECESSARY) DURING AND AFTER CONCRETING SUCH THAT THE REQUIRED ALIGNMENT IS MAINTAINED.
9. ALL STEEL COMPONENTS SHALL BE HOT DIPPED GALVANISED IN ACCORDANCE WITH AS/NZS 4680, TO HDG 900 IN ACCORDANCE WITH AS/NZS 2312.
10. LAGGING JOINTS SHALL OCCUR AT POSTS ONLY. LAGGING JOINTS SHALL BE STAGGERED. LAGGING TO BE SECURED TO POSTS WITH Ø4.0mm, 200mm LONG NAILS.
11. MATERIAL FOR BACKFILLING BEHIND THE WALL SHALL BE DRAINAGE AP40 IN ACCORDANCE WITH THE SPECIFICATION. COMPACTION TO CONSIST OF MAX. 120kg PLATE COMPACTOR WITHIN 2.0m OF WALL. BACKFILL TO BE PLACED AND COMPACTED IN HORIZONTAL LAYERS OF MAX. 200mm LAYER DEPTH. COMPACT TO 95% OF THE MAXIMUM DRY DENSITY OF THE MATERIAL.

POST CONSTRUCTION:

1. THE FOLLOWING LIMITATIONS APPLY TO TRENCHING NEXT TO RETAINING WALLS POST CONSTRUCTION:

- MAXIMUM 3m LENGTH OF TRENCH OPEN AT ANY GIVEN TIME.
- TRENCH SECTIONS TO BE EXCAVATED AND BACKFILLED ON THE SAME DAY.
- NO TRENCHING OR EXCAVATION ALLOWED WITHIN 3m IN FRONT OF WALL.
- TRENCHING OR EXCAVATION GREATER THAN 0.5m DEEP WILL REQUIRE CONSULTATION WITH THE ENGINEER.

www.beca.com

FOR TENDER
NOT FOR CONSTRUCTION

0	FOR TENDER	JJ	JD	AM	10.20

Beca

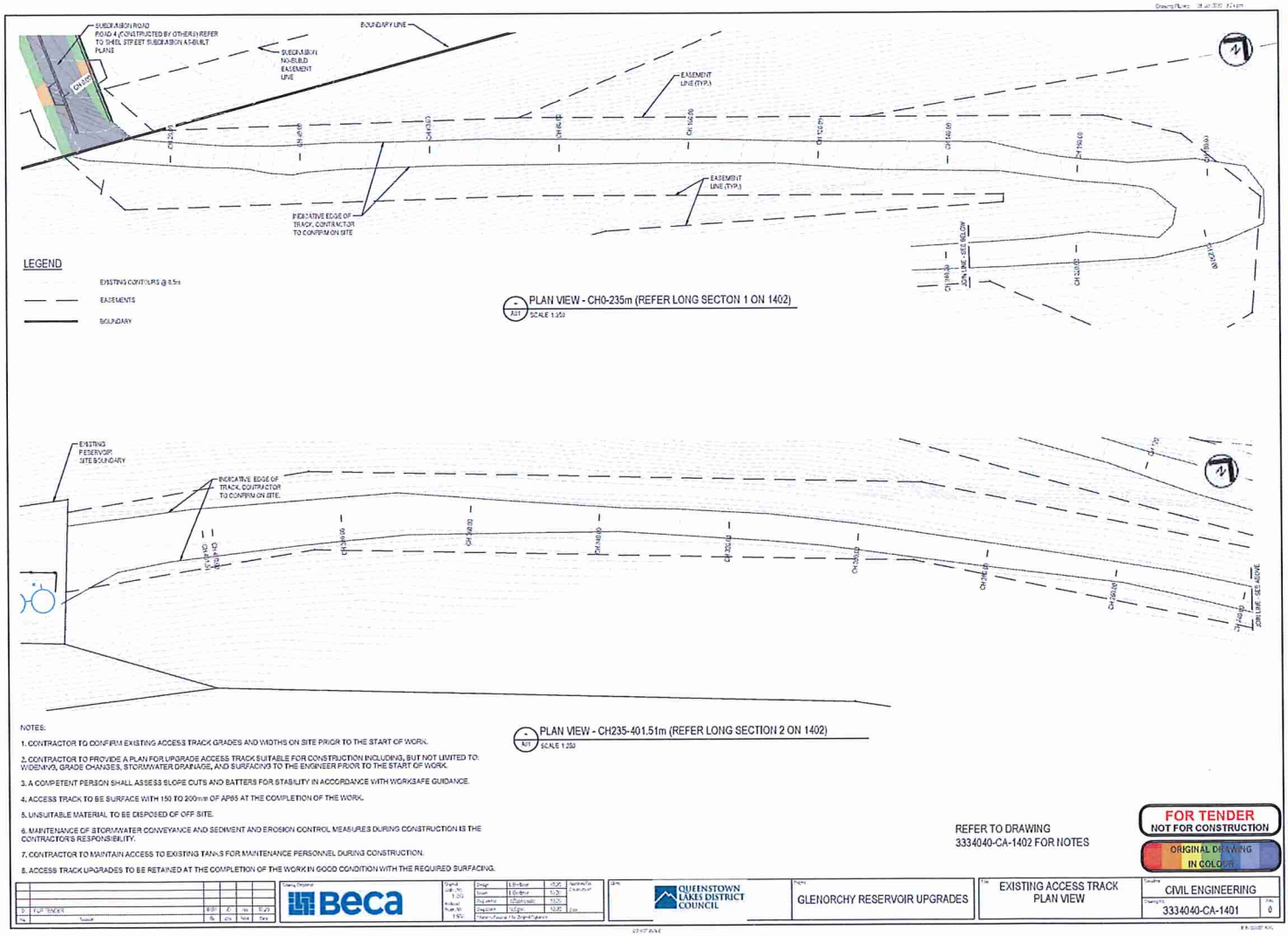
QUEENSTOWN LAKES DISTRICT COUNCIL

GLENORCHY RESERVOIR UPGRADES

RETAINING WALL SECTIONS AND DETAILS

STRUCTURAL

3334040-SE-3502 | 0



NOTES:

1. CONTRACTOR TO CONFIRM EXISTING ACCESS TRACK GRADES AND WIDTHS ON SITE PRIOR TO THE START OF WORK.
2. CONTRACTOR TO PROVIDE A PLAN FOR UPGRADE ACCESS TRACK SUITABLE FOR CONSTRUCTION INCLUDING, BUT NOT LIMITED TO: WIDENING, GRADE CHANGES, STORMWATER DRAINAGE, AND SURFACING TO THE ENGINEER PRIOR TO THE START OF WORK.
3. A COMPETENT PERSON SHALL ASSESS SLOPE CUTS AND BATTERS FOR STABILITY IN ACCORDANCE WITH WORKSAFE GUIDANCE.
4. ACCESS TRACK TO BE SURFACE WITH 150 TO 200mm OF AP65 AT THE COMPLETION OF THE WORK.
5. UNSUITABLE MATERIAL TO BE DISPOSED OF OFF SITE.
6. MAINTENANCE OF STORMWATER CONVEYANCE AND SEDIMENT AND EROSION CONTROL MEASURES DURING CONSTRUCTION IS THE CONTRACTOR'S RESPONSIBILITY.
7. CONTRACTOR TO MAINTAIN ACCESS TO EXISTING TANKS FOR MAINTENANCE PERSONNEL DURING CONSTRUCTION.
8. ACCESS TRACK UPGRADES TO BE RETAINED AT THE COMPLETION OF THE WORK IN GOOD CONDITION WITH THE REQUIRED SURFACING.

REFER TO DRAWING 3334040-CA-1402 FOR NOTES

FOR TENDER
NOT FOR CONSTRUCTION

ORIGINAL DRAWING IN COLOUR

Beca

QUEENSTOWN LAKES DISTRICT COUNCIL

GLENORCHY RESERVOIR UPGRADES

EXISTING ACCESS TRACK PLAN VIEW

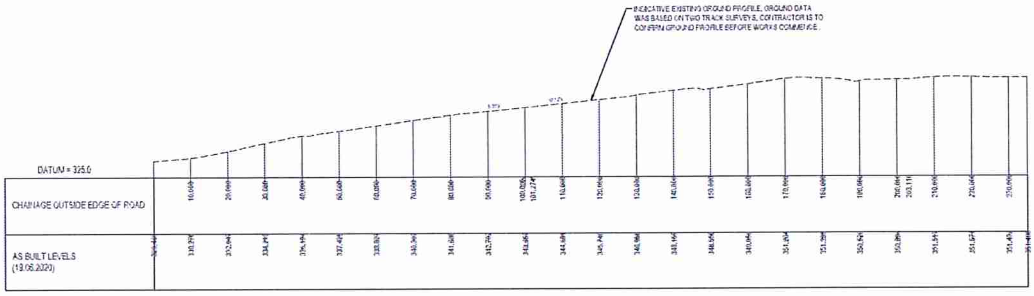
CIVIL ENGINEERING

3334040-CA-1401

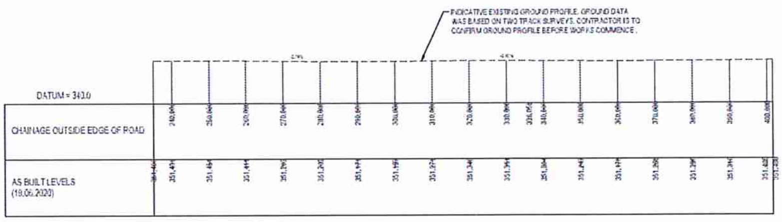
0

GENERAL NOTES

1. ROAD & BUND TO BE CONSTRUCTED BY OTHERS. REFER TO SHIEL STREET SUBDIVISION PLANS. CONTRACTOR TO COORDINATE WITH SHIEL ST CONTRACTOR AROUND TIE-INS AND SUBDIVISION WORKS WITHIN RESERVOIR SITE.
2. ALL WORKS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE QLDC LAND DEVELOPMENT AND SUBDIVISION CODE OF PRACTICE.
3. SHIEL ST SUBDIVISION SITE TO BE PROTECTED FROM SEDIMENT AND RUNOFF FROM RESERVOIR AND ROADING SITE WORKS.
4. EXISTING GROUND LEVEL IS BASED ON SURVEY COMPLETED ON 18.06.2020. CONTRACTOR TO CONFIRM TIE IN LEVELS ONSITE.
5. AP65 NOT LESS THAN 50% BY WEIGHT OF EACH FRACTION RETAINED ON THE 37, 19, 9.5 AND 4.75mm SIEVES SHALL HAVE 2 OR MORE BROKEN FACES.
7. THE CONTRACTOR SHALL SUPPLY ASBUILTS PRIOR TO COMPLETION SUFFICIENT TO SATISFY THE BUILDING AUTHORITY. IN THE MINIMUM THESE SHOULD BE IN THE FORM OF TIDILY MARKED UP CONSTRUCTION DRAWINGS SHOWING CHANGES TO LINE, LEVEL OR OTHER DETAILS.



1 RESERVOIR TRACK LONG SECTION CH0-235M
1401 SCALE 1:500



2 RESERVOIR TRACK LONG SECTION CH235-401.51
1401 SCALE 1:500

FOR TENDER
NOT FOR CONSTRUCTION

ORIGINAL DRAWING IN COLOUR

Beca

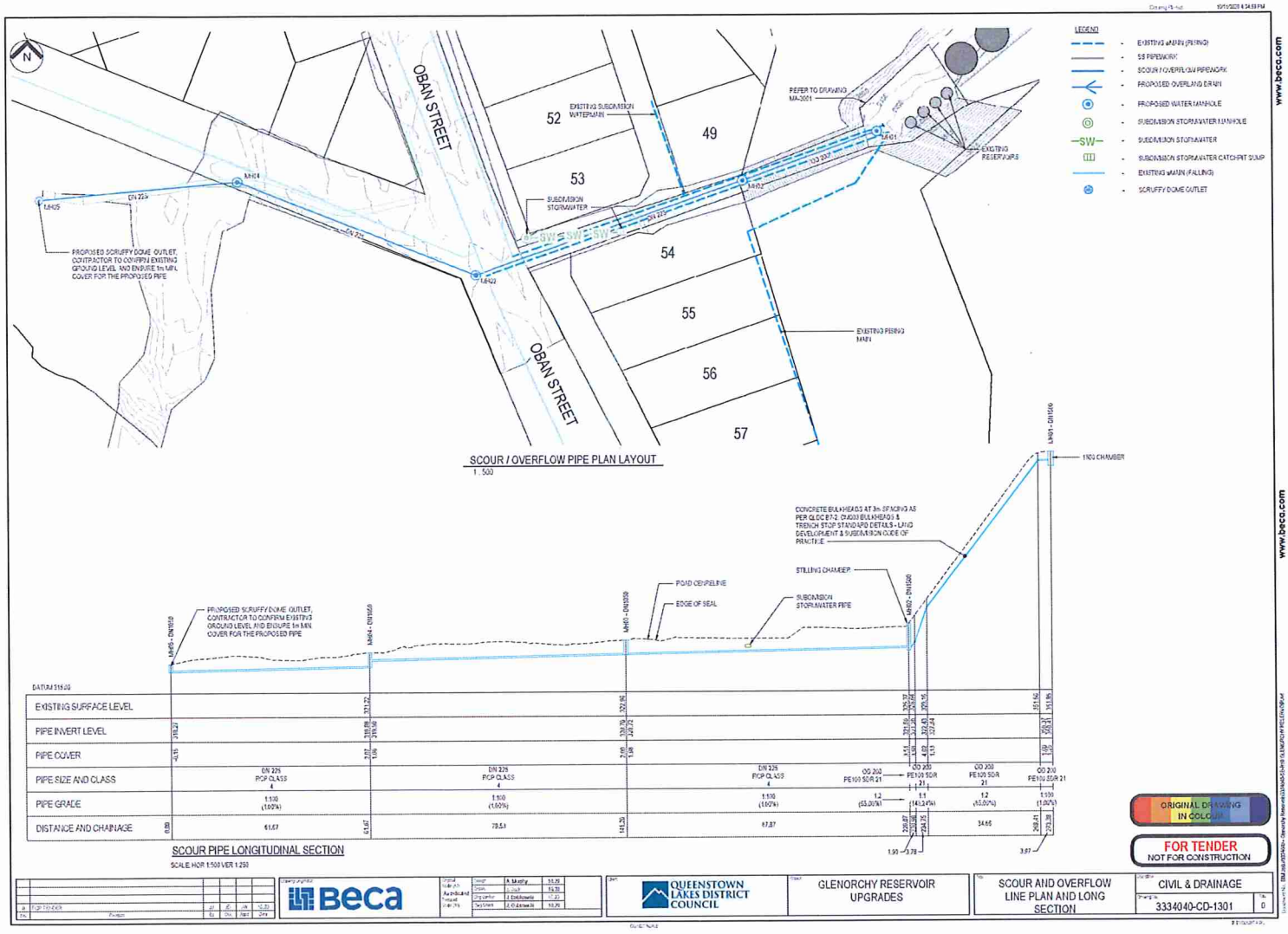
QUEENSTOWN LAKES DISTRICT COUNCIL

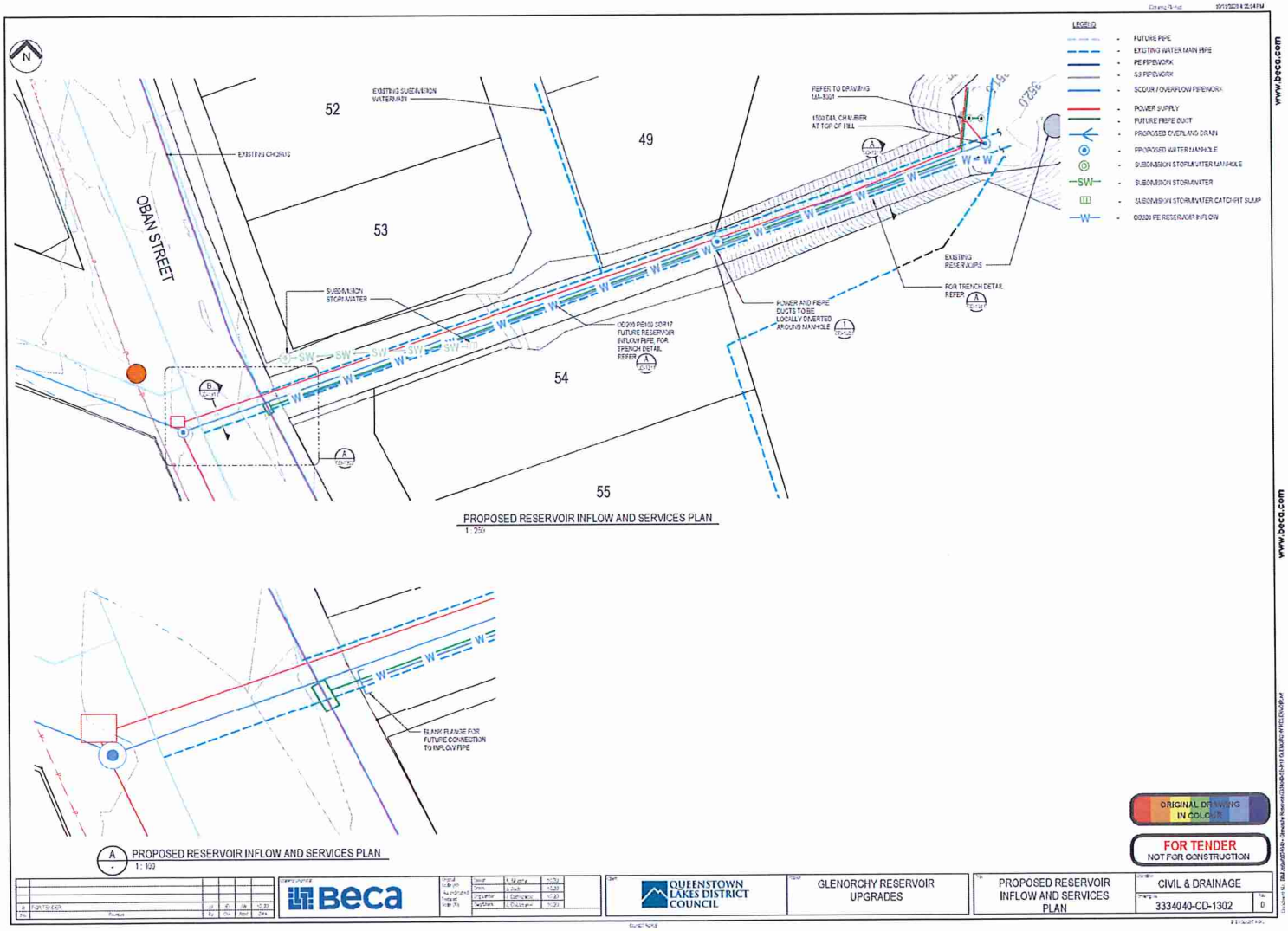
GLENORCHY RESERVOIR UPGRADES

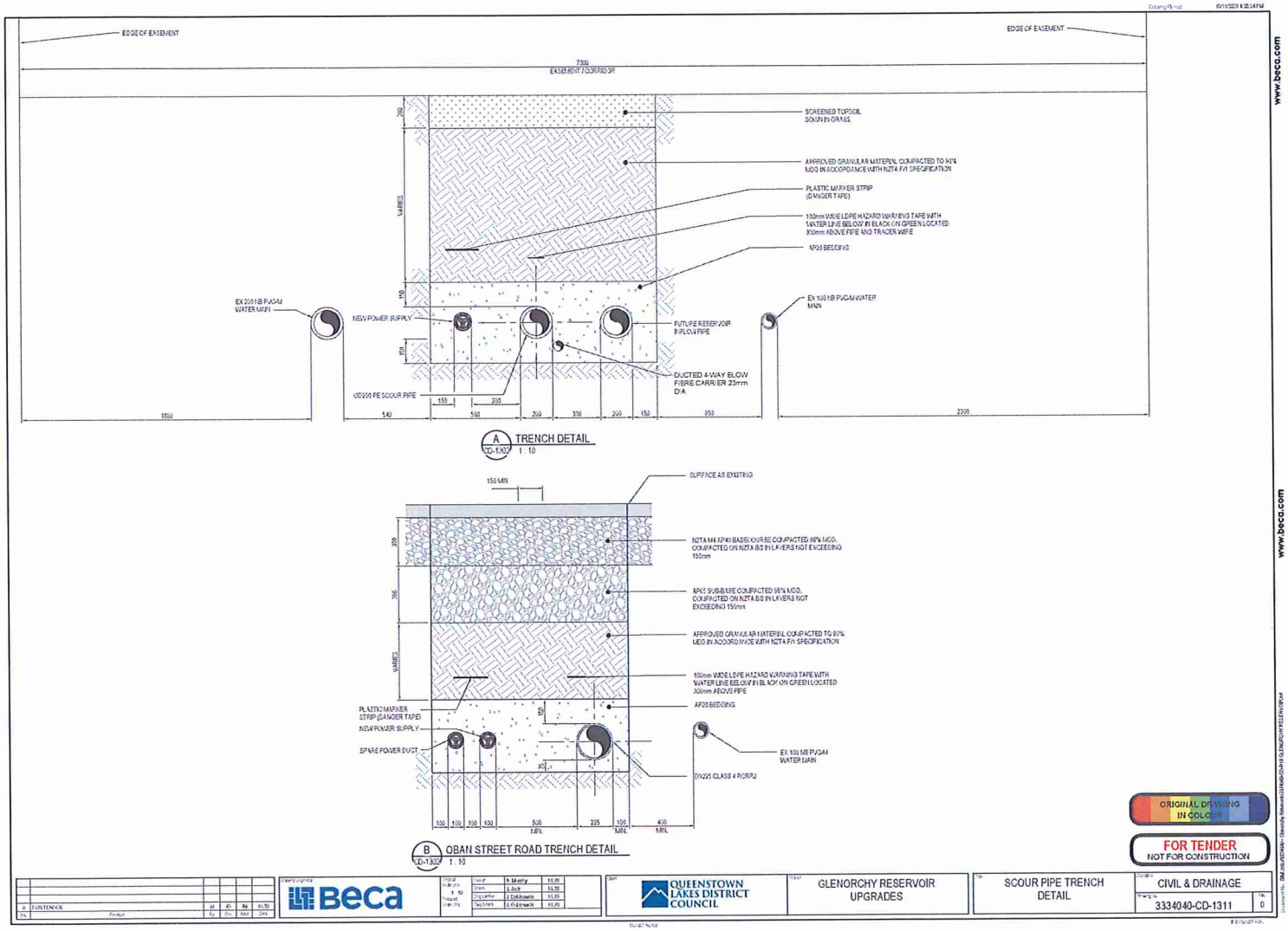
EXISTING ACCESS TRACK LONG SECTION

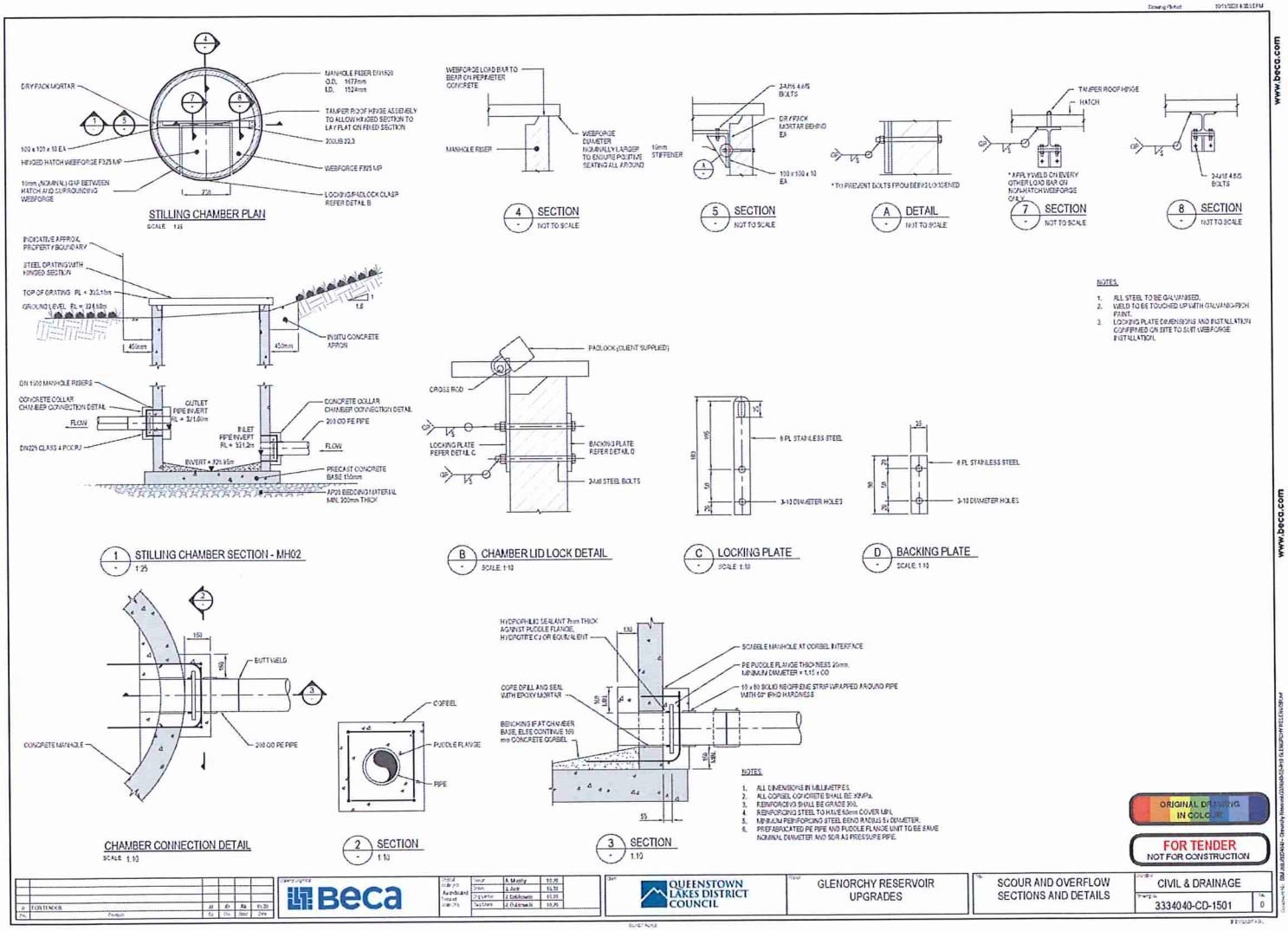
CIVIL ENGINEERING

3334040-CA-1402 | 0



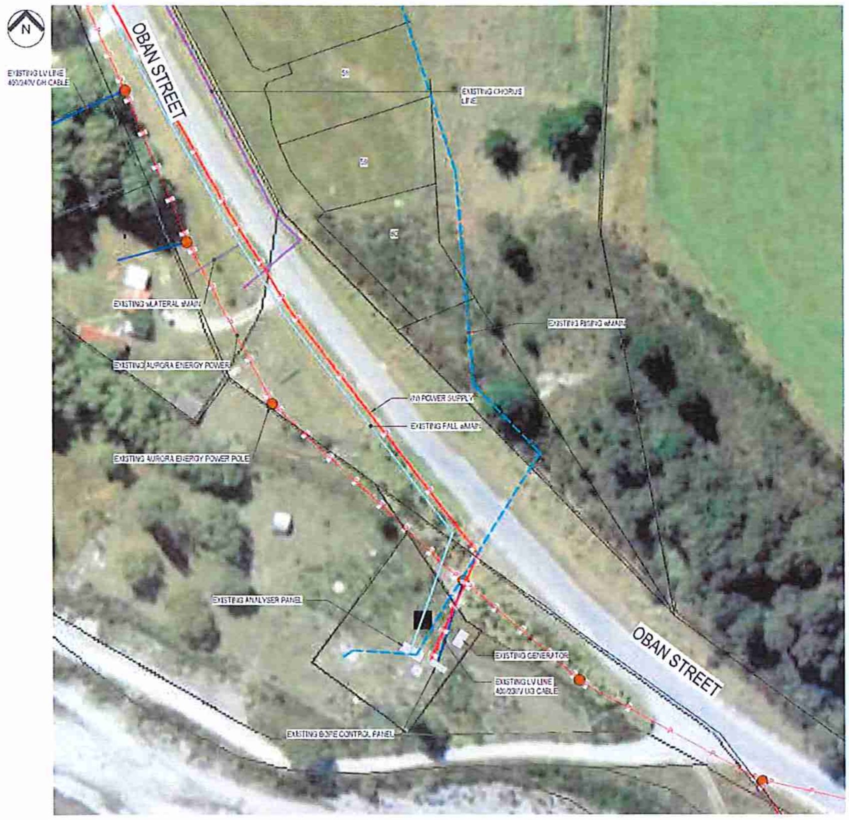




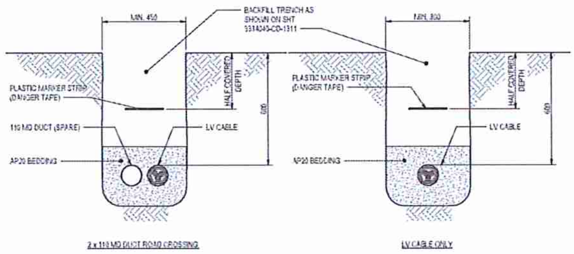


NOTES:

1. LOCATIONS OF SERVICES INDICATIVE ONLY. CONTRACTOR TO VERIFY LOCATIONS DURING CONSTRUCTION.
2. NEW POWER SUPPLY TO MAINTAIN 500mm (MIN) OFFSET TO EXISTING FALLING WATER MAIN AND OTHER SERVICES AS PER QLDC LAND DEVELOPMENT AND SUBDIVISION CODE OF PRACTICE, APPENDIX B DRAWING B1-1.



POWER AND SERVICES PLAN
1 : 500



TYPICAL ELECTRICAL TRENCH PROFILES
1 : 10

LEGEND
- EXISTING RISING WATER MAIN
- EXISTING FALLING WATER MAIN
- PROPOSED POWER SUPPLY
- EXISTING POWER (OVERHEAD)
- EXISTING POWER POLE
- EXISTING CHORUS LINE

ORIGINAL DRAWING IN COLOUR

FOR TENDER
NOT FOR CONSTRUCTION

A	FOR TENDER	AJ	JD	AA	10.20
No.	Revision	By	Chk	Appd	Date

Beca

QUEENSTOWN LAKES DISTRICT COUNCIL

GLENORCHY RESERVOIR UPGRADES

SITE POWER CONNECTION PLAN AND DETAILS

POWER AND SERVICES

3334040-UA-1001 | 0

www.beca.com

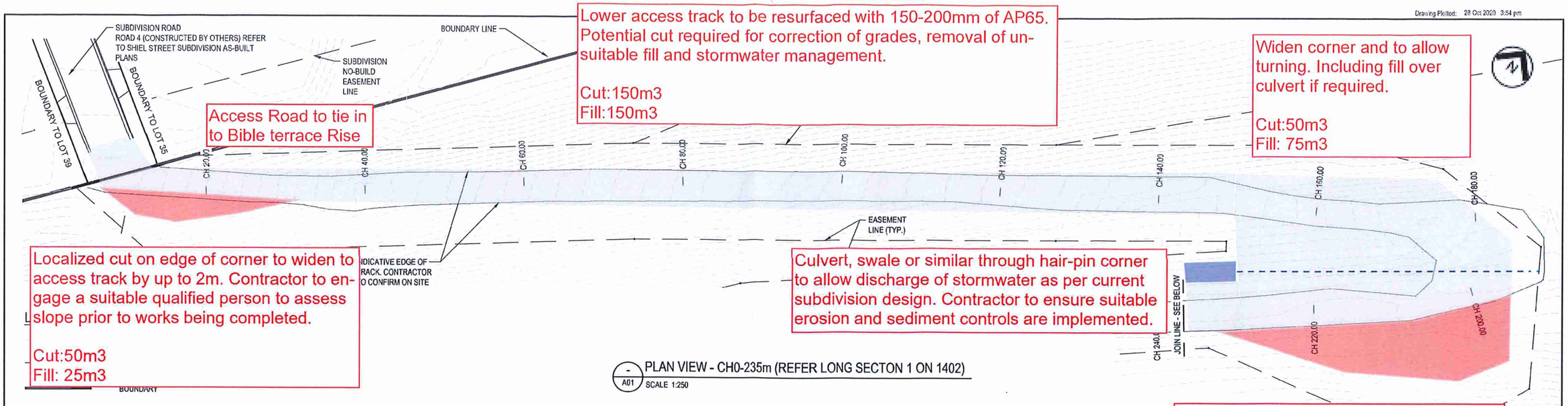
Drawing Plotted: 28 Oct 2020 3:54 pm

Lower access track to be resurfaced with 150-200mm of AP65. Potential cut required for correction of grades, removal of unsuitable fill and stormwater management.

Cut:150m3
Fill:150m3

Widen corner and to allow turning. Including fill over culvert if required.

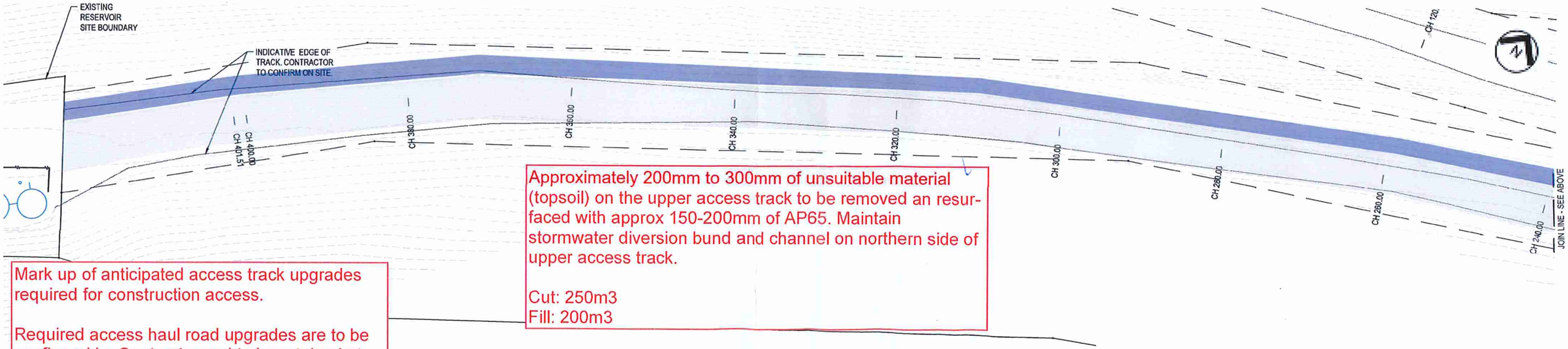
Cut:50m3
Fill: 75m3



Localized cut on edge of corner to widen to access track by up to 2m. Contractor to engage a suitable qualified person to assess slope prior to works being completed.

Cut:50m3
Fill: 25m3

PLAN VIEW - CH0-235m (REFER LONG SECTON 1 ON 1402)
A01 SCALE 1:250



Approximately 200mm to 300mm of unsuitable material (topsoil) on the upper access track to be removed an resurfaced with approx 150-200mm of AP65. Maintain stormwater diversion bund and channel on northern side of upper access track.

Cut: 250m3
Fill: 200m3

Mark up of anticipated access track upgrades required for construction access.

Required access haul road upgrades are to be confirmed by Contractor and to be retained at the completion of the project. Erosion and sediment controls are to be confirmed by contractor and installed prior to works commencing.

Total estimated quantities for earthworks consent:

Cut: 650m3
Fill: 450m3

PLAN VIEW - CH235-401.51m (REFER LONG SECTION 2 ON 1402)
A01 SCALE 1:250

1. IOR TO THE START OF WORK.
2. TRUCTION INCLUDING, BUT NOT LIMITED TO: ER PRIOR TO THE START OF WORK.
3. CCORDANCE WITH WORKSAFE GUIDANCE.
4. THE WORK.
5.
6. L MEASURES DURING CONSTRUCTION IS THE
7. EL DURING CONSTRUCTION.
8. OD CONDITION WITH THE REQUIRED SURFACING.

REFER TO DRAWING
3334040-CA-1402 FOR NOTES

FOR TENDER
NOT FOR CONSTRUCTION

ORIGINAL DRAWING IN COLOUR

No.	Revision	By	Chk	Appd	Date
0	FOR TENDER	IRB1	JD	JW	10.20

Drawing Originator: Beca

Original Scale (A1) 1:250	Design	I. Berliner	10.20	Approved For Construction*
	Draws	I. Berliner	10.20	
Reduced Scale (A3) 1:500	Dsg Verifier	J.Dabkowski	10.20	
	Dwg Check	N.Egan	10.20	Date
	* Refer to Revision 1 for Original Signature			

Client: QUEENSTOWN LAKES DISTRICT COUNCIL

Project: GLENORCHY RESERVOIR UPGRADES

Title: EXISTING ACCESS TRACK PLAN VIEW

Discipline: CIVIL ENGINEERING

Drawing No.: 3334040-CA-1401 Rev.: 0

Document No.: 3334040-CA-1401-1402.DWG

DO NOT SCALE

IF IN DOUBT ASK.