Full Council Meeting – 2nd June 2022

Item 8: Coneburn Attachments

Attachment A: Proposed Variations to Chapters 25, 27, 29, 31, 36 and 44

Variation to Chapter 25 - Earthworks

Underlined text for additions and ~~strike through~~ text for deletions

25.5 Rules – Standards

	Table 25.2 - Maximum Volume	Maximum Total Volume
25.5.5	…. Coneburn Industrial Zone ….	500m^3

Variation to Chapter 27 – Subdivision

	Zone and Location Specific Rules	**Activity Status**
27.7.7.3	Subdivision whereby prior to the issue of a s224(c) certification under the Act for any subdivision of any land within the zone: a. prior to the Northern Access Point being constructed as a Priority T Intersection (Austroads Guide to Road Design (Part 4A)) and being available for public use every subdivision of any land within the zone must contain a condition requiring that the Northern Access Point be constructed as a Priority T Intersection (Austroads Guide to Road Design (Part 4A)) and be available for public use prior to issue of a s.224(c) certificate; b. any subdivision of land within the Activity Areas 1a and 2a which, by itself or in combination with prior subdivisions of land within the zone, involves subdivision of more than 25% of the land area of Activity Areas 1a and 2a must include a condition ~~requiring the construction of the Southern Access Point as a Priority T intersection (Austroads Guide to Road Design (Part 4A)) and that it be available for public use prior to issue of a s.224(c) certificate, unless the Southern Access Point has been constructed and is available for public use at the time the consent is granted.~~ to provide the consent authority written confirmation from Waka Kotahi NZ Transport Agency that access for the subdivision via a new intersection with State Highway 6 *at the Southern Access Point* has been designed and constructed to a safe and acceptable standard.	NC

Variation to Chapter 29 - Transport

Underlined text for additions and ~~strike through~~ text for deletions

Table 29.3 – Standards for activities outside of roads

	Table 29.3 - Standards for activities outside roads	Non-compliance status
29.5.10	Loading Spaces a. Off-street loading shall be provided in accordance with this standard on every site in the Coneburn Industrial Zone, Business Mixed Use Zone, the Town Centre zones, and the Local Shopping Centre Zone, except in relation to unstaffed utility sites and on sites where access is only available from the following roads ….	RD Discretion is restricted to: a. The location, size, and design of the loading space and associated manoeuvring. b. Effects on safety, efficiency, and amenity of the site and of the transport network, including the pedestrian and cycling environment.

Variation to Chapter 31 Signs

Underlined text for additions and ~~strike through~~ text for deletions

31.6 Rules – Activity Status of Signs in Commercial Areas

Table 31.6 – Activity Status of Signs in Commercial Areas		Coneburn Industrial Zone
31.6.1	**Static signage platforms that is one of the sign types listed in Rules 31.6.2 to 31.6.5 below and complies with the standards applying to that sign type.** Control is reserved to the matters set out in Rule 31.14.	C
31.6.2	**Arcade directory signs.**	P
31.6.3	**Upstairs entrance signs.**	P
31.6.4	**All signs located within the ground floor facade of a building** In those zones where this is a controlled activity, control is reserved to the matters set out in Rule 31.14. Note: Parts 31.3.2 and 31.16 of this Chapter explain and illustrate the application of this rule.	C
31.6.5	**Above ground floor signs**. In those zones where this is a controlled activity, control is reserved to the matters set out in Rule 31.14. Note: Part 31.16.7 of this Chapter has a diagram which illustrates the application of this rule.	C
31.6.6	**Digital signage platforms within the ground floor facade of a building**	PR
31.6.7	**Digital signage platforms above ground floor level**	PR
31.6.8	**Digital signs not located within a digital signage platform**	PR

31.6.9	**Billboard signs**	PR
31.6.10	**Any sign activity which is not listed in Table 31.4 or Rules 31.6.1 to 31.6.9 inclusive**	D

Variation to Chapter 36 - Noise

Underlined text for additions and ~~strike through~~ text for deletions

36.5 Rules – Standards
Table 3: Specific Standards

Rule Number	Specific Standards				Non-compliance Status
	Activity or sound source	**Assessment location**	**Time**	**Noise limits**	
36.5.15	Sound from activities in the Coneburn Industrial Zone. Note: For the purpose of this rule, a road that is located outside this zone is not deemed to be a "site outside this zone" and, as such, the noise levels specified may be exceeded on road reserves adjacent to this zone.	At any point within any site located in any other zone.	Refer to standard relevant to the zone in which noise is received.	Refer to standard relevant to the zone in which noise is received.	NC

36.7 Ventilation Requirements for other Zones (Table 5)

The following table (Table 5) sets out the ventilation requirements in the Wanaka and Queenstown Town Centre Zones, the Local Shopping Centre Zone, Coneburn Industrial Zone and the Business Mixed Use Zone.

Table 5

Room Type	**Outdoor Air Ventilation Rate (Air Changes Room Type per Hour, ac/hr)**	
	Low Setting	**High Setting**
Bedrooms	1-2 ac/hr	Min. 5 ac/hr
Other Critical Listening Environments	1-2 ac/hr	Min. 15 ac/hr

Noise from ventilation systems shall not exceed 35 dB LAeq(1 min), on High Setting and 30 dB LAeq(1 min), on Low Setting. Noise levels shall be measured at a distance of to 2 m from any diffuser.
Each system must be able to be individually switched on and off and when on, be controlled across the range of ventilation rates by the occupant with a minimum of 3 stages.
Each system providing the low setting flow rates is to be provided with a heating system which, at any time required by the occupant, is able to provide the incoming air with an 18 ºC heat rise when the airflow is set to the low setting. Each heating system is to have a minimum of 3 equal heating stages.
If air conditioning is provided to any space then the high setting ventilation requirement for that space is not required.

Variation to Rule 44.4.9 - Custodial Units

Underlined text for additions and ~~strike-through~~ text for deletions

	Activities located in the Coneburn Industrial Zone	**Activity Status**
44.4.9	Custodial Units A single ~~residential flat~~ Residential Unit providing for the custodial management of an Industrial or Service activity and which complies with all of the following requirements: a. It is located above or behind an Industrial or Service Activity; b. It is maintained in the same ownership as the Industrial or Service Activity; c. It is not subdivided, unit titled or otherwise separated, including by lease from the Industrial or Service activity it is attached to; d. It is not over 50m² and no more than 20% of the GFA of the building in which it is contained; e. It is only occupied by persons working in the Industrial or Service activity to which the unit is attached and whose duties require them to live on site.	D

Variation to Rule 44.4.20 - Visitor Accommodation

Underlined text for additions and ~~strike-through~~ text for deletions

	Activities located in the Coneburn Industrial Zone	**Activity Status**
44.4.20	Visitor Accommodation, Residential Visitor Accommodation and Homestay activities	PR

Variation to Site Coverages

Underlined text for additions and ~~strike-through~~ text for deletions

44.5 Rules - Standards

	Standards for activities located in the Coneburn Industrial Zone	**Non-compliance Status**
~~44.5.5~~	~~Building Coverage~~ ~~Activity Area 1a (Large Lot Size) 30%~~ ~~Activity Area 2a 35%~~	~~**RD**~~ ~~a. The extent to which increased building coverage will decrease the availability of onsite parking or loading;~~ ~~b. Whether the needs of the industrial or service activity require parking or loading within a building;~~ ~~c. Whether the needs of the industrial or service activity require that the manufacture or maintenance of vehicles or large items take place within a building;~~ ~~d. The extent to which the safety and efficiency of the surrounding roading network would be adversely affected by the proposal;~~ ~~e. Any cumulative effect on the proposal in conjunction with other activities in the vicinity on the safety and efficiency of the surrounding roading.~~

And consequential renumbering of Rules 44.5.6-44.5.12.

ATTACHMENT B – Coneburn Variations Section 32 Report

Queenstown Lakes District Proposed District Plan
Section 32 Evaluation Report

May 2022

For:

Variation to Proposed District Plan Chapters in relation to Chapter 44 Coneburn Industrial Zone

And associated Variations to Proposed District Plan:

Chapter 25 Earthworks

Chapter 27 Subdivision

Chapter 29 Transport

Chapter 31 Signs

Chapter 36 Noise

EXECUTIVE SUMMARY

This variation addresses matters in relation to the efficient and effective implementation of the Coneburn Industrial Zone (CIZ).

This proposal is to amend Chapter 44 (Coneburn Industrial Zone) of the Proposed District Plan (PDP) and allow for greater building coverages, to prohibit Residential Visitor Accommodation and Homestay activities and amend the provision controlling custodial units so it correctly refers to a residential unit. In Chapter 27 (Subdivision and Development), a rule is varied to reflect the updated intersection requirements for this type of development.

The proposal also includes associated variations to PDP Chapters 25 (Earthworks), 29 (Transport), 31 (Signs) ad 36 (Noise) in respect of adding appropriate controls for the Coneburn Industrial Zone within these district-wide chapters.

Addressing the issues set out above will result in a more appropriate regime of managing the effects of activities within the Coneburn Industrial Zone and is consistent with achieving the purpose of the Act.

CONTENTS

1. INTRODUCTION

1.1. PURPOSE OF REPORT

Section 32 of the Act requires objectives in plan change proposals to be examined for their appropriateness in achieving the purpose of the Act, and the policies and methods of those proposals to be examined for their efficiency, effectiveness and risk in achieving the objectives. Section 32 (s32) of the RMA is integral to ensuring transparent, robust decision-making on RMA plans and policy statements (proposals).

This report fulfils Council's obligations under section 32 of the Act. The analysis set out below (within sections 2 to 8) should be read together with the text of Appendix 1A.

The effects of new policies and rules on the community, the economy, and the environment need to be clearly identified and assessed as part of this evaluation. The analysis must be documented, so stakeholders and decision-makers can understand the reasoning behind policy proposals.

Section 32 requires that:

- new proposals must be examined for their appropriateness in achieving the purpose of the RMA, being the sustainable management of natural and physical resources;
- As part of considering appropriateness, the benefits and costs of the environmental, economic, social and cultural effects of implementing the new policies and rules need to be clearly identified and assessed;
- all advice received from iwi authorities and the response to the advice needs to be summarised; and
- the analysis must be documented, so stakeholders and decision-makers can understand the rationale for policy choices.

The full text of Section 32 can be found in Appendix 2A.

2. ISSUE DEFINITION

2.1 CURRENT STATE

The proposed variation removes the Restricted Discretionary Building Coverage Rule (44.5.5) from Chapter 44 (Coneburn Industrial Zone), to allow for greater building coverages within the Zone, up to the non-complying levels. In Activity Area 1a the maximum building coverage increases from 30% to 40%. In Activity Area 2a the maximum building coverage increases from 35% to 65%.

Activity Area	Permitted	Restricted Discretionary	Non-Complying
Operative Building Coverages			
Activity Area 1A	Up to 30%	30 to 40 %	Above 40%
Activity Area 2A	Up to 35%	35 to 65 %	Above 65%
Proposed Building Coverages			
Activity Area 1A	Up to 40%	-	Above 40%
Activity Area 2A	Up to 65%	-	Above 65%

In Chapter 27 (Subdivision and Development), Rule 27.7.3 is varied to reflect that it is it no longer acceptable to construct a priority T intersection to service this type of development, and a roundabout is required.

The proposal also involves minor changes to Chapter 44 to improve the clarity and intent of its existing provisions relating to custodial units and Visitor Accommodation type activities, and to ensure these provisions more closely align with the overall strategic intent of the PDP. Residential Visitor Accommodation and Homestay Activities are to be prohibited.

The proposal also includes a variation to the district wide chapters of the PDP, as listed below, in order to identify the Coneburn Industrial Zone within their overall management framework:

- Chapter 25 (Earthworks);
- Chapter 29 (Transport);
- Chapter 31 (Signs); and
- Chapter 36 (Noise)

The identification of the Coneburn Industrial Zone within these existing chapters will ensure that potential adverse effects which may be generated by earthworks, transport, signs and noise, that are

a related aspect of activities and development taking place within the Zone are appropriately managed in accordance with the overall strategic intent set out within these district wide chapters.

2.2 ISSUE DESCRIPTION

Key issues	Summary
Issues 1-4 – There are no provisions for Coneburn in the *Earthworks, Transport*, *Signs* and *Noise* Chapters of the PDP.	In the absence of these relevant district wide provisions, the Council is not able to control a range of potential land use and development activities within the Coneburn Industrial Zone. This has the potential to give rise to a range of unintended adverse social, economic and environmental effects, and cause inefficiencies for plan users and potential future landowners and/or occupiers within the Zone. The identification of the Coneburn Industrial Zone within these existing PDP chapters will ensure that potential adverse effects which may be generated by earthworks, transport, signs and noise that are a related aspect of activities and development taking place within the Zone are appropriately managed in accordance with the overall strategic intent of the PDP.
Issue 5 – Building Coverage and Access	Landowners within the CIZ have sought to amend Chapter 44 to revert building coverages within the Zone to those originally sought when a roundabout was proposed at the intersection of SH6 and Woolshed Road. This is in accordance with the planning framework when CIZ was to be accessed via the existing Priority T as well as a roundabout. It is proposed that this is achieved through removing the Restricted Discretionary Activity thresholds, as detailed in Section 2.1 of this report. This report will demonstrate that the effects of buildings with coverage between 30-40% in Activity Area A1, and between 35-65% in Activity Area A2 will **not**: • unduly impact the effective functioning of the Zone or the internal and surrounding transport networks • increase the natural hazard risk, • have significant adverse landscape or ecological effects

	and **can:** • be supported from an economic costs and benefits perspective • have feasible infrastructure connections
Issue 6 – Custodial Units	The provision for Custodial Units currently refers to 'residential flat'. By definition, a residential flat is ancillary to a residential unit. A custodial unit is generally small in nature and attached to the primary activity on the site. The reference to residential flat in this provision is unintentional and this variation seeks to correct this by amending the rule to refer to residential unit. The proposal seeks to improve the way in which it functions with existing PDP definitions. The intent and associated requirements of the provision are to remain unchanged.
Issue 7 – Other types of visitor Accommodation	Rule 44.4.20 currently prohibits visitor accommodation activities within the Zone. This needs to be expanded to include other types of visitor accommodation activities (being Residential Visitor Accommodation and Homestays) from occurring in an industrial zone.

3. DEVELOPMENT OF PROPOSAL

3.1. COMMUNITY/STAKEHOLDER ENGAGEMENT

Broad community or stakeholder engagement has not been undertaken for this variation. The variation is considered to be relatively uncontentious and generate a low level of interest (from a district-wide perspective) on the basis that:

- Allowing for higher permitted building coverages in the zone will not greatly alter the capacity of the zone
- Adding appropriate provisions for Coneburn into select district-wide chapters to manage the effects of *transport, noise, earthworks* and *signs* within the zone aligns with the management of such in most other zones in the PDP framework.

3.2. CONSULTATION WITH IWI AUTHORITIES

Clause 3(1)(d) of Schedule 1 of the RMA sets out the requirements for local authorities to consult with iwi authorities during the preparation of a proposed plan.

Clause 4A requires the Council to provide a copy of a draft proposed plan to iwi authorities consulted, prior to notification, and have particular regard to any advice received.

The proposed variations were workshopped with iwi representatives from Te Ao Marama and Auhaka on 6 April 2022. The following issues were traversed:

Topic	Feedback	Comment
Earthworks	Is 500m^3 consistent with other chapters?	Yes, 500m^3 is consistent with the other industrial zone in the District, the General Industrial and Service Zone.
Visual Impacts	Will the Zone be an eyesore from the Jacks Point Area?	Maintaining the open space zone will be key to ensuring that the development remains visually sympathetic to its surroundings. There are already additional protections for this (Policies 27.3.10.2 and 27.1.10.3) in the Subdivision and Development Chapter for the Coneburn Industrial Zone.
Stormwater	What are the stormwater provisions to negate the increase extent of hard surfacing?	Council is satisfied that, it has been demonstrated that disposal of stormwater is feasible and can be achieved via private treatment and soakage devices within the site, the details of which can be determined at the time subdivision occurs within the Zone.
Stormwater	Is there anything in the structure plan or sub-division provisions in relation to larger buildings/controlling runoff?	Chapter 27 Subdivision contains the relevant policies (27.2.5.6, 27.2.5.11 and 27.2.5.12) for stormwater, these are applied across all subdivision in the District. Chapter 27 Subdivision contains the relevant policies for stormwater, these are applied across all subdivision in the District.

Urban Design	Will there be other building design controls or guidelines?	Urban Design guides have not currently been introduced in Business Zones except from the Business Mixed Use Zone. There is currently no intention to produce one for the CIZ However, all buildings in the CIZ are controlled through Rule 44.4.7 which addresses these aspects, including design: a. Landscaping; The extent to which landscaping will improve the visual appearance of the site, buildings, outdoor storage areas, and carparking areas, taking account of: i. The nature of planting or materials to be used; ii. The ease of maintenance; and iii. The size of the plans and/or the time it will take for the plants to mature. b. External appearance (including signage, the colour of the buildings and, in particular, the extent of corporate colours used); c. The ability to service the building(s), in terms of roading, water supply, stormwater and waste water; d. Waste and recycling storage space; e. Natural Hazards (if not addressed at the time of subdivision); f. Fencing adjacent to the open space area.

Further feedback on these comments has not yet been received.

4. CURRENT STATE, ISSUES, AND DESIRED OUTCOMES

Issue 1 – Lack of maximum earthworks volume provisions

Chapter 25 of the PDP contains all provisions relating to earthworks. Earthworks is defined in the PDP as follows:

'Means the disturbance of land by the removal or deposition on or change to the profile of land. Earthworks includes excavation, filling, cuts, root raking and blading, firebreaks, batters and the formation of roads, access, driveways, tracks and the deposition and removal of cleanfill.'[1]

Chapter 44 itself does not contain any zone specific provisions which limit the volume of earthworks that might take place on land location within the Coneburn Industrial Zone. Table 25.2 of Chapter 25

1 Page 8, PDP Chapter 2 (Definitions)

sets out maximum earthworks volumes across the District's PDP zones.[2] No volume limits are located within 25.2 for the Coneburn Industrial Zone. In the absence of such limitations, any volume of earthworks may be undertaken within the Zone. While it is noted that the balance of non-zone specific Chapter 25 provisions would currently apply to the Zone, the absence of a maximum volume trigger inadvertently precludes a substantial proportion of otherwise compliant earthworks activities from being assessed for their possible adverse effects on the environment.

Earthworks activities which do not comply with the maximum volumes set out within Table 25.2 require a restricted discretionary activity resource consent subject to Rule 25.4.2. Provision 25.7.1 sets out the range of matters of discretion which must be considered for resource consents that fail to comply with the limits of Table 25.2. These include the following:

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

25.7.1.2 Landscape and visual amenity.

25.7.1.3 Effects on infrastructure, adjacent sites and public roads.

25.7.14 Land stability.

25.7.1.5 Effects on water bodies, ecosystem services and biodiversity.

25.7.1.6 Cultural, heritage and archaeological sites.

25.7.1.7 Nuisance effects.

25.7.1.8 Natural Hazards

25.7.1.9 Functional aspects and positive effects.

In the absence of a maximum earthworks volume, these matters of discretion would not be able to be taken into account, even when large volumes of earthworks are proposed within the Zone. A discussion in regard to the relevance of these matters are discussed below.

<u>Ecological effects</u>

The inability to consider *soil erosion, generation and run off of sediment* alongside *effects on waterbodies, ecosystem services and biodiversity* may result in adverse effects on ecological values within the Zone. These values have been identified and discussed through the plan making process for

[2] Note that a number of zones are not incorporated into the PDP framework as they have not yet been reviewed. Land use, subdivision and development activities within these as yet un-reviewed zones are still contained within the ODP. Earthworks within these ODP zones are controlled by provisions within the ODP earthworks chapter (Section 22).

the Coneburn Industrial Zone, and in addition, are safeguarded by specific provisions within Chapter 44[3].

Matters relating to ecology within the Zone were discussed by the IHP in their decision report relating to Chapter 44. The Council's ecological expert outlined that policy and rules promoting the retention and enhancement of existing ecological values, restoration of ecologically appropriate forest and control of exotic weeds were necessary, particularly given the extensive loss of indigenous cover from the land environments on which it sits[4]. The submitter's ecological expert accepted this view[5], as did the IHP[6]. As a result, a range of provisions were included in the decisions version of Chapter 44 relating to the restoration and enhancement of ecological values within the Zone.

Taking these matters into account, it is important that a maximum earthworks volume trigger is identified within Chapter 25 for the Coneburn Industrial Zone. Uncontrolled volumes of earthworks may have adverse effects on ecological values.

Landscape and Visual amenity effects

The inability to consider possible *landscape and visual amenity* effects associated with earthworks activities involving large volumes of disturbance may result in adverse effects on the landscape values present in the area of the Coneburn Industrial Zone.

Landscape values were considered by the IHP in their decision report for the Zone. On balance, the IHP considered that the resultant landscape related effects of the proposed urban zone to be acceptable[7]. However, the unique location of the Zone set amongst an Outstanding Natural Landscape (ONL) of the Remarkables Mountain Range and surrounding rural setting, is recognised through Objective 44.2.2 and Policies 44.2.2.1 and 44.2.2.3 which outline that the Zone is required to fit into the surrounding landform and that any resulting visual effects when viewed from outside the Zone be mitigated through the use of landscaping and revegetation.

[3] Note Rules 44.4.8(b), 44.5.1 and 44.5.2 of Chapter 44
[4] Para 206, Report 17-8
[5] Para 207, Report 17-8
[6] Para 228, Report 17-8
[7] Para 227, Report 17-8

Uncontrolled quantities of earthworks activity within the Zone may result in adverse visual effects being experienced beyond the boundaries of the Zone and, in particular from the immediately surrounding ONL.

It is also noted that large volumes of earthwork activities may result in adverse amenity related effects within the Coneburn Industrial Zone, such as the creation of unsightly mounds of disturbed earth. While it is acknowledged that the Zone is intended to accommodate specific types of activities (being Industrial and Service activities) that are known to have the potential to create noise, odour, heavy traffic movements and other effects, and accommodate larger sites and buildings, it should be recognised that the Zone is an urban one, being a place of place of human activity, employment and trade. Uncontrolled earthworks volumes of this type may compromise the Zone's capacity to strike the appropriate balance between a place of industrial activity and a place of business and employment as a result of adverse visual and amenity related effects within its boundaries.

Natural Hazards

The inability to consider possible *natural hazard* related effects associated with earthworks activities involving larger volumes of disturbance may result in adverse effects on the nature and scale of natural hazard risk within the Coneburn Industrial Zone.

An assessment of natural hazards affecting the Zone was undertaken as part of a past resource consent process. This assessment investigated the presence of landslide movement, rockfall, liquefaction, and flooding. The Council's natural hazard maps illustrate a range of hazards being present across the Zone consistent with those identified in the abovementioned assessment. Report 190413 dated September 2019 by Geosolve presents the results of a geotechnical investigation that assessed the following natural hazard risks within the Coneburn Industrial Zone. It was reviewed by Golder Associates (WSP). A summary of the findings follows:

Landslide/Debris Flood

- *No evidence identified to date indicates the site of the proposed building platform or accessway has experienced recent or historic geotechnical instability*
- *Nil to extremely low risk from the mapped landslide feature adversely affecting the stability of the proposed development.*
- *The review confirmed there is a low to moderate risk of debris flood across the site.*

Alluvial Fan/Flooding

- *The site contains a less than recently active alluvial fan and the reservoir site is assessed too be adequately protected from the avulsion of Stoney Creek by existing natural landforms*
- *The review confirmed there is a low to moderated risk of flooding across the site.*

Liquefaction

- *The regional groundwater table was not intercepted by test pitting or borehole investigations. It is considered to be a significant depth below the development.*
- *Liquefaction of the foundation soil is not feasible above the water table, which is beyond the zone of influence for any large or heavy buildings on this site*
- *The review confirmed that the present risk is acceptably low and engineering controls are unlikely to be prohibitively expensive.*

Rockfall

- *Risk is considered negligible and construction of the proposed development is feasible from a rock fall risk perspective and no mitigation works are required with respect to this hazard.*
- *The review judged this risk assessment to be appropriate.*

Report 190413 covered an area from the Remarkables Access Road, north of the Coneburn Industrial Zone, to slightly south of the zone, capturing the extent of the zone.

The review concluded that the Geosolve report adequately addresses the geohazards for the proposed development to a level appropriate for a District Plan Change.

However, uncontrolled volumes of earthworks activity within the Zone may intensify the nature and scale of effects that accompany the type of natural hazard events that are identified as possibly effecting the site. As a result, they may increase the resulting risk to people and property that would be present within the Zone once it is developed for industrial purposes. It is considered appropriate to impose a maximum total volume for earthworks within the zone, above which resource consent will be required.

Plan use and administration

The absence of a specified maximum volume of earthworks generally creates inconsistencies and inefficiencies in terms of the overall form and integrity of the PDP. In particular, a lack of any maximum earthworks volume for this zone is inconsistent with the balance of Chapter 25 and with the overall intent of Chapter as set out within its suite of objectives and policies. It is a district wide chapter and Table 25.2 intends to set out maximum volumes for the full range of PDP zones within the District.

In addition, the absence of a maximum volume limit is likely to create uncertainty and confusion for lay plan users who might be intending to develop land within the Zone which would otherwise be in

overall accordance with the intent of Chapter 44 and Chapter 25. This uncertainty is unnecessary and unintentional.

Issue 2 – Lack of complete transport provisions

Chapter 29 (Transport) was addressed as part of Stage 2 of the plan review process. Therefore, Chapter 44 was developed and decided in the absence of an understanding of how the PDP intended to control transport related components of land use and development.

Chapter 29 addresses all substantially relevant transport matters applicable to the Coneburn Industrial Zone. However, loading spaces have not been addressed in relation to the Zone to date, and which have the potential to generate adverse environmental effects.

Loading spaces

Rule 29.5.10 of Chapter 29 sets out where (i.e. in what zone) and how (i.e. width, length and height) off-street loading spaces are to be provided. The Coneburn Industrial Zone is not identified as a zone in which loading spaces are to be provided. Given the purpose of the Zone is to provide for the establishment and operation of Industrial and Service activities it is anticipated that loading and unloading of vehicles will be a common and necessary occurrence within the Zone. The absence of such off-street loading space may result in loading and unloading operations taking place within the road corridor, thereby impacting the safe and efficient operation of the transport network.

Issue 3 – Lack of signs provisions

Chapter 31 (signs) does not currently contain any provisions controlling the nature and scale of signage within the Coneburn Industrial Zone. Given that that the Coneburn Industrial Zone came into existence post the notification of Chapter 31 and prior to the IHP releasing their related recommendations, sign provisions would not have been able to be incorporated into either chapter. No further discussion in regard to appropriate signage provisions for the Coneburn Industrial Zone appears to have taken place in proceedings relating to either chapter.

The absence of provisions controlling signage within the Coneburn Industrial Zone may result in adverse environmental effects. In particular, it is noted that the Zone is commercial in nature and as a result, signage is a necessary and important element of land use and development. It may be the case that multiple businesses on single sites (including ancillary activities) need to provide locational information, branding, and a certain level of self-promotion through the use of signage. There are

examples of signage proliferation in other commercial and industrial locations within the District which has resulted in poor environmental outcomes in terms of visual amenity, signage legibility, and has had an overall detrimental impact to the safe and efficient movement of pedestrians and vehicles. As such, an unmanaged, unclear or overly permissive approach to signage is likely to result in cumulative adverse environmental effects.

It is the overall intent of the PDP to ensure signs within the District's commercial purpose urban zones are appropriately managed in terms of their number, type, location, appearance and design. It is acknowledged that the District's commercial zones are hubs of employment and trade, and therefore, signage is a necessary component of land use and development activities within these areas. As a result, these zones face pressures from signage, the adverse effects of which need to be managed appropriately.

It is also necessary to afford landowners and business operators within the District's commercial zones with a degree of certainty in terms of the signage they are able to establish in association with their activities.

It is noted that the Council's proposed Chapter 18A (GIZ)[8] has recommended accepting a submission identifying a set of provisions in Chapter 31 controlling signage within the GIZ. The absence of signage provisions for the Coneburn Industrial Zone would be inconsistent with this recommended approach (if accepted by the IHP). Such inconsistency is not considered efficient or effective plan making and is likely to create uncertainties and ambiguities for plan users when planning development within the Coneburn Industrial Zone.

Issue 4 – Lack of noise provisions

The IHPs recommended Chapter 44 was released on 7 May 2018 as part of Stage 1 of the review process. Chapter 36 (noise) was also reviewed as part of Stage 1. The IHP did not recommend that any specific noise provisions be included within Chapter 44 or Chapter 36 to control the effects of noise produced by activities within the Coneburn Industrial Zone. It is noted that noise provisions were initially included within a set of draft provisions produced by the submitter prior to the IHP recommendations being released. However, it was agreed at the expert planner conferencing that this

8 Appendix 1, Section 42a Report of Luke Thomas Place, Chapter 18a General Industrial Zone – Text And Mapping, 18 March 2020

noise rule be deleted and that the PDP noise chapter be relied on to control noise effects[9]. The joint planning witness statement goes on to note that 'industrial' noise standards had been removed from the Council's right of reply version of Chapter 36 (Noise). In their recommendation report, the IHP noted that that the PDP should not include noise rules for zones that are not yet within the PDP framework[10] (i.e. industrial zones), and highlighted that the rule[11] would not, in any event, apply to the Coneburn Industrial Zone due to its specific drafting. Nonetheless, the IHP note that the effect of the previously proposed noise rule would be that '*activities in the Coneburn Industrial Zone, while not needing to meet noise limits within the zone, would still need to meet the standards for noise received in the adjoining Rural Zone, or the nearby Jacks Point Zone'*[12].

Taking into account the above, it is noted that Chapter 36 does not currently control noise effects experienced either within or outside of the Zone. This is of no material consequence at this point in time as the Zone has not yet been developed for the type of urban development enabled by Chapter 44. However, in the event that the Zone is developed, the absence of such noise controls may result in adverse noise related effects being experienced.

Given that Coneburn Industrial Zone is intended to provide for the establishment and operation of Industrial and Service activities, it is likely that the Zone will generate greater levels of noise than other similar commercial type zones. In the event that this noise travels beyond the boundaries of the Zone to other adjoining or nearby zones, such as the Rural Zone and Jacks Point Special Zone, owners and/or occupiers of properties within these zones may be adversely affected. In this case, no abatement or other enforcement related action is likely to be able to be undertaken. Taking into account the IHPs view that the immediately surrounding Coneburn Valley is almost inevitably going to be urbanised[13] (which is also envisaged by a number of Council's draft FDS scenarios), it is important that appropriate noise controls be provided in Chapter 36 which apply to activities undertaken within the Coneburn Industrial Zone.

9 Page 4, Expert Conferencing – Coneburn Industrial Submission, Planning Expert Conferencing Statement, 15 September 2017

10 Para 615, Report 8, Report and Recommendations of Independent Commissioners Regarding Chapter 30, Chapter 35 and Chapter 36, May 2018

11 Rule 36.5.7, Appendix 1 'Revised Chapter', Reply of Ruth Christine Cameron Evans, Chapter 36 Noise, 22 September 2016

12 Para 613, Report 8, Report and Recommendations of Independent Commissioners Regarding Chapter 30, Chapter 35 and Chapter 36, May 2018

13 Para 227, Report 17-8

It is noted that the Council's proposed Chapter 18A (GIZ) did vary Chapter 36 to identify a standard for noise generated by activities within the GIZ[14]. These standards only control noise generated by activities within the Zone when this noise is received in other zones.

The Council's Chapter 18A also proposes to vary Rule 36.7 controlling *ventilation requirements for other zones*[15]*.* This variation identifies the GIZ as an 'other zone' in which ventilation systems should be provided for activities that contain 'bedrooms' and 'other Critical Listening Environments' in order to control adverse noise effects that might be experienced by such activities, and to avoid potential reverse sensitivity effects from their presence within the GIZ. The absence of such controls in Chapter 36 for the Coneburn Industrial Zone gives rise to the potential for adverse noise effects on Critical Listening Environments and for reverse sensitivity effects on Industrial and Service activities permitted within the Zone. Such effects are likely to arise on account of Chapter 44's enabling approach to ancillary Office and Commercial activities, in addition to the provision of Custodial Units as a discretionary activity.

The absence of noise standards for the Coneburn Industrial Zone would be inconsistent with the approach taken for managing potential noise effects within the GIZ, a similar commercial zone. This is not considered efficient or effective plan making and is likely to create uncertainties and ambiguity for landowners and/or occupiers when preparing development projects within the Coneburn Industrial Zone.

Issue 5 – Building Coverage and access

Landowners within the CIZ have sought to amend Chapter 44 to revert building coverages within the Zone to those originally sought when a roundabout was proposed at the intersection of SH6 and Woolshed Road. This is in accordance with the planning framework when CIZ was to be accessed via the existing Priority T as well as a roundabout.

In October 2019, Waka Kotahi advised that the reason permission was not granted to construct the Austroads Priority T intersection at the southern access point was that following the release of the *Government Policy Statement on Land Transport 2018,* it was no longer acceptable to construct this

14 36.5 Rules - Standards, Appendix 1, Section 42a Report of Luke Thomas Place, Chapter 18a General Industrial Zone – Text And Mapping, 18 March 2020 - Proposed Rule 36.5.15, Notified Chapter 18A, General Industrial Zone

15 Rule 36.7, Appendix 1, Section 42a Report of Luke Thomas Place, Chapter 18a General Industrial Zone – Text And Mapping, 18 March 2020 - Proposed Rule 36.5.15, Notified Chapter 18A, General Industrial Zone

type of intersections to service this type of development, and a roundabout would be required. It also advised that there are no other intersection alternatives.

Landowners within the CIZ have sought to amend Chapter 44 to revert building coverages within the Zone to those originally sought when a roundabout was proposed at the intersection of SH6 and Woolshed Road. This is in accordance with the planning framework when CIZ was to be accessed via the existing Priority T as well as a roundabout.

In Activity Area 1A, site coverage of between 30% and 40% is restricted discretionary in the current PDP, but the proposal would include that range within the permitted status (i.e. up to 40% would be permitted). In Activity Area 2A, site coverage between 35% and 65% is restricted discretionary, but the proposal would include that range within the permitted status (i.e. up to 65% would be permitted). The non-complying thresholds remain the same at 40% and 65% respectively. The structure plan provided in **Appendix 2A** shows the locations and extend of the activity areas.

Only 37% of the gross zone area is able to be developed once open space and proposed roading is excluded.[16] This equates to a maximum of 26.56ha of industrial land capacity, which is dominated (83%) by Activity Area 2A, which provides for the smaller of the two minimum lot sizes permitted (1,000sqm). Not all of this industrial land capacity is vacant.

Table 1. Current and Proposed Building Coverages for Coneburn Industrial Zone[17]

	Permitted	Restricted Discreationary	Non-complying	Minumum Permitted Lot Size	Indicative Minimum Permitted Building Footprint
Coneburn Operative Site Coverages:					
Activity Area 1A	Up to 30%	>= 30%	>=40%	3,000	900
Activity Area 2A	Up to 35%	>=35%	>=65%	1,000	360
Coneburn Proposed Site Coverages:					
Activity Area 1A	Up to 40%	N/A	>=40%	3,000	1,200
Activity Area 2A	Up to 65%	N/A	>=65%	1,000	660
Comparator					
GISZ	Up to 75%	>=75%	N/A	1,000	760

[16] Coneburn Industrial Zone Site Coverage Variation: Economic Assessment. Market Economics.

[17] Ibid. Figure 1.4, p4

To reflect the updated intersection requirements, and ensure that the zone is only intensified after the roundabout has been constructed, Rule 27.7.73(b) (see **Appendix A** for full rule) is proposed to require:

> "any subdivision of land within the Activity Areas 1a and 2a which, by itself or in combination prior subdivisions of land within the zone, involves subdivision of more than 25% of the land area of Activity Areas 1a and 2a must include a condition to provide the consent authority written confirmation from Waka Kotahi NZ Transport Agency that access for the subdivision via a new intersection with State Highway 6 *at the Southern Access Point* has been designed and constructed to a safe and acceptable standard."

This ensures that the development of the zone will not exceed the capacity of its access or pose undue risks to the users of State Highway 6 before the current southern access point is upgraded to a roundabout.

Transport network considerations of increased building coverage have determined that the traffic generation from the proposed increased building coverage would typically be accommodated within the existing capacity for the State Highway link to Queenstown.[18]

In terms of visual amenity, the zone requires the screening of buildings developed (using planting) so that they are not easily seen from State Highway 6. Development is also likely to be single storey development, in keeping with the assumption that industrial buildings typically require ground floor space and higher internal roof heights, with little or no space on upper floors (including tenancies on upper floors available to other businesses).

An assessment of landscape and visual effects (**Attachment D**) rated adverse landscape effects associated with the proposal, including the roundabout, as very low.[19]

Issue 6 – Custodial Units

Rule 44.4.9 provides for custodial units to be established within the Coneburn Industrial Zone as a discretionary activity. Rule 44.4.9 states the following:

> *A single residential flat providing for the custodial management of an Industrial or Service activity and which complies with all of the following requirements:*

[18] Stantec Technical Review Coneburn Industrial Review – Change to Land Use Coverage

[19] Bridget Gilbert Landscape Architecture – Coneburn Industrial Zone: Landscape & Visual Effects

a) *It is located above or behind an Industrial or Service Activity;*
b) *It is maintained in the same ownership as the Industrial or Service Activity;*
c) *It is not subdivided, unit titled or otherwise separated, including by lease from the Industrial or Service activity it is attached to;*
d) *It is not over 50m² and no more than 20% of the GFA of the building in which it is contained;*
e) *It is only occupied by persons working in the Industrial or Service activity to which the unit is attached and whose duties require them to live on site.*

Chapter 2 (Definitions) does not provide a definition of custodial unit. Given this, Rule 44.4.9 appears to rely on the definition of Residential Flat in order to facilitate its administration.

The definition of Residential Flat is as follows:

Means a residential activity that comprises a self-contained flat that is ancillary to a residential unit and meets all of the following criteria:

a. the total floor area does not exceed;

i. 150m2 in the Rural Zone and the Rural Lifestyle Zone;

ii. 70m2 in any other zone;

not including in either case the floor area of any garage or carport;

b. contains no more than one kitchen facility;

c. is limited to one residential flat per residential unit; and

d. is situated on the same site and held in the same ownership as the residential unit. [20]

Critically, this definition requires Residential Flats to be *ancillary* to a Residential Unit. Therefore, Residential Flats cannot exist in the absence of a primary Residential Unit. Chapter 44 does not enable Residential Units within the Zone as Rule 44.4.19 identifies Residential Activities (other than those provided for in Rule 44.4.9) as prohibited activities. Given this, Rule 44.4.9 and Rule 44.4.19 are at odds as currently written, and effectively exclude the intent of the Zone to provide for custodial units as discretionary activities.

[20] Page 29, PDP Chapter 2 (Definitions)

In addition, despite the specificity of Rule 44.4.9 to the definition of Residential Flat, it sets out a suite of specific standards that custodial units within the Zone are expected to achieve. This position does not work effectively with the definition of Residential Flat which itself establishes a different set of specific criteria that need to be met before an activity can in fact meet the definition. As such, as currently written, Rule 44.4.9 contains internal conflicts which are likely to prevent ease of plan use and administration. It would be more effective to remove the term custodial unit from Rule 44.4.9 and replace it with the defined term of 'Residential Unit'.

Issue 7 – Visitor Accommodation

Rule 44.4.20 sets out that Visitor Accommodation activities within the Coneburn Industrial Zone are prohibited. This is an appropriate activity status for this Zone which is primarily intended to provide viable opportunities for the establishment and operation of Industrial and Service activities.

Since the IHP released their recommendation on Chapter 44, the Council has notified a new district wide approach to the management of Visitor Accommodation type activities. This new approach was provided for by way of Stage 2 of the District Plan review. The IHP has released its decisions on Stage 2 topics, including on Visitor Accommodation.

This new management framework includes controls on the related and defined activities of *Residential Visitor Accommodation*[21] (RVA) and *Homestay*[22] activities. There are no appeals on these definitions. These newly defined activities are not identified within Chapter 44 and are not captured by Rule 44.4.20. As such, subject to Rule 44.4.15 they may be applied for as a non-complying activity. This does not reflect the intent of Rule 44.4.20, nor of Policies 44.2.1.2 and 44.2.1.7 which outline that the use of land within the Zone for non-industrial activities is to be excluded.

Although the direction provided for in Policies 44.2.1.2 and 44.2.1.7 go some way toward ensuring that RVA and Homestay activities do not occur within the Zone, it is noted that, through the provision of custodial units, there is some scope for such activities to take place, given that they rely in the first

21 Means the use of a residential unit including a residential flat by paying guests where the length of stay by any guest is less than 90 nights. Excludes: Visitor Accommodation and Homestays. Note: Additional requirements of the Building Act 2004 may apply.

22 Means the use of a residential unit including a residential flat by paying guests (where the length of stay by any guest is less than 90 nights) at the same time that either the residential unit or the residential flat is occupied by residents for use as a Residential Activity. Includes bed & breakfasts and farm-stays. Excludes: Residential Visitor Accommodation and Visitor Accommodation. Note: Additional requirements of the Building Act 2004 may apply.

instance on the presence of residential activities to take place. It would be more effective and efficient to expressly prohibit these activities within Rule 44.4.20 along with Visitor Accommodation activities.

5. SCALE AND SIGNIFICANCE

The level of detailed analysis undertaken for the evaluation of the proposed objectives and provisions has been determined by an assessment of the scale and significance of the implementation of the proposed provisions. In making this assessment, regard has been had to the following, namely whether the proposed objectives and provisions:

- Result in a significant variance from the existing baseline in the Proposed District Plan Chapter 44 Coneburn Industrial Zone;
- Have effects on matters of national importance;
- Adversely affect those with specific interests;
- Involve effects that have been considered implicitly or explicitly by higher order documents;
- Impose increased costs or restrictions on individuals, communities or businesses.

The level of detail in this evaluation report corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.

In this case, the scale and significance is considered **low to moderate** to reflect the scale and significance of the implementation of the proposed provisions because:

- The permitted building coverages are only being increased to what would have previously been obtained via a restricted discretionary consent
- A custodial unit would should only be a small scale activity, with no other units attached
- Residential Visitor Accommodation and Homestays would not usually be expected in an industrial zone
- the proposed associated variation to the district-wide earthworks, transport, sign and noise chapters are limited in their effect, and, if not for genesis of the Zone, coupled with the staged nature of the District Plan Review, would have already been included within Chapter 44

6. EVALUATION OF PROPOSED OBJECTIVE(S)

Section 32(1)(a) requires an examination of the extent to which the proposed objectives are the most appropriate way to achieve the purpose of the Act. This variation does not propose any new objectives or changes to existing objectives. In this case, an examination of the extent to which the purpose of the proposal is the most appropriate way to achieve the purpose of the Act is required (s32(6)).

A variation to certain district wide chapters of the PDP: being Chapter 25 (Earthworks); Chapter 29 (Transport); Chapter 31 (Signs); and Chapter 36 (Noise), is proposed in order to identify the Coneburn Industrial Zone within their overall management framework. The identification of the Coneburn Industrial Zone within these existing chapters will ensure that potential adverse effects which may be generated by earthworks, transport, signs and noise related aspect of activities and development taking place within the Zone are appropriately managed in accordance with the overall strategic intent set out within these district wide chapters.

Another aspect of this proposal is to undertake a building coverage variation. This variation removes the restricted discretionary activity threshold for building coverages between 30-40% in Activity Area 1A and between 35-65% in Activity Area 2A, thereby permitting site coverages of up to 40% in Activity Area 1A and up to 65% in Activity Area 2A.

Section 5 (purpose and principles) of the RMA sets out the following:

5 Purpose

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

*(2) In this Act, **sustainable management** means 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 well-being 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.

Amendments to Chapter 44 Coneburn Industrial Zone

Amending the identified provisions could significantly improve the implementation district-wide provisions in the Zone, and give clear direction to provisions relating to custodial, residential visitor accommodation and Homestay Activities.

It also removes transaction costs currently associated with restricted discretionary activity resource consent applications for building coverages between 30-40% in Activity Area 1A and between 35-65% in Activity Area 2A. Improved implementation leads to the PDP better achieving section 7(b) of the RMA in terms of the economic benefits derived from the efficient use of resources.

The proposal will enable people to provide for their economic wellbeing as it would continue to enable the use and development of the Coneburn Industrial Zone in accordance with its overall purpose. It is also acknowledged that the purpose of the Zone has been previously assessed for consistency with section 5 of the RMA. The proposal does not seek to amend any existing provisions within Chapter 44 which materially underpin the overall intent of the Zone to provide for the establishment and operation of Industrial and Service activities.

Associated Variations to District-wide chapters

The proposal would contribute to the overall efficient and effective functioning of the Zone by enabling activities to erect appropriate signage that supports the provision of locational information, branding and the self-promotion necessary to the functioning of successful business activities. Further, the proposal recognises the unique nature of activities which take place within industrial type environments. In particular, the proposal does not seek to control noise from activities which is received within the Zone boundaries. It enables an adequate volume of earthworks to be undertaken on sites to enable their use and development in accordance with the Zone purpose, and seeks to identify appropriate controls relating to the off-street loading of vehicles. It is acknowledged that the efficient and effective functioning of the District's industrial zones is important to the overall economic wellbeing of its people and communities as it is known that the District's industrial economy is '*growing rapidly and has demonstrated growth rates faster than the rest of the district's economy*'[23]. Taking these matters into account, the proposal would enable the use and development of the Coneburn Industrial Zone in a way that enables people and communities to provide for their economic wellbeing in accordance with section 5(2) of the RMA.

[23] Page 1, Economic Assessment of Queenstown Lakes District's Industrial Zones, Stage 3 District Plan Review, 22nd May 2019 – Final

In addition, the proposal would facilitate the use and development of sites within the Zone in a way that enables people to provide for their health and safety in accordance with section 5(2) of the RMA. In the absence of provisions controlling earthworks, signage, and loading spaces, land within the Zone may be used or developed in a manner that compromises the safety of sites and the overall movement of vehicles and pedestrians using the transport network.

The proposal is considered to be the most appropriate way to achieve the purpose of the Act in accordance with Section 32(1)(a).

7. EVALUATION OF PREFERRED OPTION(S) FOR PROVISIONS (POLICIES AND METHODS)

7.1. REASONABLY PRACTIABLE OPTIONS

Council has identified four reasonably practicable options for achieving the objectives. The following table assesses how well the options achieve the objective(s).

Option	Achieves objective?
Option 1: Status quo	Appropriate controls will not be put in place in regard to those matters subject to this variation. As a result, adverse effects are likely to arise which may compromise the social and economic wellbeing and the health and safety of those who own land and/or operate business within the Zone. In addition, an absence of such controls is likely to result in adverse effects on the environment that will not be suitably avoided, remedied or mitigated. This option would not address those remaining 'other issues' associated with Chapter 44 which impact its legibility as a planning instrument and its overall effectiveness.
Option 2: Apply the GISZ	This option fails to recognise the unique location and characteristics of the Coneburn Industrial Zone and the range of location specific provisions that have been developed to manage, in particular, potential landscape and visual amenity effects that may arise from urban development in this location. It is also noted that the Coneburn Zone has just recently been made operative after a reasonably lengthy period of litigation which has taken place throughout stage 1 of the plan review process, and it would not be efficient to relitigate the entire zone.
Option 3: Rely on resource consents by amending matters of control/discretion	This option would require changes to matters of control and discretion within existing provisions of Chapter 44. This would require the re-notification of existing rules such as 'buildings' and may require the introduction of new standards within other sections of the chapter. Given that the zone has recently become operative, this is not considered efficient and may result in more substantial changes to the subject provisions. This option would also result in a case by case/site by site evaluation of matters such as signage and noise which is likely to result in inconsistent outcomes throughout the Zone and complexities in plan administration. This option would be inconsistent with the district wide approach to managing matters such as signs, noise and earthworks, which has been applied within the existing PDP framework.
Option 4: Amendments to the District-wide Chapters to include appropriate Controls for the Coneburn Industrial Zone	Appropriate controls for earthworks, loading, signage and noise are consistent with overall intent of the PDP, and controls for Coneburn within these district-wide chapters. For the above reasons, these amendments are considered an appropriate option to achieve Objectives 25.2.1, 25.2.2, 29.2.2, 31.2.1, 31.2.2 and 36.2.1.
Option 5: Amendments to Chapter 44 provisions for RVA and Homestays, Custodial Units	This amendment supports the purpose of the Coneburn Industrial Zone to provide for industrial and service activities. Standalone offices, residential and almost all retail uses are excluded within the zone in order to ensure that it does not become a mixed-use zone where reverse sensitivity issues and land values make industrial and service activities unviable within the zone. For the above reasons, these amendments are considered an appropriate option to achieve Objective 42.2.1
Option 6: Deleting Rule 44.5.5, permitting building coverages up to 40% in Activity Area A1 and 65% in Activity Area A2, in conjunction with a roundabout at the Southern Access Point	Even with these increases in permitted building coverage, development within the zone can fit into the landform, with visual effects from outside the zone mitigated by landscaping and retention of areas of open space. Industrial land within the District is scarce, and even more so for true industrial and service activities. The Coneburn Industrial Zone represents one of last opportunities for industrial development within the Wakatipu Ward. Technical advice and specialist reports have demonstrated increased building sizes can be accommodated within the transport and infrastructure networks[24], have a negligible increase in risk from natural hazards[25], are economically viable[26], and can be accommodated within the existing landscape controls.[27] It was also found that these were no significant ecological values within the Coneburn Activity Areas[28]. There should not be undue constrains on its developable capacity. For the above reasons, this amendment is considered an appropriate option to achieve Objective 42.2.2.

Having considered these options, Option **4**, **5**, and **6** are the preferred options.

[24] Stantec Technical Review Coneburn Industrial Review – Change to Land Use Coverage

[25] Geosolve Geotechnical Report 190413 for Resource Consent

[26] Market Economics – Coneburn Industrial Zone Site Coverage Variation: Economic Assessment

[27] Bridget Gilbert Landscape Architecture – Coneburn Industrial Zone: Landscape and Visual Effects

[28] Beale Consultants Ltd – Coneburn Industrial Zone Ecological Peer Review

7.2 EFFECTIVENESS, EFFICIENCY, BENEFITS, COST, RISK

The following tables consider whether the proposed provisions are the most appropriate way to achieve the relevant objectives. In doing so, it considers the costs and benefits of the proposed provisions and whether they are effective and efficient at achieving the objectives. For the purposes of this evaluation the proposed provisions are grouped by the resource management issue [or alternative grouping that makes sense].

Issue 1 – Lack of maximum earthworks volume provisions
A maximum total volume of 500m3 has been identified for the Coneburn Industrial Zone

Relevant Objectives of Chapter 25
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.
25.2.2 Objective – The social, cultural and economic wellbeing of people and communities benefits from earthworks.

Costs	Benefits	Efficiency and Effectiveness
Environmental Enabling earthworks disturbance of up to 500 m^3 as a permitted activity within the Coneburn Industrial Zone may eventuate in adverse effects on the environment. While this threshold is consistent with other commercial Zones, including the proposed GIZ, the Zone is recognised as being located within a sensitive environment, both in terms of its visual appearance/amenity and ecosystem values. These values are recognised within the associated provisions of Chapter 44 which set out methods to control adverse effects on these values. The proposed earthworks variation, while assessed in the context of those issues already managed by Chapter 44, has been developed in isolation from these provisions and in the absence of the Ecological Management Plan required under Rule 44.5.2. ***Economic*** The proposed earthworks volume limit imposes restrictions on landowners and/or occupiers within the Zone. It is anticipated that this earthworks volume would be sufficient for development of sites within the Zone. However, additional earthworks may be necessary in some instances. In this case, a resource consent will need to be obtained to breach the standard. Time and monetary resources will need to be applied by landowners and/or occupiers in order to prepare and obtain any such resource consent.	***Environmental*** In setting a permitted earthworks volume for the Coneburn Industrial Zone, it is anticipated that potential adverse effects on the environment associated with earthworks activities will be appropriately managed. Given this, the proposal will bring about environmental benefits. In the event that greater volumes of earthworks are proposed, the proposal would enable consideration of effects related to matters including (but not limited to) soil erosion, generation and sediment run off, effects on ecosystem services and biodiversity, as well as effects on landscape and visual amenity. The Zone is known to contain a range of values relevant to these matters of discretion due to its unique location and environmental characteristics. Given this, it is beneficial that these matters can be considered in the event greater earthworks volumes are proposed on sites within the Zone. ***Social and cultural*** The proposal would enable natural hazards to be taken into consideration when assessing earthworks activities involving volumes greater than the permitted baseline. This would provide social and cultural benefits as it would provide the Council with the ability to assess how the activity might change the nature and scale of natural hazard events and the resulting risk to people who own or occupy sites and businesses within the Zone. The proposal wold also enable assessments of greater earthworks volumes in terms of possible effects on cultural, heritage and archaeological sites which might be present within the Zone. Although there are none identified as being located within the Zone at the present time, this does not confirm the absence of such features. ***Economic*** The proposal would enable functional aspects and positive effects of activities to be taken onto account when making decisions on applications to breach the 500 m^3 volume limit. This matter of discretion would enable applicants to demonstrate specific circumstances that might necessitate greater volumes of	The proposed provision is considered to be the most appropriate, effective and efficient way to achieve the purpose of the proposal and those relevant objectives of Chapter 25 (25.2.1 and 25.2.2). In particular, the proposal appropriately identifies the Coneburn Industrial Zone to Chapter 25 to ensure that a suitable earthworks volume limit is provided for. This also ensures that the balance of Chapter 25 appropriately applies to earthworks activities that breach the stated maximum permitted volume. The proposed variation is efficient and effective in achieving the purpose of this variation as does not attempt to alter other objectives, policies or rules within Chapter 25. These remaining components of Chapter 25 were notified, assessed and tested by the public as part of Stage 2 of the district plan review. Considerable time and resources was applied to this review. An attempt by this variation to alter other parts of Chapter 25 would re-open the provisions for further litigation. This would not be efficient or effective as it may result in a loss of effort afforded by the Council and other parties in preparing Chapter 25. The proposed variation is the most appropriate, efficient and effective way to achieve Objective 25.2.1 as it limitations on earthworks volumes are necessary to minimise adverse effects on the environment, to protect people and communities and to maintain landscape and visual amenity values. In the absence of a maximum earthworks volume for the Zone, any quantum of earthworks could take place. This would not be consistent with the intent of Objective 25.2.1. The variation would ensure that the appropriate matters of discretion could be taken into account consent with the outcome sought by this objectives when making decisions on applications to breach this earthworks volume, and where necessary, refuse such applications. The proposed variation is the most appropriate, efficient and effective way to achieve Objective 25.2.2 as it would enable positive social, cultural and economic benefits to be obtained from the occurrence of earthworks activities within the Coneburn Industrial Zone. The 500 m3 limit is considered appropriate to enable suitable use and development of sites within the Zone consistent with its purpose. It is acknowledged that the District's industrial economy is growing fast and contributes to the overall wellbeing of the District, and this variation will continue to enable this benefit to be realised. The proposed volume limit is consistent with that provided for in other commercial Zones including the proposed General Industrial Zone which is subject to Stage 3 of the district plan review.

	earthworks that contribute the economic wellbeing of their unique site and operation.	Overall the variation is efficient and effective as it contributes to achieving the overall strategic intent of Chapter 25.

Issue 2 – Lack of complete transport provisions

Coneburn Industrial Zone has been added to the list of Zones that Rule 29.5.10 (Loading Spaces) applies to. Non-compliance has a Restricted Discretionary activity status.

Relevant Objective of Chapter 29

29.2.2 Objective - Parking, loading, access, and onsite manoeuvring that are consistent with the character, scale, intensity, and location of the zone and contributes toward:

a. providing a safe and efficient transport network;
b. compact urban growth;
c. economic development;
d. facilitating an increase in walking and cycling and the use of public transport; and
e. achieving the level of residential amenity and quality of urban design anticipated in the zone.

Costs	Benefits	Efficiency and Effectiveness
Economic Landowners and/or businesses may incur costs associated with the provision of off street loading space as they will not be able to use this space for the purpose core operations and/or expanding their business overtime. They may also incur costs in demonstrating that this space meets the requirements set out within Chapter 29 (Transport).	***Environmental*** The proposed variation would produce positive environmental outcomes for the transport network in the Zone as it would ensure that space within the road corridor is not being used for the purpose of loading or unloading goods or materials used in association with activities. ***Social/Cultural*** The variation will assist in providing for the safe and efficient use of sites within the Zone thereby providing for healthy and safe work spaces for business owners, employees and clients/customers. ***Economic*** The variation will enable the efficient use of sites for activities permitted within the Zone (principally Industrial and Service activities) by ensuring that loading and unloading processes occur without necessary delay or difficulty. Efficiency improvements of this kind may lead to the operation of more economically viable and profitable activities within the Zone.	The proposed provision is considered to be the most appropriate, and effective and efficient way to achieve the purpose of the proposal and those relevant objective of Chapter 29 (29.2.2). In particular, the proposal appropriately identifies the Coneburn Industrial Zone to Chapter 29 to ensure that suitable controls are in place for activities which involve regular loading and unloading of vehicles. In addition, the proposed 'note' relating to parking for ancillary Office, Retail or Commercial activities within the Zone effectively signals to landowners and/or occupiers that additional standards located elsewhere in Chapter 29 may be relevant to their proposed activity. The proposed variation is efficient as does not attempt to alter other objectives, policies or rules within Chapter 29. The remaining components of Chapter 29 were notified, assessed and tested by the public as part of Stage 2 of the district plan review. Considerable time and resources were applied to this review. An attempt by this variation to alter other parts of Chapter 29 would re-open the provisions for further litigation. This would not be efficient or effective as it may result in a loss of effort afforded by the Council and other parties in preparing Chapter 29. The proposed variation is the most appropriate, efficient and effective way to achieve Objective 29.2.2 as it would introduce a method to control loading within the Zone that is consent with its character as a commercially focused industrial environment and which will contribute toward the provision of a safe and efficient transport network while also facilitating economic development within the Zone. In particular, a need for activities within the Zone to provide off-street loading space will contribute to a less congested road corridor thereby facilitating the safe operation of the transport network and enabling goods, employees and customers to move around the Zone more easily providing for trade to take place within what is a zone designated for commercial activity. In addition, it is not considered that the proposal would comprise the balance of Chapter 29 from achieving the overall intent of Objective 29.2.2, in particular, those outcomes sought associated with compact urban growth; facilitating an increase in walking, cycling and public transport; and achieving a level of urban design anticipated in the zone.

Issue 3 – Lack of sign provisions

Activity statuses for the sign types addressed in Table 31.6 Activity Status of Signs in Commercial Areas have been added for the Coneburn Industrial Zone. For full details, see the proposal in Appendix 1A.

Relevant Objectives of Chapter 31

31.2.1 Objective - Signage which is of a scale and extent that maintains the character and amenity values of the District and enhances access.

31.2.2 Objective - Signs have limited adverse effects on public safety, including the safety of pedestrians and users of the transport network.

Costs	Benefits	Efficiency and Effectiveness
Economic The proposed signage provisions would impose restrictions on landowners and/or occupiers within the Zone. In particular, it is acknowledged that a controlled activity resource consent would be required to establish signage platforms and to locate signs within these signage platforms (excluding arcade and directory signs which are permitted within signage platforms). Time and monetary resources would need to be applied by landowners and/or occupiers in order to prepare and obtain any such resource consent. The proposal imposes a number of other associated signage standards on landowners and/or occupiers within the Zone (ie 31.7 – standards for sings in commercial areas). In some cases, these standards may not fit the needs of businesses within the Zone and may need to be breached. In this case, further resource consents may need to be applied for. The proposal prohibits a range of sign types within the Zone, including digital signs and billboard signs. These provisions therefore impose significant constrains on landowners and/or occupiers.	***Environmental*** The proposed provisions will provide a framework to manage the nature and scale of signage within the Zone. The proposed controls, alongside those existing provisions of Chapter 31 will avoid, remedy or mitigate the adverse environmental effects of signage. In particular, the cumulative effects associated with signage proliferation, poorly located and inappropriately designed signs. ***Economic*** Clear, consistent and controlled signage within the Zone is likely to assist in the efficient and effective functioning of Industrial and Service activities. Customers and clients of activities within the Zone will be able to navigate the multitude of businesses more easily. The proposed provisions offer landowners and occupiers a greater degree of certainty in regard to the natural and scale of signage that can take place within the Zone. Greater certainty enables faster and more cost efficient project planning and management. Additional certainty is offered by the proposed provisions in that signage platforms and signs within these platforms are provided for as controlled activities. Controlled activity resource consents must be granted (albeit with conditions). The proposed provisions (along with the balance of Chapter 31) enable a suitable variety of signage types to be established. ***Social/Cultural*** While it is anticipated that industrial type urban zones may have a lower level of amenity compared with town centre type locations, industrial zones are also acknowledged as places of community activity, providing business and employment, and are not therefore a 'no amenity location'. The proposed provisions will assist in ensuring that signage within the Zone provides a suitable level of amenity for people working within and visiting the Zone.	The proposed provision is considered to be the most appropriate, and effective and efficient way to achieve the purpose of the proposal and those relevant objectives of Chapter 31 (31.2.1 and 31.2.2). In particular, the proposal appropriately identifies the Coneburn Industrial Zone within Chapter 31 to ensure that suitable controls are in place relating to signage. The Zone is commercial in nature and therefore Table 31.6 relating to the District's commercial areas is the most appropriate location to identify the Zone. This also ensures that the balance of Chapter 31 appropriately applies to signage which does not meet the expectations set out within Table 31.6. The proposed variation is efficient and effective in achieving the purpose of this variation as does not attempt to alter other objectives, policies or rules within Chapter 31. These remaining components of Chapter 31 were notified, assessed and tested by the public as part of Stage 2 of the district plan review. Considerable time and resources was applied to this review. An attempt by this variation to alter other parts of Chapter 31 would re-open the provisions for further litigation. This would not be efficient or effective as it may result in a loss of effort afforded by the Council and other parties in preparing Chapter 31. The proposed variation is the most appropriate, efficient and effective way to achieve Objective 31.2.1 as it would introduce a method to control the scale and extent of signage and any potential adverse effects that signage might have on the character and amenity values present within the Zone. In the absence of the proposed rules, the provisions of Chapter 31 would not apply within the Zone and signage could be established that may adversely affect character and amenity values. Further, the provisions would enable signage capable of enhancing access within the Zone as they would assist the operation of the Zone as an urban location with a commercial function, including through the provision of wayfinding/navigation, branding and self-promotion. The proposed variation is the most appropriate, efficient and effective way to achieve Objective 31.2.2 as it would enable the control of signage to avoid adverse effects on pedestrian access and overall traffic safety. The absence of such controls may enable the establishment of proliferated signage within the Zone that could hinder the safe and efficient functioning of the roading network and result in public safety issues. The proposed variation facilitates efficient plan making as it outlines that the same management framework should apply to signage within the Coneburn Industrial Zone as that provided for within the District's other commercial Zones, including the proposed General Industrial Zone, which is subject to Stage 3 of the district plan review.

Issue 4– Lack of noise provisions

A rule has been added to Chapter 36 for Sound from activities within the Coneburn Industrial Zone which limits noise to the relevant standard of the zone in which the noise is received. If the standard is not meet, then any application will become a non-complying activity. Ventilation requirements have also been set commensurate with those in the Town Centre Zones, the Local Shopping Centre Zone, and the Business Mixed Use Zone.For full details, see the proposal in Appendix 1A.

Relevant Objectives of Chapter 36

36.2.1 Objective - The adverse effects of noise emissions are controlled to a reasonable level to manage the potential for conflict arising from adverse noise effects between land use activities.

Costs	Benefits	Efficiency & Effectiveness
Economic The proposed provisions will impose costs for any landowner or business operator who seeks to establish activities within the Zone which include Critical Listening Environments. These additional costs would be incurred in meeting the ventilation requirements set out within Table 5 of Chapter 36 for any Critical Listening Environments. The costs of meeting these standards may limit the type and scale of operation sought by some landowners and/or occupiers. In the event that noise produced from activities received outside of the boundaries of the Zone exceeds the specified noise limits identified for that 'other' zone, a non-complying activity resource consent will need to be obtained. A non-complying activity status indicates that such effects are not anticipated and sets a high bar in terms of the scale and quality of information which must accompany any consent application. Applicants may need to engage technical experts such as planning and acoustic consultants in preparing such applications. This is likely to cost the applicant a large amount of money. Further, the application may need to be notified and may take a long amount of time to process. Ultimately, any such consent may not be granted.	**Economic** The proposed variation requiring that Critical listening environments within the Zone meet the standards set out in Table 5 of Chapter 36 will provide positive economic outcomes in terms of the intended function of the Zone to provide for the establishment and operation of Industrial and Service activities as it will ensure they are not undermined or constrained by reverse sensitivity effects which might arise from the presence of activities that contain critical listening environments. The proposed provisions support an overall enabling approach to the establishment and operation of Industrial and Service activities within the Zone. In particular, they do not attempt to control noise produced from activities that is received within the boundaries of the Zone. ***Environmental*** The proposed provisions requiring Critical listening environments within the Zone to meet the standards set out in Table 5 of Chapter 36 will provide positive environmental outcomes for people who work within and visit the Zone as their activities will not be compromised by noise that may be emitted from Industrial and Service activities which are located on the same site or on adjoining sites. The proposed provisions set out the expectation that noise produced by activities within the Zone and which is received in other zones will not exceed the noise limits of these 'other' zones. This control will ensure that the levels of amenity anticipated by the owners and/or occupiers of properties within other zones adjoining or in close proximity to the Coneburn Industrial Zone will not be adversely effected. ***Social/Cultural*** Custodial Units (Residential Units – note the proposed variation) are provided for within the Zone (as a discretionary activity). Therefore, the Zone may contain some residential occupiers. The proposed provisions will assist in maintaining a suitable degree of amenity for these residential occupiers.	The proposed provisions are considered to be the most appropriate, and effective and efficient way to achieve the purpose of the proposal and the relevant objective of Chapter 36 (36.2.1). In particular, the proposal appropriately identifies the Coneburn Industrial Zone within Chapter 36 to ensure that suitable controls are in place relating to noise, including noise which is produced by activities within the Zone but which is experienced outside its boundaries, as well as noise from activities that might be experienced by activities within the Zone which contain Critical Listening Environments. The proposed variation is efficient and effective in achieving the purpose of this variation as does not attempt to alter other objectives, policies or rules within Chapter 36. These remaining components of Chapter 36 were notified, assessed and tested by the public as part of Stage 1 of the district plan review. Considerable time and resources was applied to this review. An attempt by this variation to alter other parts of Chapter 36 would re-open the provisions for further litigation. This would not be efficient or effective as it may result in a loss of effort afforded by the Council and other parties in preparing Chapter 36. The proposed variation is the most appropriate, efficient and effective way to achieve Objective 36.2.1 as it seeks to balance the direction to manage adverse noise effects with an approach that aligns with the purpose of the Zone to provide for the establishment and operation of activities that often produce greater noise emissions. The proposed variation achieves this by imposing controls on activities only when the noise they produced is received outside the boundaries of the Zone. Any such noise is required by the proposed variation to meet the existing noise limits within the subject zone. Therefore, the variation seeks to control noise to 'reasonable levels' in accordance with Objective 36.2.1. The variation sets out that it is reasonable to experience greater levels of noise within zones designated for Industrial and Service Activities than 'other' zones. These 'other' zones are likely to contain activities that anticipate higher levels of amenity and therefore, it is reasonable to ensure that noise from activities which might travel beyond the boundaries of the Coneburn Industrial Zone meet these anticipated noise limits. The provisions will therefore effectively manage potential noise conflicts between different land use activities. The proposed variation to 36.7 Ventilation Requirements for other Zones (Table 5) also ensures that a reasonable level of control is placed on the establishment of activities that contain Critical Listing Environments within the Zone to manage conflicts between these activities and other Industrial and Service Activities within the Zone, ultimately to ensure they do not experience adverse noise related effects. The proposed variation facilitates efficient plan making as it outlines that the same management framework should apply to noise within the Coneburn Industrial Zone as that provided for within the proposed General Industrial Zone, which is subject to Stage 3 of the district plan review.

Issue 5 – Building coverage and Access

Rule 44.5.5 Building Coverage Standard

Activity Area 1a (Large Lot Size) 30%

Activity Area 2a 35%

Note: The non-complying thresholds remain the same at 40% and 65% respectively.

44.2.2 Objective – The zone will fit into the landform with visual effects from outside the zone mitigated by landscaping and retention of areas of open space.

The matters of discretion listed for Rule 44.5.5 traverse:

(a) availability of on-site parking,
(b) whether the industrial or service activity requires parking or loading within a building
(c) whether the manufacturing or maintenance of vehicles or large items take place within a building
(d) the extent to which the safety and efficiency of the surrounding roading network would be adversely effected by the proposal
(e) cumulative effect on the safety and efficiency of the surrounding roading network

27.2.5 Objective – Infrastructure and services are provided to new subdivisions and developments.

Rule 27.7.7.3 Zone and Location Specific Rules

Requires subdivision to not exceed 25% of the Zone's area until access is via a new intersection with State Highway 6 at the Southern Access Point, has been designed and constructed to a safe and acceptable standard.

Costs	Benefits	Efficiency & Effectiveness
By permitting development with greater building coverages, there is a potential for adverse environmental effects within a sensitive environment. Changing the site coverages to become more enabling, may result in a reduction of industrial capacity perceived by the market to be available for more land extensive industrial and service businesses. Increasing the permitted maximum building coverage will likely increase the internal traffic movements within Coneburn as well have impacts of the wider transport network. Previously, matters of discretion could address the extent to which the safety and efficiency of the surrounding roading network would be adversely affected by the proposal; as well as cumulative effects of other activities in the vicinity of the safety and efficiency of the surrounding roading. Under the proposal, these matters would not need to be considered for building coverages under 40% in Activity Area 1A and 65% in Activity Area 2A. If 100% development were to occur up to the non-complying thresholds, this would result in a low level of service provided by the Coneburn exit leg of the proposed roundabout.[29]	The key net benefit of the variation is regulatory efficiency – including reducing compliance costs by reducing reliance on more complex resource consent processes, reducing the possibility of notification, simplifying development controls in the District Plan and improving competition and commercial feasibility of industrial development. Increasing the permitted building coverage will give businesses greater flexibility, enabling a broader range of industrial activities to locate within the Coneburn Industrial Zone, consistent with the technical advice received, whilst managing the effects of potentially larger building coverages in a sensitive environment. This will allow the Zone to better compete with the General Industrial and Service Zone as an alternative location for industrial activities. Larger permitted building coverages may improve the commercial feasibility of bringing the zone to market.[30] The proposed requirement in Rule 27.7.7.3 will ensure that the subdivision and development of the zone does not outpace the provision of infrastructure, or exceed the capacity of the access point and surrounding transport network to accommodate such growth.	In regards to the Restricted Discretionary building coverage threshold, the matters of discretion focus on transport matters, both on-site and the effects on the surrounding roading network. With the removal (December 2020) of minimum parking standards from the district plan, there is no longer minimum levels of parking spaces to be provided, with the exception of accessible parking. However, any issues arising from traffic movements and parking can be addressed through the resource consent process. Applicants would not seek the additional site coverage (and reduced yard area) unless it suited them on that particular sized lot. The proposed variation is considered to be the most appropriate, and effective and efficient way to achieve the purpose of the proposal and the relevant objective of Chapter 44 (44.2.2).

[29] Stantec Technical Review Coneburn Industrial Review – Change to Land Use Coverage

[30] Market Economics – Coneburn Industrial Zone Site Coverage Variation: Economic Assessment

Issue 6 – Custodial Units Rule 44.4.9 is being varied to refer to Residential Unit, instead of Residential Flat **44.2.1 Objective** - A dedicated industrial and service zone with a mix of compatible activities that excludes residential, standalone offices, and most retail.		
Costs	**Benefits**	**Efficiency & Effectiveness**
The proposed variation would not result in any change to the nature or scale of the potential social, economic, environmental or cultural costs of the existing provision. The intent and associated requirements of the provision remain unchanged as a result of this variation which only seeks to improve the way in which it functions with existing PDP definitions.	The proposed variation would not result in any material change to the nature or scale of the potential social, economic, environmental or cultural benefits of the existing provision. The intent and associated requirements of the provision remain unchanged as a result of this variation which only seeks to improve the way in which it functions with existing PDP definitions. The provision may result in small economic benefits to potential landowners and/occupiers of sites within the Zone who wish to develop sites incorporating a residential unit for custodial management purposes as they will have greater clarity on how the District Plan intents to manage the activity. This may result in less time and monetary costs associated with plan interpretation and overall project management.	The proposed variation is considered to be the most appropriate, and effective and efficient way to achieve the purpose of the proposal and the relevant objective of Chapter 44 (44.2.1). In particular, the proposal seeks to better integrate Chapter 44 with Chapter 2 (Definitions), which it is noted also applies at a district wide scale. The variation enables a more effective application of the definitions within the Coneburn Industrial Zone. Currently, Rule 44.4.9 confuses the interconnectedness of the definitions of Residential Unit and Residential Flat (being that a residential flat cannot exist in the absence of a Residential Unit). In correctly representing this interconnectedness, the variation more effectively implements the intended approach to managing residential activities. The proposed variation is the most appropriate, efficient and effective way to achieve Objective 44.2.1 as it does not alter the overall intent of this already tested provision. It continues to exclude all but those Residential Units which expressly meet the clear and narrow limits relating to custodial purposes set out within limbs a – e of Rule 44.4.9. The proposed variation represents more effective and efficient plan making as it seeks to remove the apparent conflict between the limits on Residential Flats set out in Rule 44.4.9 and those set out within Chapter 2. The proposed variation enables more efficient plan administration and interpretation as it seeks to correctly identify the relationship between the defined terms of Residential Unit and Residential Flat. The absence of this clarity may result in confusion and unnecessary costs to project management for landowners and/or occupiers within the Zone.

Issue 7 – Visitor Accommodation **<u>Rule 44.4.20 – Visitor Accommodation</u>** An addition to Rule 44.4.20 to prohibit Residential Visitor Accommodation and Homestay Activities within the Zone Objective 44.2.1 - A dedicated industrial and service zone with a mix of compatible activities that excludes residential, standalone offices, and most retail		
Costs	**Benefits**	**Efficiency & Effectiveness**
The proposed variation would not result in any change to the nature or scale of the potential social, economic, environmental or cultural costs of the existing provision. The intent and associated requirements of the provision remain unchanged as a result of this variation which only seeks to improve the way in which it functions with existing PDP definitions.	The proposed variation would not result in any material change to the nature or scale of the potential social, economic, environmental or cultural benefits of the existing provision. The intent and associated requirements of the provision remain unchanged as a result of this variation which only seeks to improve the way in which it functions with existing PDP definitions. The provision may result in small economic benefits to potential landowners and/occupiers of sites within the Zone who wish to develop sites incorporating a residential unit for custodial management purposes as they will have greater clarity on how the District Plan intents to manage the activity. This may result in less time and monetary costs associated with plan interpretation and overall project management.	The proposed variation is considered to be the most appropriate, and effective and efficient way to achieve the purpose of the proposal and the relevant objective of Chapter 44 (44.2.1). In particular, the proposal seeks to better integrate Chapter 44 with new approach to managing Visitor Accommodation type activities within the District. By identifying RVA and Homestay activities as being prohibited within Rule 44.4.20, Chapter 44 more effectively integrates with the overall approach to managing these activities, including the use terms that have recently been defined as part of the Stage 2 of the PDP review process. The proposed variation is the most appropriate, efficient and effective way to achieve Objective 44.2.1 as it seeks to provide a method to ensure that activities which are not compatible with the intention of the Zone to provide sites dedicated for Industrial and Service activities are excluded from taking place. A prohibited activity status is the most effective way to ensure such incompatible activities do not have consenting pathways to establish within Zone. It is noted that proposed variation also aligns with the Council's new proposed approach to managing Visitor Accommodation activities within the GIZ which also prohibits RVA and Homestay activities. This provides strategic alignment between Zones with similar purposes and effectively provides for overall plan integrity.

8. CONCLUSIONS

This evaluation has been undertaken in accordance with Section 32 of the RMA in order to identify the need, benefits and costs and the appropriateness of the proposal having regard to its effectiveness and efficiency relative to other means in achieving the purpose of the RMA. The evaluation demonstrates that this proposal is the most appropriate option as it:

a. Is efficient and effective in terms of section 7(b) of the RMA while still achieving the purpose of 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

25.2.2: The social, cultural and economic wellbeing of people and communities benefits from earthworks.

27.2.5 Infrastructure and services are provided to new subdivisions and developments

29.2.2: Parking, loading, access, and onsite manoeuvring that are consistent with the character, scale, intensity, and location of the zone and contributes toward: providing a safe and efficient transport network; compact urban growth; economic development; facilitating an increase in walking and cycling and the use of public transport; and achieving the level of residential amenity and quality of urban design anticipated in the zone.

31.2.1 Signage which is of a scale and extent that maintains the character and amenity values of the District and enhances access

31.2.2 Signs have limited adverse effects on public safety, including the safety of pedestrians and users of the transport network.

36.2.1 The adverse effects of noise emissions are controlled to a reasonable level to manage the potential for conflict arising from adverse noise effects between land use activities.

44.2.1 A dedicated industrial and service zone with a mix of compatible activities that excludes residential, standalone offices, and most retail

and

42.2.2 The zone will fit into the landform with visual effects from outside the zone mitigated by landscaping and retention of areas of open space.

b. The provisions are in accordance with the relevant Strategic Direction objectives and policies of the Proposed District Plan.
c. They are in accordance with the functions of territorial authorities in s31 of the RMA and the sustainable management purpose of Part 2 of the RMA.

APPENDIX 1

APPENDIX 1A – PROPOSED VARIATIONS TO CHAPTERS 25, 27, 29, 31, 36 and 44

Variation to Chapter 25 - Earthworks

Underlined text for additions and ~~strike through~~ text for deletions

25.5 Rules – Standards

	Table 25.2 - Maximum Volume	Maximum Total Volume
25.5.5	…. Coneburn Industrial Zone ….	500m^3

Variation to Chapter 27 – Subdivision

	Zone and Location Specific Rules	**Activity Status**
27.7.7.3	Subdivision whereby prior to the issue of a s224(c) certification under the Act for any subdivision of any land within the zone: … b. any subdivision of land within the Activity Areas 1a and 2a which, by itself or in combination with prior subdivisions of land within the zone, involves subdivision of more than 25% of the land area of Activity Areas 1a and 2a must include a condition ~~requiring the construction of the Southern Access Point as a Priority T intersection (Austroads Guide to Road Design (Part 4A)) and that it be available for public use prior to issue of a s.224(c) certificate, unless the Southern Access Point has been constructed and is available for public use at the time the consent is granted.~~ to provide the consent authority written confirmation from the NZ Transport Agency that access for the subdivision via a new intersection with State Highway 6 *at the Southern Access Point* has been design and constructed to a safe and acceptable standard.	NC

Variation to Chapter 29 - Transport

Underlined text for additions and ~~strike through~~ text for deletions

Table 29.3 – Standards for activities outside of roads

	Table 29.3 - Standards for activities outside roads	Non-compliance status
29.5.10	Loading Spaces a. Off-street loading shall be provided in accordance with this standard on every site in the Coneburn	RD Discretion is restricted to: a. The location, size, and design of the loading

	Industrial Zone, Business Mixed Use Zone, the Town Centre zones, and the Local Shopping Centre Zone, except in relation to unstaffed utility sites and on sites where access is only available from the following roads ….	space and associated manoeuvring. b. Effects on safety, efficiency, and amenity of the site and of the transport network, including the pedestrian and cycling environment.

Variation to Chapter 31 Signs

Underlined text for additions and ~~strike through~~ text for deletions

31.6 Rules – Activity Status of Signs in Commercial Areas

Table 31.6 – Activity Status of Signs in Commercial Areas		Coneburn Industrial Zone
31.6.1	**Static signage platforms that is one of the sign types listed in Rules 31.6.2 to 31.6.5 below and complies with the standards applying to that sign type.** Control is reserved to the matters set out in Rule 31.14.	C
31.6.2	**Arcade directory signs.**	P
31.6.3	**Upstairs entrance signs.**	P
31.6.4	**All signs located within the ground floor facade of a building** In those zones where this is a controlled activity, control is reserved to the matters set out in Rule 31.14. Note: Parts 31.3.2 and 31.16 of this Chapter explain and illustrate the application of this rule.	C
31.6.5	**Above ground floor signs**. In those zones where this is a controlled activity, control is reserved to the matters set out in Rule 31.14. Note: Part 31.16.7 of this Chapter has a diagram which illustrates the application of this rule.	C
31.6.6	**Digital signage platforms within the ground floor facade of a building**	PR
31.6.7	**Digital signage platforms above ground floor level**	PR
31.6.8	**Digital signs not located within a digital signage platform**	PR
31.6.9	**Billboard signs**	PR
31.6.10	**Any sign activity which is not listed in Table 31.4 or Rules 31.6.1 to 31.6.9 inclusive**	D

Variation to Chapter 36 - Noise

Underlined text for additions and ~~strike through~~ text for deletions

36.5 Rules – Standards
Table 3: Specific Standards

Rule Number	Specific Standards				Non-compliance Status
	Activity or sound source	Assessment location	Time	Noise limits	
36.5.15	Sound from activities in the Coneburn Industrial Zone. Note: For the purpose of this rule, a road that is located outside this zone is not deemed to be a "site outside this zone" and, as such, the noise levels specified may be exceeded on road reserves adjacent to this zone.	At any point within any site located in any other zone.	Refer to standard relevant to the zone in which noise is received.	Refer to standard relevant to the zone in which noise is received.	NC

36.7 Ventilation Requirements for other Zones (Table 5)

The following table (Table 5) sets out the ventilation requirements in the Wanaka and Queenstown Town Centre Zones, the Local Shopping Centre Zone, Coneburn Industrial Zone and the Business Mixed Use Zone.

Table 5

Room Type	Outdoor Air Ventilation Rate (Air Changes Room Type per Hour, ac/hr)	
	Low Setting	High Setting
Bedrooms	1-2 ac/hr	Min. 5 ac/hr
Other Critical Listening Environments	1-2 ac/hr	Min. 15 ac/hr
Noise from ventilation systems shall not exceed 35 dB LAeq(1 min), on High Setting and 30 dB LAeq(1 min), on Low Setting. Noise levels shall be measured at a distance of to 2 m from any diffuser.		
Each system must be able to be individually switched on and off and when on, be controlled across the range of ventilation rates by the occupant with a minimum of 3 stages.		
Each system providing the low setting flow rates is to be provided with a heating system which, at any time required by the occupant, is able to provide the incoming air with an 18 ºC heat rise when the airflow is set to the low setting. Each heating system is to have a minimum of 3 equal heating stages.		

If air conditioning is provided to any space, then the high setting ventilation requirement for that space is not required.

Variation to Rule 44.4.9 - Custodial Units

Underlined text for additions and ~~strike through~~ text for deletions

	Activities located in the Coneburn Industrial Zone	**Activity Status**
44.4.9	Custodial Units A single ~~residential flat~~ Residential Unit providing for the custodial management of an Industrial or Service activity and which complies with all of the following requirements: a. It is located above or behind an Industrial or Service Activity; b. It is maintained in the same ownership as the Industrial or Service Activity; c. It is not subdivided, unit titled or otherwise separated, including by lease from the Industrial or Service activity it is attached to; d. It is not over 50m² and no more than 20% of the GFA of the building in which it is contained; e. It is only occupied by persons working in the Industrial or Service activity to which the unit is attached and whose duties require them to live on site.	D

Variation to Rule 44.4.20 - Visitor Accommodation

Underlined text for additions and ~~strike through~~ text for deletions

	Activities located in the Coneburn Industrial Zone	**Activity Status**
44.4.20	Visitor Accommodation, Residential Visitor Accommodation and Homestay activities	PR

Variation to Site Coverages

Underlined text for additions and ~~strike through~~ text for deletions

44.5 Rules - Standards

	Standards for activities located in the Coneburn Industrial Zone	**Non-compliance Status**
~~44.5.5~~	~~Building Coverage~~ ~~Activity Area 1a (Large Lot Size) 30%~~ ~~Activity Area 2a 35%~~	~~**RD**~~ ~~a. The extent to which increased building coverage will decrease the~~

		~~availability of onsite parking or loading;~~ ~~b. Whether the needs of the industrial or service activity require parking or loading within a building;~~ ~~c. Whether the needs of the industrial or service activity require that the manufacture or maintenance of vehicles or large items take place within a building;~~ ~~d. The extent to which the safety and efficiency of the surrounding roading network would be adversely affected by the proposal;~~ ~~e. Any cumulative effect on the proposal in conjunction with other activities in the vicinity on the safety and efficiency of the surrounding roading.~~

And consequential renumbering of Rules 44.5.6-44.5.12.

APPENDIX 2

APPENDIX 2A - STATUTORY CONTEXT
APPENDIX 2B - PLANNING CONTEXT

APPENDIX 2A - STATUTORY CONTEXT

Resource Management Act 1991

1.2. The Resource Management Act 1991 ("RMA" or "the Act"), requires an integrated planning approach and direction to promote the sustainable management of natural and physical resources. Section 5 of the act sets out the purpose and principles of the act. Section 5 is given further elaboration in, sections 6, 7 and 8 of Part 2 of the Act. Sections 6, 7 and 8 supplement the core purpose of sustainable management by stating the particular obligations of those administering the RMA in relation to the various matters identified:

5 Purpose

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

(2) In this Act, sustainable management means 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 well-being 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.

1.3. Section 6 of the RMA sets out a number of matters of national importance that are to be recognised and provided for. The following section 6 matters are relevant:

(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:

(b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:

(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

(e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

(f) the protection of historic heritage from inappropriate subdivision, use, and development:

(g) the protection of protected customary rights:

(h) the management of significant risks from natural hazards.

1.4. Section 7 lists "other matters" that Council shall have particular regard to and those most relevant to Chapter 44 Coneburn Industrial Zone include the following:

(b) the efficient use and development of natural and physical resources:

(c) the maintenance and enhancement of amenity values:

(d) intrinsic values of ecosystems:

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

1.5. Section 8 requires that Council take into account the principles of the Te Tiriti o Waitangi or Treaty of Waitangi ("the treaty"). The principles as they relate to resource management derive from the treaty itself and from resource management case law and practice. They can be summarised as follows:

a) The active protection of the **Partnership** between the two parties;
b) The **Protection** of resources of importance to tangata whenua from adverse effects;
c) The active **Participation** by tangata whenua in resource management decision making;
d) The obligation to reasonably, honourably and in good faith towards each other, ; and
e) The obligation to make informed decisions on matters that affect the interests of Māori.

1.6. Section 31 of the RMA states (underlined to emphasise the provisions relevant to this variation:

31 Functions of territorial authorities under this Act

(1) Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district:

(a) the establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district:

(aa) the establishment, implementation, and review of objectives, policies, and methods to ensure that there is sufficient development capacity in respect of housing and business land to meet the expected demands of the district:

(b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of—

(i) the avoidance or mitigation of natural hazards; and

(ii) [Repealed]

(iia) the prevention or mitigation of any adverse effects of the development, subdivision, or use of contaminated land:

(iii) the maintenance of indigenous biological diversity:

(c) [Repealed]

(d) the control of the emission of noise and the mitigation of the effects of noise:

(e) the control of any actual or potential effects of activities in relation to the surface of water in rivers and lakes:

(f) any other functions specified in this Act.

(2) The methods used to carry out any functions under subsection (1) may include the control of subdivision

Section 32 of the RMA states:

(1) An evaluation report required under this Act must—

(a) examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and

(b) examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by—

(i) identifying other reasonably practicable options for achieving the objectives; and

(ii) assessing the efficiency and effectiveness of the provisions in achieving the objectives; and

(iii) summarising the reasons for deciding on the provisions; and

(c) contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.

(2) An assessment under subsection (1)(b)(ii) must—

(a) identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for—

(i) economic growth that are anticipated to be provided or reduced; and

(ii) employment that are anticipated to be provided or reduced; and

(b) if practicable, quantify the benefits and costs referred to in paragraph (a); and

(c) assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions.

(3) If the proposal (an ***amending proposal****) will amend a standard, statement, national planning standard, regulation, plan, or change that is already proposed or that already exists (an* ***existing proposal****), the examination under subsection (1)(b) must relate to—*

(a) the provisions and objectives of the amending proposal; and

(b) the objectives of the existing proposal to the extent that those objectives—

(i) are relevant to the objectives of the amending proposal; and

(ii) would remain if the amending proposal were to take effect.

(4) If the proposal will impose a greater or lesser prohibition or restriction on an activity to which a national environmental standard applies than the existing prohibitions or restrictions in that standard, the evaluation report must examine whether the prohibition or restriction is justified in the circumstances of each region or district in which the prohibition or restriction would have effect.

(4A) If the proposal is a proposed policy statement, plan, or change prepared in accordance with any of the processes provided for in Schedule 1, the evaluation report must—

(a) summarise all advice concerning the proposal received from iwi authorities under the relevant provisions of Schedule 1; and

(b) summarise the response to the advice, including any provisions of the proposal that are intended to give effect to the advice.

(5) The person who must have particular regard to the evaluation report must make the report available for public inspection—

(a) as soon as practicable after the proposal is made (in the case of a standard, regulation, national policy statement, or New Zealand coastal policy statement); or

(b) at the same time as the proposal is notified.

(6) In this section,—

objectives *means,—*

(a) for a proposal that contains or states objectives, those objectives:

(b) for all other proposals, the purpose of the proposal

proposal *means a proposed standard, statement, national planning standard, regulation, plan, or change for which an evaluation report must be prepared under this Act*

provisions *means,—*

(a) for a proposed plan or change, the policies, rules, or other methods that implement, or give effect to, the objectives of the proposed plan or change:

(b) for all other proposals, the policies or provisions of the proposal that implement, or give effect to, the objectives of the proposal.

1.7. The proposed provisions help to achieve the integrated management of natural and physical resources by introducing appropriate provisions for the Coneburn Industrial Zone into the relevant district-wide chapters of the Proposed District Plan.

Local Government Act 2002

1.8. Section 14 of the Local Government Act 2002 is also of relevance in terms of policy development and decision making:

(a) a local authority should—

(i) conduct its business in an open, transparent, and democratically accountable manner; and

(ii) give effect to its identified priorities and desired outcomes in an efficient and effective manner:

(b) a local authority should make itself aware of, and should have regard to, the views of all of its communities; and

(c) when making a decision, a local authority should take account of—

(i) the diversity of the community, and the community's interests, within its district or region; and

(ii) the interests of future as well as current communities; and

(iii) the likely impact of any decision on the interests referred to in section 10:

(d) a local authority should provide opportunities for Māori to contribute to its decision-making processes:

(e) a local authority should actively seek to collaborate and co-operate with other local authorities and bodies to improve the effectiveness and efficiency with which it achieves its identified priorities and desired outcomes; and

(f) a local authority should undertake any commercial transactions in accordance with sound business practices; and

(fa) a local authority should periodically—

(i) assess the expected returns to the authority from investing in, or undertaking, a commercial activity; and

(ii) satisfy itself that the expected returns are likely to outweigh the risks inherent in the investment or activity; and

(g) a local authority should ensure prudent stewardship and the efficient and effective use of its resources in the interests of its district or region, including by planning effectively for the future management of its assets; and

(h) in taking a sustainable development approach, a local authority should take into account—

1) the social, economic, and cultural interests of people and communities; and

2) the need to maintain and enhance the quality of the environment; and

3) the reasonably foreseeable needs of future generations.

1.9. Having regard to these provisions, the approach through this review is to provide a balanced framework in the District Plan to manage these resources appropriately. Furthermore, no less important is the need to ensure the provisions are presented in a manner that is clearly interpreted to facilitate effective and efficient District Plan administration.

National Planning Standards

1.10. In April 2019 the Government released a set of National Planning Standards (**planning standards**) that require all regional policy statements, regional plans and district plans to have a nationally consistent structure and format. The planning standards also prescribe certain definitions, noise and vibration metrics, and requirements for electronic functionality and accessibility. The planning standards have been introduced to improve the efficiency and effectiveness of the planning system, rather than seeking to alter the outcomes of policy statements or plans.

Other National Legislation or Policy Statements

1.11. When preparing district plans, local authorities must give effect to any National Policy Statement (NPS) and National Environmental Standard (NES).

1.12. The following NPSs are relevant:

(a) NPS on Urban Development
(b) NPS for Freshwater Management
(c) NPS for Renewable Electricity Generation
(d) NPS on Electricity Transmission

1.13. The following NESs are relevant:

(a) NES for Air Quality
(b) NES for Sources of Drinking Water
(c) NES for Telecommunication Facilities
(d) NES for Electricity Transmission Activities
(e) NES for Assessing and Managing Contaminants in Soil to Protect Human Health
(f) NES for Plantation Forestry
(g) NES for Freshwater
(h) NES for Storing Tyres Outdoors

1.14. Queenstown Lakes District (the District) is identified as a 'Tier 2' authority under the National Policy Statement on Urban Development (NPS-UD) and is therefore subject to the full suite of NPS-UD provisions and requirements. Tier 2 authorities are required to produce a Housing and Business Development Capacity Assessment (HBA).

1.15. The HBA for a tier 2 urban environment must: set out the most likely projection of demand for business land by business sector in the short term, medium term, and long term; and set out the assumptions underpinning that projection; and if those assumptions involve a high level of uncertainty, the nature and potential effects of that uncertainty.

1.16. The Council produced its first set of housing and business development capacity assessments in March 2018. For the purpose of this variation, the Business Development Capacity Assessment (BDCA) is most relevant. The Council updated its BDCA, including in regard to industrial development capacity, in March 2020[31]. This update was taking into account as part of the Council's s42A report on the GIZ.

1.17. Although the NPS-UD is an important consideration in regard to the provision and development of land intended for industrial development capacity, this variation does not attempt to materially alter the ability of the Coneburn Industrial Zone to contribute to the provision of industrial sites.

[31] Evidence In Chief Of Natalie Dianne Hampson For Queenstown Lakes District Council, NPS-UDC Capacity And Economic Matters Relating To The General Industrial And Three Parks Zones, 18 March 2020

APPENDIX 2B - PLANNING CONTEXT

Iwi Management Plans

1.18. When preparing or changing a district plan, Section 74(2A)(a) of the Resource Management Act ("the Act" or "RMA") states that Councils must take into account any relevant planning document recognised by an iwi authority and lodged with the territorial authority, to the extent that its content has a bearing on the resource management issues of the district.

1.19. The following iwi management plans are relevant:

The Cry of the People, Te Tangi a Tauira: Ngāi Tahu ki Murihiku Natural Resource and Environmental Iwi Management Plan 2008	
Provision	**Discussion**
3.4.13	Hazardous Substances and New Organisms 1. Require appropriate consultation with regards to Hazardous Substances or New Organisms applications. Pre application, site visits, and presentation of findings are encouraged. Continued liaison with Te Rūnanga o Ngāi Tahu is essential. 2. Consultation and communication of highly technical information should in addition be presented in plain language, to enable rūnanga (and other community groups) to make informed decisions. 3. Consider any application for Hazardous Substances or New Organisms in terms of the potential effect, both positive and adverse, on indigenous biodiversity. 5. Oppose the use of any hazardous substances where it is likely that such use will have an effect on water quality and land, influencing the life supporting and productive capacity of both.
3.1.1	Localised Influences on the Global Environment 11. Actively support the promotion of appropriate disposal of toxic missions and discharge methods through improved technology. 12. Support further development and improvement of contingency measures to recognise for increased natural hazard risk as a result of sea level rise and unpredictable weather patterns. Ngāi Tahu ki Murihiku will take an active role in the development of contingency measures and education of local communities
3.1.2	Economy and Industry 8. Participate in planning for climate change and its potential risks to ensure industries and communities are well placed (build resilience) to deal with climate change conditions in the future. Such involvement could include building of partnerships with scientists, sharing of information, enhanced community engagement and education, joint management and co management of resources, and enhanced economic development through changing environments and technologies.

3.2.1	Discharges to Air 1. Discourage discharges from industrial and trade premises that will have an impact on mahinga kai, taonga species, biodiversity, wāhi tapu and wāhi taonga. 2. Ensure that the processes used during activities that discharge to air are supervised and monitored to ensure that contaminant emissions are minimised. 5. Support and advocate for controlled use and appropriate storage of highly toxic and hazardous substances within the region. 9. Discourage and prevent discharges to air that will have impacts on cultural wellbeing and community health
3.2.2	Amenity Values 1. Limit through promotion of improved production and techniques, visual and physical effects from activities associated with exhaust emissions, dust, unacceptable and intense odour, smoke and lighting. 2. Ensure where avoidable that impacts from activities that create effects such as glare, shading, or electrical disturbance do not interfere with the amenity values associated with a place, environment or neighbouring property. 3. Ngāi Tahu ki Murihiku shall actively participate in interagency and cross boundary decision making in respect to development, design and placement of structures and where appropriate may provide qualified recommendations for the protection of amenity values. 4. Ngāi Tahu ki Murihiku shall provide qualified recommendations with respect to concerns raised related to odour and offensive discharge, from rural, urban and industrial activities. 6. Where there may be visual impacts on the natural and cultural landscapes as a result of development, encourage the integration of landscaping techniques which utilise reserve planting or vegetation screens to soften intrusion.

***Kāi Tahu ki Otago* Natural Resource Management Plan 2005**	
Provision	**Discussion**
5.2	Overall Objectives i. The rakātirataka and kaitiakitaka of Kāi Tahu ki Otago is recognised and supported. ii. Ki Uta Ki Tai management of natural resources is adopted within the Otago region. iii. The mana of Kāi Tahu ki Otago is upheld through the management of natural, physical and historic resources in the Otago Region.

	iv. Kāi Tahu ki Otago have effective participation in all resource management activities within the Otago Region. v. The respective roles and responsibilities of Manawhenua within the Otago Region are recognised and provided for through the other objectives and policies of the Plan.
5.4.3	Wāhi Tapu Objectives: i. All wāhi tapu are protected from inappropriate activities. ii. Kāi Tahu ki Otago have access to wāhi tapu. iii. Wāhi tapu throughout the Otago region are protected in a culturally appropriate manner.
5.4.4	Wāhi Tapu General Policies 1. To require consultation with Kāi Tahu ki Otago for activities that have the potential to affect wāhi tapu 2. To promote the establishment of processes with appropriate agencies that: i. enable the accurate identification and protection of wāhi tapu. ii. provide for the protection of sensitive information about the specific location and nature of wāhi tapu. iii. ensure that agencies contact Kāi Tahu ki Otago before granting consents or confirming an activity is permitted, to ensure that wāhi tapu are not adversely affected Earth Disturbance: 4. To require that a Kāi Tahu ki Otago mandated archaeologist survey an area before any earth disturbance work commences. 5. To promote the use of Accidental Discovery Protocols for any earth disturbance work. 6. To require all Māori archaeological finds to remain the cultural property of Kāi Tahu ki Otago.
5.6.3	Cultural Landscapes Objectives i. The relationship that Käi Tahu ki Otago have with land is recognised in all resource management activities and decisions.
5.6.4	Cultural Landscapes General Policies 1. To identify and protect the full range of landscape features of significance to Kāi Tahu ki Otago.

	Earth Disturbance: 19. To require all earthworks, excavation, filling or the disposal of excavated material to: i. Avoid adverse impacts on significant natural landforms and areas of indigenous vegetation; ii. Avoid, remedy, or mitigate soil instability; and accelerated erosion; iii. Mitigate all adverse effects. Structures: 24. To discourage the erection of structures, both temporary and permanent, in culturally significant landscapes, lakes, rivers or the coastal environment. Subdivisions: 26. To encourage a holistic planning approach to subdivisions between the Local Government Agencies that takes into account the following: i. All consents related to the subdivision to be sought at the same time. ii. Protection of Kāi Tahu ki Otago cultural values. iii. Visual amenity. iv. Water requirements. v. Wastewater and storm water treatment and disposal. vi. Landscaping. vii. Location of building platforms 27. To require that where any earthworks are proposed as part of a subdivision activity, an accidental discovery protocol is to be signed between the affected papatipu Rūnaka and the Company 28. To require applicants, prior to applying for subdivision consents, to contact Kāi Tahu ki Otago to determine the proximity of the proposed subdivision to sites of significance identified in the resource inventory.
5.7.2	Air and Atmosphere Objectives i. Kāi Tahu ki Otago sites of significance are free from odour, visual and other pollutants. iii. The life supporting capacity and mauri of air is maintained for future generations. iii. The life supporting capacity and mauri of air is maintained for future generations.
5.7.3	Policies 1. To require earthworks and discharges to air consider the impact of dust and other air-borne contaminants on health, mahika kai, cultural landscapes, indigenous flora and fauna, wāhi tapu and taoka.

	12. To require light suppression techniques are used for any new subdivisions and replacement lighting

1.20. Part 10: Clutha/Mata-au Catchments Te Riu o Mata-au outlines the issues, objectives and policies for the Clutha/Mata-au Catchments within which the Coneburn Industrial Zone is situated. Included in this chapter is a description of some of the Kāi Tahu ki Otago values associated with the Clutha/Mata-au Catchments. The following Clutha/Mata-au specific objectives and policies are relevant:

Plan Reference	Provision
10.2.3	Wai Māori Policies in the Clutha/Mata-au Catchment Land use: 9. To encourage the adoption of sound environmental practices, adopted where land use intensification occurs. 10. To promote sustainable land use in the Clutha/Mata-au Catchment. 11. To encourage all consents related to subdivision and lifestyle blocks are applied for at the same time including, land use consents, water consents, and discharge consents. 12. To require reticulated community sewerage schemes that have the capacity to accommodate future population growth.

Regional Policy Statements

1.21. In accordance with the above, the relevant provisions of the Iwi Management Plans have been taken into account in this Section 32 analysis.

1.22. Section 74 of the Act requires that a district plan prepared by a territorial authority must "give effect to" any operative Regional Policy Statement. The Partially Operative Otago Regional Policy Statement 2019 (**PORPS 19**) and the Proposed Regional Policy Statement 2021 (**PRPS 21**) are the relevant regional policy statements to be given effect to within the PDP.

Partially Operative Regional Policy Statement 2019	
Reference	**Detail**
Objective 1.1	Otago's resources are used sustainably to promote economic, social, and cultural wellbeing for its people and communities
Policy 1.1.1	Economic wellbeing Provide for the economic wellbeing of Otago's people and communities by enabling the resilient and sustainable use and development of natural and physical resources.
Policy 1.1.2	Social and cultural wellbeing and health and safety Provide for the social and cultural wellbeing and health and safety of Otago's people and communities when undertaking the subdivision, use, development and protection of natural and physical resources by all of the following: a) Recognising and providing for Kāi Tahu values;

	c) Taking into account the diverse needs of Otago's people and communities; d) Avoiding significant adverse effects of activities on human health; e) Promoting community resilience and the need to secure resources for the reasonable needs for human wellbeing; f) Promoting good quality and accessible infrastructure and public services.
Policy 1.2.1	Integrated resource management Achieve integrated management of Otago's natural and physical resources, by all of the following: b) Taking into account the impacts of management of one natural or physical resource on the values of another, or on the environment; c) Recognising that the value and function of a natural or physical resource may extend beyond the immediate, or directly adjacent, area of interest; f) Managing adverse effects of activities to give effect to the objectives and policies of the Regional Policy Statement. g) Promoting healthy ecosystems and ecosystem services;
Objective 2.1	The principles of Te Tiriti o Waitangi are taken into account in resource management processes and decisions
Policy 2.1.2	Treaty principles Ensure that local authorities exercise their functions and powers, by: a) Recognising Kāi Tahu's status as a Treaty partner; and b) Involving Kāi Tahu in resource management processes implementation; c) Taking into account Kāi Tahu values in resource management decision making processes and implementation; h) Taking into account iwi management plans.
Objective 4.1	Risks that natural hazards pose to Otago's communities are minimised
Policy 4.1.4	Assessing activities for natural hazard risk Assess activities for natural hazard risk to people, property and communities, by considering all of the following: a) The natural hazard risk identified, including residual risk; b) Any measures to avoid, remedy or mitigate those risks, including relocation and recovery methods; c) The long-term viability and affordability of those measures; d) Flow-on effects of the risk to other activities, individuals and communities; e) The availability of, and ability to provide, lifeline utilities, and essential and emergency services, during and after a natural hazard event.
Policy 4.1.5	Natural hazard risk Manage natural hazard risk to people, property and communities, with particular regard to all of the following: a) The risk posed, considering the likelihood and consequences of natural hazard events; b) The implications of residual risk; c) The community's tolerance of that risk, now and in the future, including the community's ability and willingness to prepare for and adapt to that risk, and respond to an event; d) Sensitivity of activities to risk;

	e) The need to encourage system resilience; f) The social costs of recovery.
Policy 4.1.6	Minimising increase in natural hazard risk Minimise natural hazard risk to people, communities, property and other aspects of the environment by: a) Avoiding activities that result in significant risk from natural hazard; b) Enabling activities that result in no or low residual risk from natural hazard; d) Encouraging the location of infrastructure away from areas of hazard risk where practicable; e) Minimising any other risk from natural hazard.
Policy 4.1.7	Reducing existing natural hazard risk Reduce existing natural hazard risk to people and communities, including by all of the following: a) Encouraging activities that: i. Reduce risk; or ii. Reduce community vulnerability; b) Discouraging activities that: i. Increase risk; or ii. Increase community vulnerability; c) Considering the use of exit strategies for areas of significant risk to people and communities; d) Encouraging design that facilitates: i. Recovery from natural hazard events; or ii. Relocation to areas of lower risk; or iii. Mitigation of risk; g) Reassessing natural hazard risk to people and communities, and community tolerance of that risk, following significant natural hazard events.
Objective 4.5	Urban growth and development is well designed, occurs in a strategic and coordinated way, and integrates effectively with adjoining urban and rural environments.
Policy 4.5.1	Providing for urban growth and development Provide for urban growth and development in a strategic and co-ordinated way, including by: b) Monitoring supply and demand of residential, commercial and industrial zoned land; c) Ensuring that there is sufficient housing and business land development capacity available in Otago; f) Having particular regard to: ii. Minimising competing demands for natural resources; iii. Maintaining high and outstanding natural character in the coastal environment; outstanding natural features, landscapes, and seascapes; and areas of significant indigenous vegetation and significant habitats of indigenous fauna; v. Avoiding land with significant risk from natural hazards; g) Ensuring efficient use of land; h) Restricting urban growth and development to areas that avoid reverse sensitivity effects unless those effects can be adequately managed;

Policy 4.5.3	Urban design Design new urban development with regard to: a) A resilient, safe and healthy community; b) A built form that relates well to its surrounding environment; c) Reducing risk from natural hazards; d) Good access and connectivity within and between communities; e) A sense of cohesion and recognition of community values; h) A diverse range of housing, commercial, industrial and service activities;
Objective 4.6	Hazardous Substances Promote an integrated approach to the management of hazardous substances in Otago.
Policy 4.6.2	Use, storage and disposal of hazardous substances Manage the use, storage and disposal of hazardous substances, by all of the following: a) Providing secure containment for the storage of hazardous substances; b) Minimising risk associated with natural hazard events; c) Ensuring the health and safety of people; d) Avoiding, remedying or mitigating adverse effects on the environment; e) Providing for the development of facilities to safely store, transfer, process, handle and dispose of hazardous substances; f) Ensuring hazardous substances are treated or disposed of in accordance with the relevant regulatory requirements; g) Restricting the location and intensification of activities that may result in reverse sensitivity effects near authorised facilities for hazardous substance bulk storage, treatment or disposal; h) Encouraging the use of best management practices.
Policy 4.6.9	New contaminated land Avoid the creation of new contaminated land or, where this is not practicable, minimise adverse effects on the environment.
Objective 5.3	Sufficient land is managed and protected for economic production
Policy 5.3.2	Distribution of commercial activities Manage the distribution of commercial activities by: c) Restricting commercial activities outside of a) and b) when such activities are likely to undermine the vibrancy and viability of those centres; (for clarity purposes: a) Enabling a wide variety of commercial, social and cultural activities in central business districts, and town and commercial centres; b) Enabling smaller commercial centres to service local community needs;)
Policy 5.3.3	Industrial Land Manage the finite nature of land suitable and available for industrial activities, by all of the following: a) Providing specific areas to accommodate the effects of industrial activities;

	b) Providing a range of land suitable for different industrial activities, including land-extensive activities; c) Restricting the establishment of activities in industrial areas that are likely to result in: i. Reverse sensitivity effects; or ii. Inefficient use of industrial land or infrastructure.
Objective 5.4	Adverse effects of using and enjoying Otago's natural and physical resources are minimised
Policy 5.4.1	Offensive or objectionable discharges Manage offensive or objectionable discharges to land, water and air by: a) Avoiding significant adverse effects of those discharges; c) Avoiding, remedying or mitigating other adverse effects of those discharges.
Policy 5.4.3	Precautionary approach to adverse effects Apply a precautionary approach to activities where adverse effects may be uncertain, not able to be determined, or poorly understood but are potentially significant or irreversible.

1.23. The following Issues from Part 3: Urban Form and Development (UFD) of the PRPS 21 are relevant:

Proposed Regional Policy Statement 2021	
Reference	**Detail**
UFD-P2-Sufficiency of development capacity	Sufficient urban area housing and business development capacity in urban areas, including any required competitiveness margin, is provided in the short, medium and long term by: 4) providing for commercial and industrial activities in accordance with UFD–P5 and UFD–P6 5) responding to any demonstrated insufficiency in housing or business development capacity by increasing development capacity or providing more development infrastructure as required, as soon as practicable, and 6) requiring Tier 2 urban environments to meet, at least, the relevant housing bottom lines in APP10.
UFD-P6-Industrial Activities	Provide for industrial activities in urban areas by: (1) identifying specific locations and applying zoning suitable for accommodating industrial activities and their reasonable needs and effects including supporting or ancillary activities, (2) identifying a range of land sizes and locations suitable for different industrial activities, and their operational needs including land-extensive activities, (3) managing the establishment of non-industrial activities, in industrial zones, by avoiding activities likely to result in reverse sensitivity effects on industrial activities, or likely to result in an inefficient use of industrial zoned land or infrastructure, particularly where: (a) the area provides for a significant operational need for a particular industrial activity or grouping of industrial activities that are unlikely or are less efficiently able to be met in alternative locations, or

	(b) the area contains nationally or regionally significant infrastructure and the requirements of EIT–INF–P15 apply, and
UFD-M2-District Plans	Territorial authorities must prepare or amend their district plans as soon as practicable, and maintain thereafter, to: (2) in accordance with any required Housing and Business Development Capacity Assessments or monitoring, including any competitiveness margin, ensure there is always sufficient development capacity that is feasible and likely to be taken up and, for Tier 2 urban environments, at a minimum meets the bottom lines for housing in APP-10, and meets the identified land size and locational needs of the commercial and industrial sectors … (3) ensure that urban development is designed to: (a) achieve a built form that relates well to its surrounding environment, including by identifying and managing impacts of urban development on values and resources identified in this RPS, (b) provide for a diverse range of housing, commercial activities, industrial and service activities, social and cultural opportunities,

Proposed Regional Policy Statement 2015

Proposed District Plan - Notified 26 August 2015

1.24. The following objectives and policies (or parts thereof) of the PDP (Part 2 Strategic) are relevant to the Coneburn Industrial Zone, and the proposal should take into account and give effect to these provisions:

Strategic Direction: Chapter 3	
Reference	**Detail**
Objective 3.2.1	The development of a prosperous, resilient and equitable economy in the District.
Policy 3.2.1.5	Local service and employment functions served by commercial centres and industrial areas outside of the Queenstown and Wanaka town centres[32], Frankton and Three Parks, are sustained.
Policy 3.2.1.6	Diversification of the District's economic base and creation of employment opportunities through the development of innovative and sustainable enterprises.
Objective 3.2.2	Urban growth is managed in a strategic and integrated manner.
Policy 3.2.2.1	Urban development occurs in a logical manner so as to: a. promote a compact, well designed and integrated urban form; c. achieve a built environment that provides desirable, healthy and safe places to live, work and play; d. minimise natural hazard risk, taking into account the predicated effects of climate change; *e.* protect the District's rural landscapes from sporadic and sprawling urban development;

32 Defined by the extent of the Town Centre Zone in each case

	h. be integrated with existing, and proposed infrastructure and appropriately manage effects on that infrastructure.
Objective 3.2.4	The distinctive natural environments and ecosystems of the District are protected.
Policy 3.2.4.1	Development and land uses that sustain or enhance the life-supporting capacity of air, water, soil and ecosystems, and maintain indigenous biodiversity.
Policy 3.2.4.6	<u>The values of significant indigenous vegetation and significant habitats of indigenous fauna are protected.</u>
Policy 3.2.4.7	The survival chances of rare, endangered, or vulnerable species or indigenous plant or animal communities are maintained or enhanced.
Objective 3.2.5	The retention of the District's distinctive landscapes.
Policy 3.2.5.3	In locations other than in the Rural Zone, the landscape values of Outstanding Natural Features and Outstanding Natural Landscapes are protected from inappropriate subdivision, use and development.
Objective 3.2.6	The District's residents and communities are able to provide for their social, cultural and economic wellbeing and their health and safety.
Strategic Policy 3.3.8	Avoid non-industrial activities not ancillary to industrial activities occurring within areas zoned for industrial activities.
Strategic Policy 3.3.12	Provide for a wide variety of activities and sufficient capacity within commercially zoned land to accommodate business growth and diversification.

1.25. The Strategic Directions seek to enable development while protecting the valued natural and physical resources of the District. Chapter 44 Coneburn Industrial Zone is required to give effect to these obligations, and does so by providing for increased industrial capacity, whilst retaining a large, visually prominent area of the zone as vegetation.

Urban Development Chapter 4:	
Reference	**Detail**
Policy 4.2.1.4	Ensure Urban Growth Boundaries encompass a sufficient area consistent with: a. the anticipated demand for urban development within the Wakatipu and Upper Clutha Basins over the planning period assuming a mix of housing densities and form; b. ensuring the ongoing availability of a competitive land supply for urban purposes; c. the constraints on development of the land such as its topography, its ecological, heritage, cultural or landscape significance; or the risk of natural hazards limiting the ability of the land to accommodate growth; d. the need to make provision for the location and efficient operation of infrastructure, commercial and industrial uses, and a range of community activities and facilities; e. a compact and efficient urban form; f. avoiding sporadic urban development in rural areas; g. minimising the loss of the productive potential and soil resource of rural land

Objective 4.2.2A	A compact and integrated urban form within the Urban Growth Boundaries that is coordinated with the efficient provision and operation of infrastructure and services.
Objective 4.2.2B	Urban development within Urban Growth Boundaries that maintains and enhances the environment and rural amenity and protects Outstanding Natural Landscapes and Outstanding Natural Features, and areas supporting significant indigenous flora and fauna.
Policy 4.2.2.1	Integrate urban development with the capacity of existing or planned infrastructure so that the capacity of that infrastructure is not exceeded and reverse sensitivity effects on regionally significant infrastructure are minimised.

1.26. The Urban Development objectives and policies encourage consolidation of urban growth within the urban growth boundaries and existing settlements.

Tangata Whenua Chapter 5:	
Objective or provision	**Detail**
Objective 5.3.1	Consultation with tangata whenua occurs through the implementation of the Queenstown Lakes District Plan.
Policy 5.3.1.1	Ensure that Ngāi Tahu Papatipu Rūnanga are engaged in resource management decision-making and implementation on matters that affect Ngāi Tahu values, rights and interests, in accordance with the principles of the Treaty of Waitangi.
Policy 5.3.1.2	Actively foster effective partnerships and relationships between the Queenstown Lakes District Council and Ngāi Tahu Papatipu Rūnanga.
Policy 5.3.1.4	Recognise that only tangata whenua can identify their relationship and that of their culture and traditions with their ancestral lands, water sites, wāhi tapu, tōpuni and other taonga.

1.27. Consultation was undertaken with representatives from Te Ao Marama and Auhaka on 6 April 2022. The issues traversed are summarised in Section 3.2 of this report.

1.28. The proposal gives effect to Sections 6(b) and 7(c) of the Act and the Landscape Chapter 6 by managing the actual and potential adverse effects of increased building coverages where these could affect the District's landscape values.

Other Council Documents Considered

1.29. The following Council documents and projects have informed this Section 32 evaluation.

(a) 2021-2031 Long Term Plan Volume 1
(b) 2021-2031 Long Term Plan Volume 2
(c) Growth Projections to 2051
(d) Economic Development Strategy
(e) Reserve Management Plans
(f) QLDC Infometrics
(g) Queenstown Lake Spatial Plan Whaiora 2021
(h) Housing and Business Capacity Assessment 2017

APPENDIX 3

PLANNING BACKGROUND OF THE CONEBURN INDUSTRIAL ZONE

Submission 361[33] was made on Stage 1 of the District Plan review. This submission sought the inclusion of the Coneburn Industrial Zone land within the Operative District Plan (ODP) Industrial B Zone. The Independent Hearings Panel (IHP) released their Stage 1 topic decisions in May 2018. The IHP considered submission 361 in decision report 17-8[34] relating to mapping matters in the Coneburn Valley, Queenstown Park and Jacks Point areas. The IHP resolved that submission 361 be accepted in part, and the subject land be zoned 'Coneburn Industrial'[35]. The Coneburn Industrial Zone now comprises Chapter 44 of the Proposed District Plan (PDP).

The submitter's initially appealed the IHPs decision on Submission 361, however this appeal was subsequently withdrawn and Chapter 44 is now operative.

Chapter 44 is a special purpose industrial zone which covers a discrete area of land, approximately 114 Ha in area situated on the Kingston Highway (State Highway 6/SH6) to the south of the Remarkables ski field access road and across the road to the east of the Jacks Point Zone.

The purpose of Chapter 44 is outlined at 44.1 of Chapter 44 as follows:

'The Coneburn Industrial Zone provides for industrial and service activities. Conversely, standalone offices, residential and almost all retail uses are excluded within the zone in order to ensure that it does

33 Grant Hylton Hensman, Sharyn Hensman & Bruce Herbert Robertson, Scope Resources Ltd, Granty Hylton Hensman & Noel Thomas van Wichen, Trojan Holdings Ltd

34 Report 17-8, Report and Recommendations of Independent Commissioners Regarding Mapping of Coneburn Valley, Queenstown Park, Jacks Point, 7 May 2018

35 Para 244, IHP Report 17-8

not become a mixed use zone where reverse sensitivity issues and land values make industrial and service activities unviable within the zone.'

Variations to District-wide Chapters

However, provisions for the Coneburn Industrial Zone relating to the district wide chapters subject to this variation were not identified by the IHP. Partly, this was due to the staged nature of the plan review process, with Chapter 25 (Earthworks), Chapter 29 (Transport) and Chapter 31 (Signs) being subject to Stage 2 of the review. Chapter 36 (Noise) was however considered through Stage 1. In the absence of relevant provisions within these district wide chapters, some critical aspects of land use and development activities within the Zone cannot be controlled by the District Plan. This has the potential to result in environmental, social, cultural and economic adverse effects.

Although Chapter 44 is now treated as operative, the land zoned Coneburn Industrial Zone is currently a working quarry operation. It is not clear when, or if, the land will in fact be developed in accordance with the provisions of Chapter 44. It is understood that a considerable amount of earthworks/quarry activities have yet to be undertaken on the land. This activity is anticipated to continue for the foreseeable future, both to exercise those rights afforded by the existing consented quarry operation, and to sufficiently prepare the land to accommodate urban development in accordance with the landscape and visual amenity protections as set out in Chapter 44.

In September 2019, Queenstown Lakes District Council (QLDC or the Council) notified its Stage 3 topics of the District Plan review. This included Chapter 18A - General Industrial Zone (GIZ). As notified, the GIZ incorporated almost all land located within the ODP Industrial 'A' Zone, Industrial B Zone and the Ballantyne Road Mixed Use Zone. Stage 3 did not seek to identify substantive new areas of land within the GIZ in order to enable a more strategic and integrated assessment of future industrial land allocation in association with the development of the Council's Future Development Strategy (FDS). Work on the FDS is progressing in partnership with Iwi, Central Government and other key stakeholders. Due to the recent conclusion of litigation associated with the Coneburn Industrial Zone, its unique site characteristics and the ongoing FDS work, it was determined that the land subject to Chapter 44 need not be identified within the GIZ at this time.

It should be noted that the notified GIZ did propose variations (and consider submission on) the district wide chapters subject to this variation. These variations have been taken into account as part of this s32 assessment.

Variation to Building Coverages[36]

Originally the Coneburn Industrial Zone proposed two Activity Areas (AA) where AA1a originally sought to provide up to 40% building coverage as a permitted activity and AA2a 60% where any coverage in excess of these thresholds was to be treated as a non-complying activity. This equated to enabling 1.83ha of building within AA1a and 13.16ha within AA2a.

To achieve an appropriate level of service AA1a (40%) was lowered to 30% a reduction of 4589m^2 while AA2a (60%) was lowered to 35% a reduction of 5.4ha in permitted building coverage. In addition to the lower building coverages and in recognition of the constraint the traffic generation presents to the Zone, a restricted discretionary assessment regime (44.5.5) was authored to enable assessment of traffic related matters for applications made to establish building coverages between 30%-40% AA1a and 35-65% AA2a.

The resulting traffic generation and intersection design was acceptable to Waka Kotahi and this was confirmed to commissioners NZTA was amenable to the revised Coneburn planning framework in this regard.

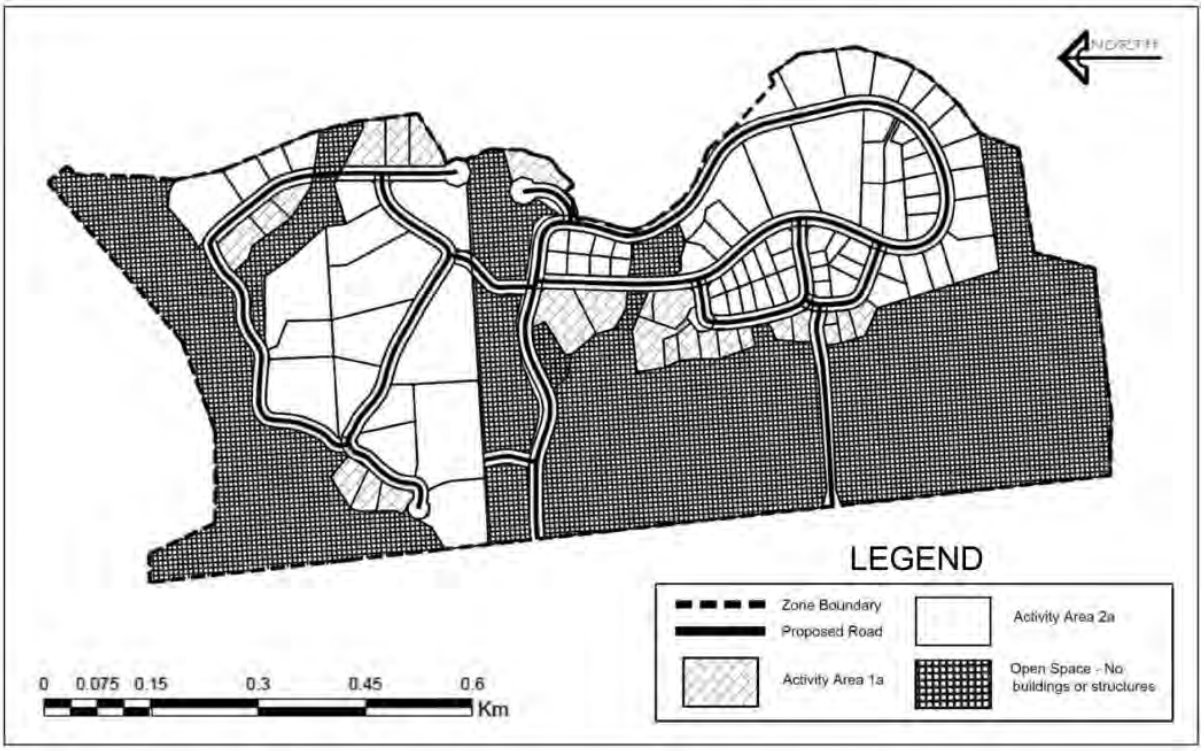
In June 2019, a pre-application for works in SH6 was made to NZTA's consultants Opus to upgrade the existing crossing (Southern Access) to Austroads Priority T intersection, along with the internal roading layout and open space area ecological work within the southern part of CIZ.

In October 2019, Waka Kotahi advised that the reason permission was not granted to construct the Austroads Priority T intersection at the southern access point was that following the release of the *Government Policy Statement on Land Transport 2018* it was no longer acceptable to construct these type of intersections to service this type of development, a roundabout is required, and there are no other alternatives, as confirmed by Waka Kotahi.

Landowners within the CIZ have sought to amend Chapter 44 to revert building coverages within the Zone to those originally sought when a roundabout was proposed at the intersection of SH6 and Woolshed Road. This is in accordance with the planning framework when CIZ was to be accessed via the existing Priority T as well as a roundabout.

[36] Memorandum from applicant's planner Nick Geddes re Coneburn Industrial Zone, Chapter 44 – Potential Variation dated 10 July 2020

APPENDIX 4 – CONEBURN STRUCTURE PLAN



ATTACHMENT - C Beale Consultants – Coneburn Industrial Zone Ecological Peer Review

Memorandum

File Ref: Coneburn Industrial Zone (The Zone)

To: Luke Place, Senior Policy Planner, Queenstown Lakes District Council

From: Simon Beale, Senior Ecologist, Beale Consultants Limited

Date: 3 August 2021

Subject: Ecological Peer Review – Proposed variation to area of open space at the southern entrance to the Zone.

1 INTRODUCTION

1.1 Beale Consultants was engaged to undertake a review of expert ecological comments prepared by the landowner to support the proposed variation to open space at the southern entrance of the Zone to accommodate a roundabout and temporary construction areas.

2. SCOPE OF WORK

2.1 The scope of this review entailed:

- A site inspection conducted on 2 August 2021 from 9 to 9.30 am.
- Desktop research involving reading of an Ecological Management Plan prepared by Dawn Palmer of Natural Solutions for Nature Ltd (NSN) that applies to the Open Space Areas of the Zone, an ecological assessment of the Zone by Davis Consulting Group plus analysis of the Open Space plans, the design/land requirement plans of the intersection and Chapters 27, 33 and 44 of the PDP.
- A review of a letter by Dawn Palmer, dated 22 July 2021 specific to the open space area affected by roundabout construction.

3 SITE INSPECTION

3.1 The site inspection of the land affected by construction of the roundabout indicates that it is exotic in nature with the possible exception of small group of sub-mature matagouri and hard tussocks that appear to border Area 2A shown on the Land requirement Plan (310103213-01-002-C400).

3.2 The vegetation cover within the affected area, which includes minor earthworks in the vicinity of SH6 is almost exclusively exotic grassland dominated by swards of cocksfoot, browntop and Chewings fescue. The grassland is interspersed with numerous common exotic herbaceous plants such as woolly mullein, yarrow, Scotch thistle, Californian thistle, wireweed, wild mignonette, white clover, haresfoot trefoil, horehound, sheeps' sorrel, dandelion and narrow leaved plantain along with the occasional young specimen of broom. Wild mignonette is especially prevalent along the margins of Quarry Road.

3.3 These observations align with those of Dawn Palmer that are set in the July 2021 letter to Nick Geddes of Clark Fortune McDonald.

4 ECOLOGICAL VALUES OF AFFECTED AREA

4.1 I agree with Dawn Palmer that there are no significant ecological values within the affected area.

ATTACHMENT D - Bridget Gilbert Landscape Architecture – Coneburn Industrial Zone: Landscape & Visual Effects

bridget gilbert
landscape architecture
021 661 650
bridget@bgla.nz

Memorandum

Project:	Coneburn Industrial Zone
Subject:	Landscape and Visual Effects
Date:	26/10/2021

1 Introduction

1.1 Bridget Gilbert Landscape Architecture Limited (**BGLA**) has been engaged by Queenstown Lakes District Council (**Council**) to undertake a review of expert landscape comments prepared Ms Michelle Snodgrass in support of the proposed variation to open space at the southern entrance of the Coneburn Industrial Zone (**CIZ**) to accommodate a roundabout and temporary construction areas.

1.2 The key documents I have referred to in preparing my comments are as follows:

a) Coneburn Proposed Zone Changes Landscape Assessment Report, prepared by Michelle Snodgrass Landscape Architecture, undated (**Landscape Report**).

b) QLDC Hearing of Submissions on Proposed District Plan Report 17-8, Report and Recommendations of Independent Commissioners Regarding Mapping of Coneburn Valley, Queenstown Park, Jacks Point.

c) PDP Chapter 44 Coneburn Industrial Zone, December 2020 (Decisions Version).

d) Intersection Design Plans, prepared by Stantec, dated May 2021.

e) Roundabout vs Intersection plan, prepared by Clark Fortune McDonald and Associates, undated.

f) Landscape Concept plan for the proposed subdivision on the west side of State Highway 6 (SH6), prepared by Stephen Riddle Landscape Design, dated August 2019.

g) Letter from Ms Snodgrass to Mr Nick Geddes, dated 20 July 2021 (**Landscape Letter**).

1.3 My landscape comments have been prepared during Covid Alert Level 3 lockdown (with Auckland border restrictions in place). While I have not undertaken a specific site visit to assist the preparation of these comments, I am generally familiar with the CIZ site and surrounding area. I am also familiar with all of the viewing locations addressed in Ms Snodgrass's Landscape Report and Landscape Letter.

1.4 I have also visited the southern flanks of Peninsula Hill (to the north of the site) as part of field work in relation to the Jacks Point appeal and flown across the western side of the Remarkables by helicopter as part of field work for the Queenstown Park appeals.

1.5 I confirm that prior to the hearing it is my intention to make a specific site visit, following which I will advise Council if my site visit has changed any of the comments set out in this Memorandum.

2 Landscape effects of the proposed roundabout and temporary construction areas

2.1 Ms Snodgrass provides a brief description of the landscape changes arising from the proposed roundabout and concludes that it will not have any effect on the visibility of the CIZ, and an 'insignificant' effect on visual amenity of the small area of pastoral land required for the roundabout. Ms Snodgrass advises that in her opinion there will be an 'insignificant' effect on landscape character due to the proximity and influence of the SHA. Ms Snodgrass provides no definition of the term 'insignificant'.

2.2 Overall, I understand Ms Snodgrass to be of the view that the proposed roundabout will not generate any greater level of landscape effects to those anticipated by the original 'T' intersection that forms part of CIZ. I concur with Ms Snodgrass's assessment in this regard.

2.3 Importantly, the roundabout will not disturb the balance of open space to built development anticipated along the eastern side of SH6, nor undermine the function of the open space area as a buffer for the industrial zone. I agree with Ms Snodgrass that the roundabout will not impact on the visibility of CIZ from the State Highway 6 (**SH6**) and that the urban character of the nearby SHA development suggests a contextual fit for the roundabout. I also note that the roundabout will not impact on noteworthy landform or vegetation features.

2.4 On balancing these considerations, adverse landscape effects associated with the roundabout are rated as **very low**. [1]

3 UGB/ONL Mapping

3.1 As demonstrated in **Figure 1** below, the Queenstown Lakes Proposed District Plan Decisions Version (**PDP DV**) mapping reveals a 'conflict' between the Urban Growth Boundary (**UGB**) (and the Coneburn Zone boundary) (red dashed line in **Figure 1**) and the Outstanding Natural Landscape boundary (brown dashed line in **Figure 1**).

3.2 Chapter 4 of the PDP forms part of the strategic intentions of the District Plan and guides planning and decision making for urban growth and development within the District. The Chapter 4 Purpose explains the important role that the quality of the landscape plays with respect to the social and

[1] Using a seven-point effects rating scale: **very low** I **low** I **moderate-low** I **moderate** I **moderate-high** I **high** I **very high**, with **moderate-low** corresponding to a 'minor effect' and **high** and **very high** corresponding to a 'significant' adverse effect.

economic wellbeing of the District. Policy seeks to define UGBs that protect the values of ONFs and ONLs.

3.3 The application of this policy approach across the District has led to a general preference to delineate UGBs outside of ONF/Ls[2] which makes sense from a landscape perspective, as it avoids the competing imperatives of enabling urban development and protecting landscape values.

***Figure 1**: QLDC Proposed District Plan Decisions Version mapping. Red dashed line corresponds to **Urban Growth Boundary**. Brown dashed line corresponds to **ONL boundary**.*

3.4 It should be noted that the DV Coneburn Structure Plan (**Figure 2** below) anticipates *Open Space - No buildings or structures* land use within this part of the Coneburn Industrial zone. Therefore, amending the UGB or ONL boundaries to better align in the part of the zone will not impact on the potential for development within the zone.

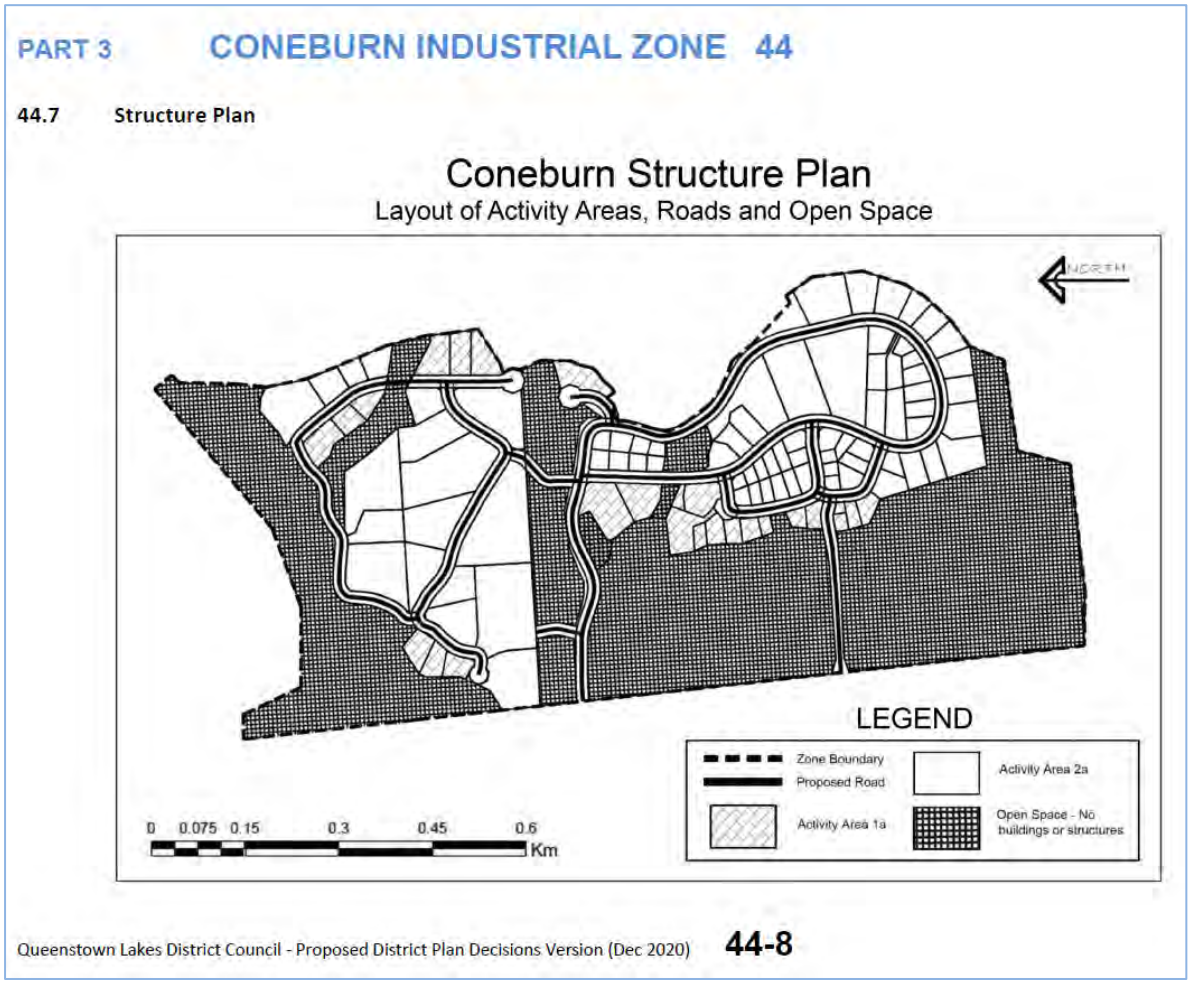


***Figure 2**: QLDC Proposed District Plan Decisions Version Coneburn Structure Plan.*

3.5 In my opinion, there are two options available to the Council to remedy the current UGB/ONL mapping conflict:

a) Amend the ONL boundary so that it aligns with the UGB (and Coneburn Industrial Zone boundary).

b) Amend the UGB (and Coneburn Industrial Zone boundary) so that it aligns with the ONL boundary.

3.6 This section of my Memorandum will consider the potential landscape effects of each of these options. It does not, however, assess the appropriateness or otherwise of the UGB and ONL boundaries as currently mapped in the DV PDP. (Luke - the reason I include this clarification is that from a landscape perspective, and in an ideal world, both boundaries would align with the watercourse in this location as it forms a clearly legible defensible edge.)

Amend the ONL boundary so that it aligns with the UGB(and Coneburn Industrial Zone boundary)

3.7 The key test to apply in considering the landscape effects of amending the ONL boundary so that it realigns with the UGB (and Coneburn Industrial Zone boundary) is whether this change will protect the landscape values of the ONL.

3.8 The relevant ONL relates to the Remarkables mountain range. The preparation of a schedule of landscape values for a number of identified (i.e. mapped) priority area ONF/Ls (and Upper Clutha RCL areas) has been directed by the Topic 2: Rural Landscapes Interim Decision 2.9.[3] The western (and northern) side of the Remarkables Range has been identified by the Court as one of the 'priority areas' and is referred to as PA Western Remarkables. The author and Ms Helen Mellsop[4] have been engaged by Council to prepare the priority area ONF/L Schedules, with the project due for completion in early 2022. To date, a DRAFT Methodology Statement has been prepared, (including Schedule templates) and three 'sample' schedules have been completed to test the methodology West Wanaka ONL, Kawarau River ONF and Mt Barker/Cardrona River RCL).

3.9 The mapping in **Figure 3** below illustrates that the PA Western Remarkables corresponds to the entire western side of the Remarkables Range north of Wye Creek. This is a spectacular and expansive landscape that is critical to the identity of Queenstown and the broader District.

***Figure 3**: PA ONF/L mapping approved by the Environment Court. The PA Western Remarkables applies to the green overlay area across the western side of the Remarkables extending from Wye Creek to the Frankton label.*

[3] [2021] NZEnvC 124.

[4] With Landscape Expert Peer Review input by Mr Brad Combs of Isthmus.

3.10 Very briefly, key landscape values associated with the PA Western Remarkables centre on:

- the jagged peaks and rugged, near vertical mountain slopes that are highly memorable, strongly expressive of the landscape's formative processes and display very high transient values;
- the elevated alluvial fans extending from the mountain faces into the Coneburn Valley that are geologically significant and highly expressiveness of the landscape's formative processes;
- its pockets of indigenous vegetation; the importance of the area to iwi as evidenced by the Wāhi Tūpuna overlay that applies to much of the area[5];
- the signature views to the western side of the Remarkables Range from Queenstown (including the airport, as a gateway to Queenstown), Jacks Point, Lake Wakatipu and State Highway 6 (**SH 6**); and
- the recreational values of the area (skiing, hiking, rock climbing).

3.11 The proposed ONL mapping amendment relates to a triangular 2,500m² area of land that coincides with a portion of an unnamed stream draining westwards from the ranges to low-lying land in the vicinity of Woolshed Road (on the western side of the SH 6).

3.12 A sparse grouping of scattered trees and shrubs is evident in aerial photographs of the triangular area. The character and quality of this vegetation has not been specifically evaluated, although it is noted that this vegetation patterning is evident both within and outside the ONL (suggesting that it is not determinative of ONL values in its own right, or instrumental in influencing the alignment of the ONL boundary).

3.13 In a similar vein, the stream that passes through the triangular area is evident both within and outside the ONL mapping, suggesting that it too is not determinative of ONL values in its own right, or instrumental in influencing the alignment of the ONL boundary.

3.14 The triangular area is expected to be indiscernible in views from Queenstown, State Highway 6, Jacks Point, Lake Wakatipu, and the Remarkables Ski Field Access Road as a consequence of its small scale (extent) and low-lying location (i.e. on the Coneburn Valley floor, rather than within the ranges 'proper').

3.15 Put another way, the triangular area plays little to no role in shaping the landscape values of PA Western Remarkables due to its very small scale (relative to the ONL), its visually indistinct character and the absence of noteworthy landscape elements, patterns, and processes.

3.16 For these reasons, it is my opinion that the proposed amendment to the ONL boundary to align with the UGB line will protect the landscape values of the ONL.

[5] Noting that the Wāhi Tūpuna overlay does not apply to the triangular area of land where an ONL mapping amendment is being considered.

Amend the UGB (and Coneburn Industrial Zone boundary) so that it aligns with the ONL.

3.17 Amending the UGB (and Coneburn Industrial Zone boundary) so that it aligns with the ONL boundary will not disturb the existing ONL mapping and, in so doing, will protect the landscape values of the ONL.

4 Conclusion

4.1 In conclusion, adverse landscape effects associated with the proposed roundabout are rated as **very low.**

4.2 With respect to the conflict between the UGB (and Coneburn Industrial Zone boundary) and the ONL boundary, amending the ONL boundary so that it aligns with the UGB (and Coneburn Industrial Zone boundary) or amending the UGB (and Coneburn Industrial Zone boundary) so that it aligns with the ONL boundary will protect the landscape values of the ONL.

Bridget Gilbert
Landscape Architect
B Hort Dip LA ALI NZILA (Registered)

Technical Review

ATTACHMENT E - Stantec Technical Review Coneburn Industrial Review – Change to Land Use Coverage

To:	Luke Place	From:	Mike Smith
	QLDC Planning		Christchurch
File:	File Name	Date:	August 5, 2021

Reference: Coneburn Industrial Zone – Change to Land Use Coverage

Stantec has been requested to undertake a review of transport related impacts of the proposed Coneburn Industrial Zone building coverage variations, including on the surrounding road network, and internal road structure of the Zone. .

BACKGROUND

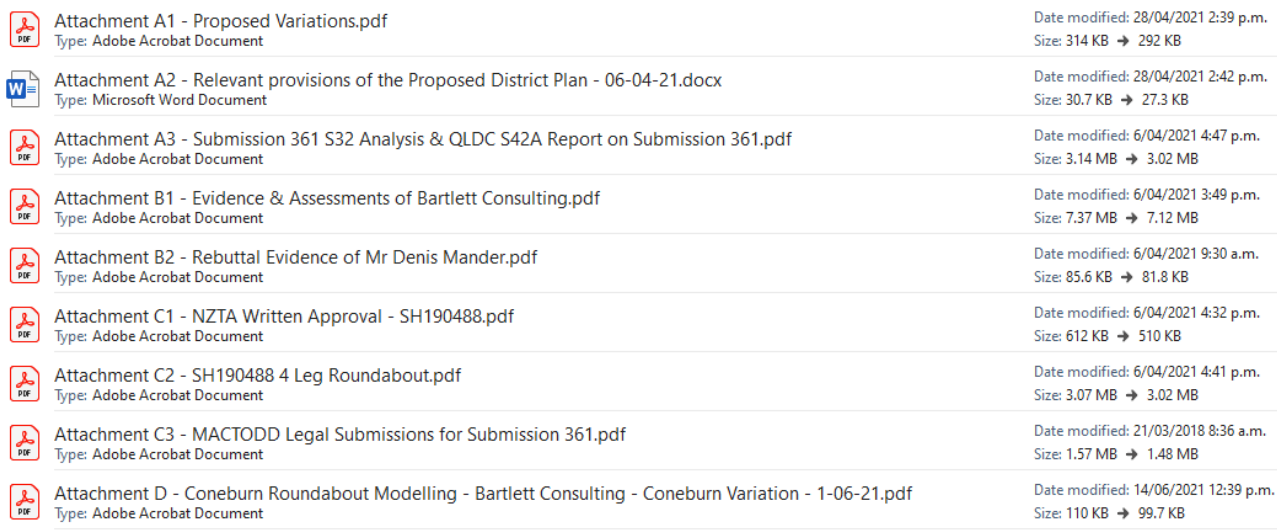
1. Landowners of the Coneburn Industrial Zone (the Zone) have approached Queenstown Lakes District Council (QLDC) to increase the permitted site coverage for buildings within the Zone.
2. QLDC is currently reviewing its District Plan over a number of stages. Recommendations of the Independent Hearings Panel (IHP) on the latest stages of the plan review (Stage 3 and 3b) have recently been adopted by elected members.
3. Land within the Zone was reviewed during Stage 1 and was initially notified as being located within the Rural Zone. A submission1 was received requesting that this land be rezoned for Industrial development. In May 2018, the IHP resolved that this submission be accepted in part, and that the subject land be re-zoned 'Coneburn Industrial'. The Zone now comprises Chapter 44 of the Proposed District Plan (PDP) and is not subject to any appeals. It is intended to provide for the establishment and operation of Industrial and Service activities with most other activities being identified as non-complying or prohibited.
4. Development within the Zone is managed by a structure plan contained within Chapter 44. This structure plan identifies two activity areas (Activity Area 1a and Activity Area 2a) which provide for different scales of built form.
5. The effect of the proposed variations is to introduce new permitted building coverage standards of 40% in Activity Area 1a and 65% in Activity Area 2a.
6. With the exception of a small area of land in the immediate vicinity of the southern entrance into the Zone identified on the structure plan within Chapter 44, no other changes are being proposed to the location or scale of development areas or landscaped open spaces. This amendment is sought to accommodate a proposed roundabout on State Highway 6 (SH6) which will provide a new form of access into the Zone.

7. The resulting Zone provisions controlling building coverage have a strong focus on managing the parking and loading of vehicles for Industrial and Service activities, as well as the safety and efficiency of the surrounding road transport network. Therefore, it is critical that the proposed amendments to building coverages are assessed carefully with respect to possible transport related effects both within and outside of the Zone.

8. This assessment has been undertaken by the following experts:

Chris Rossiter	Traffic Modelling
Mike Smith	Transport Impacts / Road Safety

9. In assessing this matter, we have considered the following material.



10. A site visit was undertaken by Mike Smith on 16th July. This enabled a direct observation of the traffic (am peak) and the surrounding environment.

TRAFFIC GENERATION

11. We have reviewed the submitted traffic generation material presented in the reports by Mr Bartlett. In our review, we have considered the traffic generation volumes stated in the submitted initial Transportation Assessment (Bartlett Consulting (BC), October 2015), the Initial Access modelling report, BC; 22 March 2017, and Access Modelling Report, BC; 12 September 2017, and Building Coverage Variations Report; BC; 1 June 2021. In reviewing this material, we have considered the reasoning for the increased traffic volumes associated with the proposed increase to the building coverage areas.

12. It is our opinion that in our review of the submitted material, the modelling of the traffic generation based on the higher building coverages produced by the landowner is correct basis and will reflect the proposed development.

13. Two models have been undertaken for the connection of the Coneburn Industrial Zone connection to SH 6. An assessment has been undertaken by WSP as part of the SH 6 Coneburn Roundabout, with an additional model being undertaken by Bartlett Consulting for the same intersection. We do note that

the modelling undertaken by WSP (Referenced in Bartlett Consulting report dated 1 June 2021) has a traffic generation rate approximately 20% higher than that of Mr Bartlett. For clarity, the output from each model is presented below in Table 1:

Table 1: Transport Model Comparison			
Model	WSP	Bartlett Consulting	Variation (%) Bartlett / WSP
2028 Design Year – 50% constructed PM Peak	479 vpd	390 vpd	18.6%
100 % Constructed PM Peak	958 vpd	780 vpd	18.6 %

14. In reviewing the traffic model analysis, we found no direct evidence detailing if the base transport model incorporated the updated land use consents for the general area surrounding the site. We have made our analysis on the basis that the model does include consideration of the traffic generation for the Special Housing Area (SHA) and other adjacent residential developments.

15. Initial discussions with Dave Smith, Abley Transportation (Network Model Consultants) indicate that this assumption is correct.

16. In reviewing the Level of Service (LOS) analysis undertaken for the proposed intersections, it is noted that the State Highway is typically operating at a LOS of A or B. This level of service would be considered to have sufficient capacity for the additional adjacent developments if not included, along with the additional building coverage as requested.

17. Our review of the proposed roundabout presented in the submitted material indicates that from a traffic volume perspective, in general the south bound movement (towards Kingston) on the State Highway will not generally experience any issues as the morning peak from the residential zones would typically be towards Queenstown, and therefore have minimal effect on the southbound movement.

18. The northbound movement towards Queenstown through the proposed roundabout would have dominance over the left turn out residential movement from the development to the west of the State Highway, so again, it is envisaged that there will be little effect on the State Highway.

19. Modelling for the afternoon peak demonstrates a higher level of traffic approaching the proposed roundabout from Queenstown. This traffic will have dominance over the new Coneburn Industrial Zone approach leg. The Coneburn Industrial Zone approach leg will have to yield to the southbound through / turning traffic, with the right turn / exit into the adjacent residential areas having dominance over the northbound State Highway movement.

20. We note that the modelling of the traffic flows for the 100% development demonstrates that the Coneburn Industrial Zone exit leg will have a low Level of Service, being LOS D based upon the Bartlett

Consulting analysis, and LOS F based upon the WSP analysis. It is presented by Mr Bartlett that this can be mitigated in future years, reducing the net impact on the Coneburn Industrial Zone approach leg. We discuss this further in the section below.

21. We concur that the traffic generation from the proposed increased building coverage would typically be accommodated within the existing capacity for the State Highway link to Queenstown, and the adjacent areas. We note that there are locations such as the intersection between SH 6 and Peninsular Road that currently have capacity / access issues at peak travel times. It is considered that the through movement on SH 6 will be relatively unaffected, however some additional minor delay to Peninsular Road may occur over time. The Coneburn Development will only be a small component of this delay increase. It is important to note that this delay will be a combination of factors such as the development growth for the residential areas in and around Coneburn, SH6 traffic increase as inter-regional traffic increases, and the development of the Peninsula. With time, it is anticipated that additional intersection controls may be required at this busy intersection, due to the greater overall development of the Queenstown area.

22. Based upon the stated traffic volumes, and the analysis presented, we do not see any significant issues with the analysis undertaken by Mr Bartlett.

Intersection Design / Form

23. It has been presented that the dominant access will be via a new single lane roundabout formed at a point that connects to the adjacent SHA. The roundabout is a critical component on the interaction and safe movement of traffic both along the State Highway, and to / from the adjacent developments, and is seen as a critical component to the traffic effects that could be experienced from the development.

24. We have reviewed the indicative roundabout layout presented as part of the supporting material and make the following comments.

Figure 0-1: View north from proposed roundabout junction location

Figure 0-2: View south from proposed roundabout junction location.

Figure 0-3: View of existing access road from Coneburn Industrial Zone area. Note road incised into topography.

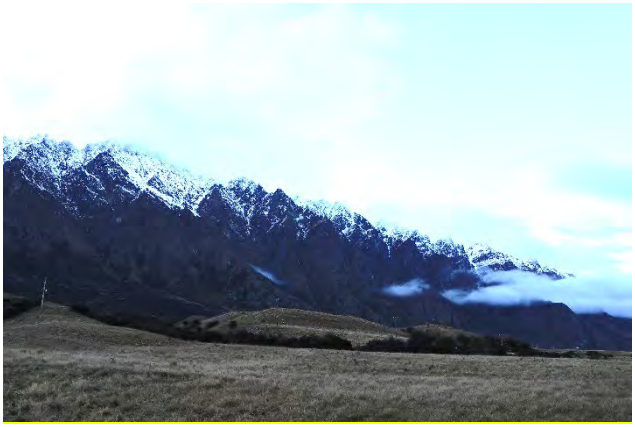


Figure 0-4: General topography of Coneburn Industrial Zone area.

25. The roundabout design presented as part of this assessment is noted to have a single circulating lane, with single approach lanes on all legs. The central island is in the order of 44 metres in diameter.

26. WSP plan 6-XZ509.01 (Sheet 1; Rev A) demonstrates an indicative roundabout design, including the land required for the formation of a single lane roundabout.

27. Based upon this initial design, we are concerned that the design does not conform with best practice as described in the relevant AUSTROADS Standards for Geometric Design. The main issue identified is the apparent lack of deflection of the approach roads, an element that assists as a speed controlling treatment for drivers entering into the roundabout. The poor deflection of the design could result in drivers entering the roundabout at high speed, resulting in side impact type crashes. We are of the opinion that design modifications should be undertaken to ensure that the design of the roundabout meets all required best practice design standards.

28. The traffic model indicates that a low level of service will result for the Coneburn Industrial Zone exit leg, for the 100 % development scenario. This low level of service reflects long average waiting times to enter SH6 rather than very long queues. There is a risk that drivers waiting at the intersection will experience frustration at the delays and may opt to undertake an exit movement into a small gap in the traffic as a result of frustration.

29. Mr Bartlett presents that the modelling suggests that with full development additional treatments may be required. Refer to Bartlett Consulting report 1 June 2021 "It is possible that future works can, if necessary, be undertaken to improve intersection capacity to better accommodate the full CIZ development."

30. We concur that in principle, additional treatments could be applied, the nature and extent of which has not been explored.

31. Critical to these additional treatments being applied, is the availability of land to allow these as yet undefined treatments to occur. While the land required indicates that it may be sufficient for the current design, this may be insufficient for any future treatments to address the long queue lengths and congestion reduction measures. It is our opinion that these additional treatments should be

designed now, and provisions made for them to be included at a later time. This includes clarity on the required land required to undertake the additional treatments.

32. Typically, these details would be supplied at the Subdivision Consent stage. We agree that this is the appropriate stage for consideration, however, we recommend that this become a condition of consent, or any other mechanism to ensure that it is evaluated prior to land parcels being developed.

33. It is our opinion that the Landowner / Developer should demonstrate the nature and intent of future works to demonstrate that this can occur within the identified road corridor land parcels.

INTERNAL ROAD STRUCTURE

34. At this stage of the proposed development, the Internal road structure is not typically supplied in detail. We have considered the submitted documentation, taking special note of the narrative around the decrease in on-site capacity for parking, the requirement of the NPS-UD1,and the potential impacts of this reduction on an increased need for on-street parking.

35. QLDC staff have requested that in undertaking this review, we consider the element of internal roads and their form, given the proposed building coverage changes. We recognise that the matters of discretion of the varied rule related largely to internal traffic movements, as presented in the extract from the Council PDP decision (Rule 44.5.5). We concur with these rules being essential to the consideration of the internal road structure.

44.5.5	Building Coverage Activity Area 1a (Large Lot Size) Activity Area 2a	 30% 35%	RD Discretion is restricted to: a. The extent to which increased building coverage will decrease the availability of on-site parking or loading; b. Whether the needs of the industrial or service activity require parking or loading within a building; c. Whether the needs of the industrial or service activity require that the manufacture or maintenance of vehicles or large items take place within a building; d. The extent to which the safety and efficiency of the surrounding roading network would be adversely affected by the proposal; e. Any cumulative effect on the proposal in conjunction with other activities in the vicinity on the safety and efficiency of the surrounding roading.

Figure 0-1: Rule 44.5.5, Council PDP decision May 2018.

36. Reviewing the supplied material, we note that the Clarke Fortune McDonald & Associates Memo (1 June 2021); pg 2, para 5 & 6 identifies that on-street parking and road format will be undertaken in accordance with [QLDC] Code of Practice and New Zealand Standards, which we have taken to mean NZS 4404:2010.

37. While we concur with this approach, we consider that there is a direct relationship between the proposed building coverage of a lot, the requirements for on-site parking, the elements of restricted Discretion as defined in Rule 44.5.5, and the impact that overflow parking may have on the internal road network. Furthermore, the road form will be affected by the type of development that would occur on sites, as larger vehicles would require a greater turn circle space. It is accepted that this element could be adequately addressed at future stages, however it is recommended that this has

[1] It is determined that under the NPS-UD, QLDC can still require parking for vehicles other than cars, in addition they can still require loading and queuing spaces.

specific controls / requirements for a detailed assessment of the land use, permissible developments and scale, and road corridor widths / road widths.

38. Given the proposed adjacent land use, and road forms that are yet to be detailed, it is recognised that the internal road structure could be impacted by inadvertent consequences of loading / standing occurring in the road corridor.

39. We concur that this is best addressed at later stages of consent applications, however, we do make the comment that without a specific directive to address the issue, looking at a completed development, there is a risk that inappropriate road widths and forms could be applied.

40. The internal transport infrastructure for all modes of transport would not typically be indicated at this stage of an application. It is noted however that the development site is in close proximity to the adjacent residential housing areas of Jacks Point, Hanley's Farm and the Coneburn SHA. This may result in staff of the development areas willing to take alternate forms of transport such as e-bikes. E-bikes and other micro-mobility devices will enable them to commute from a wider area and may enable the cycle commute from the greater area. We recommend that the Plan should provide consideration on how modes other than motor vehicle will be accommodated safely within the proposed development area, and its linkages to the adjacent road network.

SUMMARY

41. In summary, we concur with the presented traffic effects assessment demonstrated in the submitted reports. The modelling results indicate that the exit movement from the proposed Coneburn Industrial Zone will result in long delays in the PM peak with 100% development. It has been presented that additional treatments could be applied to reduce the impacts in future years. While we concur with the principle of additional treatments, these are undefined, and have not been demonstrated as being capable to be formed within the current property boundaries as indicated in the WSP plan 6-XZ509.01 (Sheet 1; Rev A).

42. The increase in building coverage, and the associated traffic generation and transport effects generated have not been defined. The submissions reviewed detail that these could be addressed at future stage, and be compliant with the QLDC Code of Practice, and NZS 4404:2010. We concur that these are the correct guides but consider that a holistic evaluation of the internal road network design should be undertaken, considering the potential development for the proposed industrial zone. It is considered that specific controls be incorporated to ensure that a holistic approach is taken and considers the overall effects on traffic movement and user safety.

43. Given the proximity to residential areas such as Jacks Point, Hanley's Farm and the Coneburn SHA, it is considered that the use of micro-mobility devices such as e-bikes will be a practical travel mode and that specific consideration should be made for vulnerable road users through the new Coneburn Industrial Zone. This could take the form of both on-road and off-road / reserve paths.

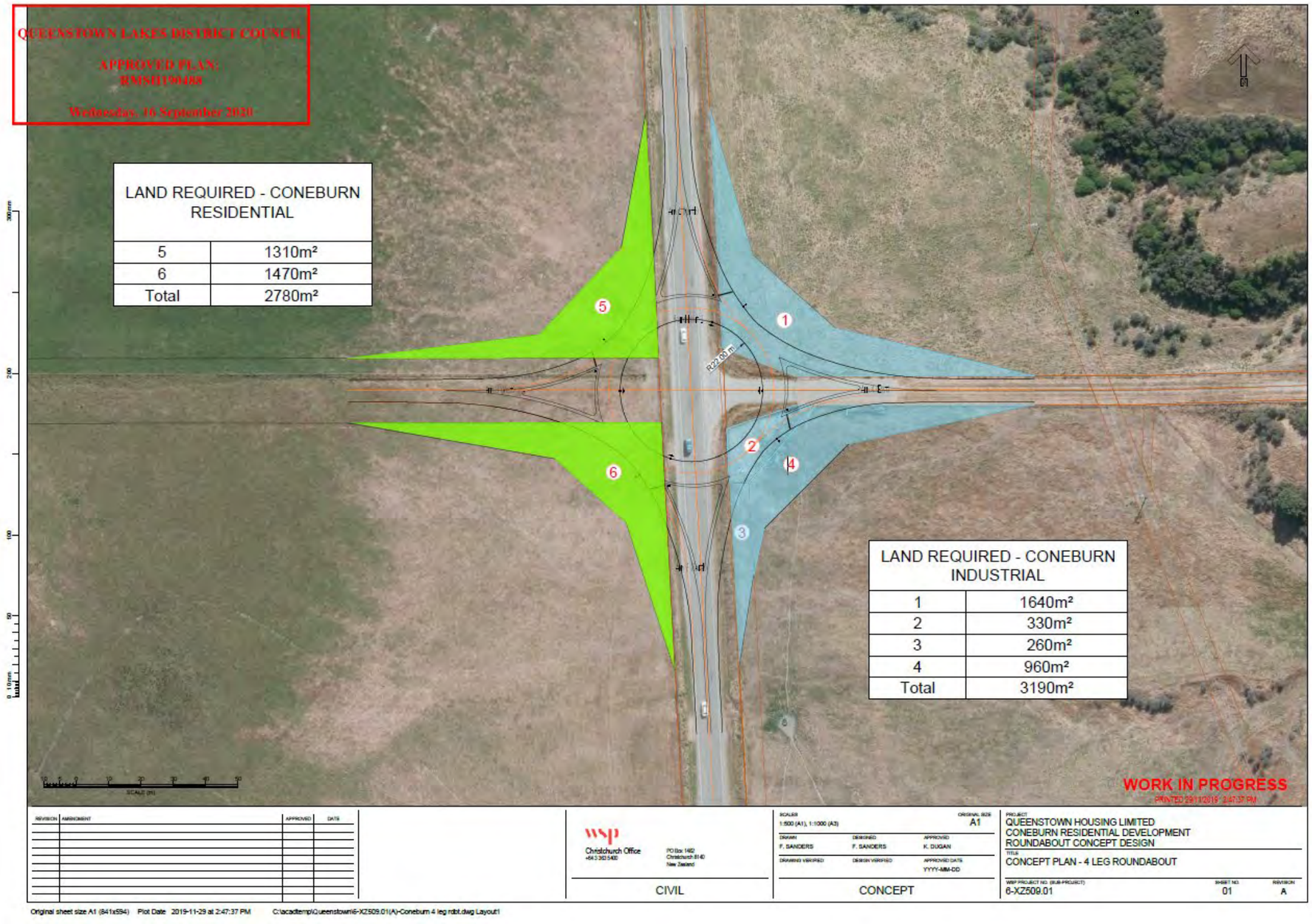
Technical Review

Mike Smith / Chris Rossiter
Principal Transport Engineer /
Phone: 0274374963
Mike.a.smith@stantec.com

Attachment: Attachment

Cc. C.C.

APPENDIX A: WSP ROUNDABOUT DESIGN:



ATTACHMENT F - QLDC Property & Infrastructure Memo - Coneburn Industrial: Infrastructure Comment

Coneburn Industrial - Infrastructure Comment

Water supply

Property and Infrastructure are satisfied that, within previous reports and updated memos, it has been demonstrated that providing the required level of service for potable water is feasible for the proposed Coneburn Industrial Zone.

The evidence provided confirms the preference for connecting to the Queenstown Water Supply which will be suitable for providing water to the Zone once the Coneburn Reservoir is operational. The evidence provided has also noted that a Water Bore Supply can be used to supply the site. Property and Infrastructure accept this to be a suitable alternative supply provided that when the Queenstown Water Supply becomes available the supply must switch to the Queenstown Water Supply and appropriate head works fees shall be paid.

Wastewater

Property and Infrastructure are satisfied that, within previous reports and updated memos, it has been demonstrated that disposal of wastewater is feasible and can be achieved via private treatment and disposal systems within the site as well as connecting to owned Coneburn Valley wastewater reticulation when available.

The evidence provided confirms the preference for connecting to the Council owned Coneburn Valley wastewater reticulation, the project for installing this network is budgeted for year 8 of the Long Term Plan. Property and Infrastructure accept that onsite treatment and disposal is suitable in the interim provided that when the Coneburn Valley wastewater reticulation becomes available any onsite disposal systems must be decommissioned and removed, a connection is made to the Coneburn Valley wastewater reticulation and appropriate head works fees shall be paid.

Stormwater

Property and Infrastructure are satisfied that, within previous reports and updated memos, it has been demonstrated that disposal of stormwater is feasible and can be achieved via private treatment and soakage devices within the site, the details of which can be determined at the time subdivision occurs within the Zone.

With regard to off-site stormwater considerations Property and Infrastructure accept the evidence provided demonstrating that the flood and debris risks are modest and are able to be dealt with using convention design approaches to mitigate these risks. The details of these mitigations can be determined at the time subdivision occurs within the Zone.

GEOSOLVE

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Geotechnical Report for Resource Consent

Lot 3 DP 392270, Kingston Road, Queenstown

Report prepared for:

Scope Resources Ltd

Report prepared by:

GeoSolve Ltd

Distribution:

QLDC

Scope Resources Ltd

GeoSolve Limited (File)

September 2019

GeoSolve Ref: 190413

GEOTECHNICAL WATER RESOURCES PAVEMENTS

Table of Contents

1 Introduction

1.1 General

This report presents the results of a geotechnical investigation carried out by GeoSolve Ltd in order to assess the natural hazard risk and provide geotechnical inputs for three proposed reservoir (tank) structures within Lot 3 DP 392270, Kingston Road, Queenstown.

This report is intended to supplement a resource consent application with the local council authority. A plan showing the proposed development is detailed in Appendix A and a photo of the general area for the building platform is shown below in photograph 1 & photograph 2.

The geotechnical investigation was carried out for the Scope Resources Ltd in accordance with GeoSolve Ltd.'s proposal dated 8 July 2019, which outlines the scope of work and conditions of engagement.

Photograph 1. Site photo looking northwest (building platform indicated by red arrow).

Photograph 2. Site photo looking east (building platform indicated by red arrow).

1.2 Proposed Development

Drawings completed by Clark Fortune McDonald & Associates (CFMA) have been provided to Geosolve and indicate it is proposed to construct 3 reservoir (tank) structures on moderately sloping ground with an associated access road.

Due to the sloping nature of the site earthworks will be required to establish a level building platform for the proposed tanks. It is understood that cuts, up to approximately 7.0 m in depth, are proposed to site the tanks on a generally level building platform. An overflow channel will be located at the south western corner of the proposed building platform to take surface water flows in the Southern Gully, a natural drainage path in south of the platform.

It is also understood minor cut earthworks will be undertaken for the construction of the access road.

A protective bund is proposed to be constructed at the top of the excavation, up to approximately 1.25 m in vertical height.

A visual protection mound is also proposed as part of the development, located downslope of the proposed tanks, adjacent to the crest of a moderately sloping terrace slope. Fill earthworks up to approximately 10.5 m are required for the construction of this mound.

The tank foundations are expected to comprise a concrete slab with perimeter thickening. The tank itself is expected to be of steel construction.

The approximate extent of the proposed earthworks is attached, Appendix C.

The position of the proposed tanks outlined in Appendix A, Figures 1a and 1b.

2 Site Description

2.1 General

The subject property which the proposed lots are located on is legally described as Lot 3 DP 392270, Kingston Road, Queenstown.

The site is located south of Frankton, on Kingston Road (SH6), as shown in Figure 1 below.

Figure 1. Site location (indicated by yellow outline) in relation to Frankton (Source: http://maps.qldc.govt.nz/qldcviewer/).

The subject property is bounded by a commercial quarry to the west and north, farmland to the south and a building platform to the east.

The subject site is generally sited on discontinuous terraced slopes formed by alluvial depositions of material adjacent to the glacial margins. These slopes have since been modified (post-glacial) by erosion, deposition and incision of various creeks.

Stoney and Southerly Creeks have deeply incised the slope that the proposed development is sited on, located to the north and south of the site respectively, as shown on Figure 1a, Appendix A.

The building platform for the reservoir structures is currently unused with ground cover comprising grass and scrubs.

2.2 Topography and Surface Drainage

The reservoir site has been surveyed and the site topography is shown on Figure 1b, Appendix A. Figure 1a and Figure 1b provide Lidar data for the general slope area.

The site is located on the moderately sloping western aspect ground, approximately 1100 metres from the toe of The Remarkables mountain range.

In this area the hillside falls for approximately 700 metres (horizontal distance) to Kingston Road. The reservoir site is at RL400 with surrounding slopes being at approximately 10-20°. Surface drainage will generally be from east to west, moving downslope, and will generally follow overland flow paths and existing access roads within, and adjacent to, the site.

Approximately 30 m to the west, or downslope of the building platform, the crest of a steep (approximately 30°) terrace slope is present. An overland flow path was observed to flow through the site on the northern side of the proposed building platform and down the terrace slope (shown on Figure 1b, Appendix A).

The terrace slope topographically separates the site from the lower ground surface of the Stoney Creek Quarry. The crest of the quarry excavation is located approximately 210 metres downslope of the proposed building platform.

A deeply incised ephemeral creek, named Southern Gully, is located to the south of the site and the crest of this steeply sloping (ranging between approximately 30-40°) gully feature is approximately 20-25 metres from the proposed building platform. The gully provides drainage to a localised fan surface located upslope of the subject site. The crest of this localised fan surface is located approximately 320 metres from the eastern site boundary (shown on Figure 1b, Appendix A). It is inferred that this gully will provide a preferential path for any upslope flow on this fan surface, intercepting any large upslope surface flow from entering the proposed building platform.

The crest of the fan surface extends in a southerly direction to the incised channel of Southerly Creek and it is inferred that Southerly Creek will provide a preferential path for any drainage upslope of the local fan surface.

Southerly Creek tracks along the southern boundary of the lot, approximately 100 m south of the building platform before exiting through a culvert to the neighbouring property. It should be noted that the incision of the southern gully and Southerly Creek has formed a ridge feature. This ridge feature continues downslope from the proposed building platform providing an effective barrier between Southerly Creek and the site.

The locations and extent of the significant topographic and drainage feature are shown on Figure 1b, Appendix A.

No surface water was observed within the building platform area during site investigations.

Seepage was recorded in Test Pit 4, 5 and 6.

3 Geotechnical Investigations

An engineering geological site inspection has been undertaken with confirmatory subsurface investigations including geomorphic mapping of the proposed building platforms and surrounding area. The following geotechnical investigations were completed on site between the 23rd and 24th of July 2019 for the purposes of this report:

- 7 test pits (TP1-7) which were advanced to a maximum depth of 6.0 m below ground level (bgl) to produce geological logs of the subsoils;
- Geomorphological mapping of the proposed building platforms and surrounding area was undertaken by an engineering geologist to assess the landforms and natural hazards at the subject site, accompanied by preliminary hazard modelling;
- Inspection of the Stoney Creek Quarry;
- Aerial photography analysis to assess the geomorphology and natural hazards at the subject site;
- A review of a Geotechnical Report prepared for a proposed development in the neighbouring property undertaken by Tonkin & Taylor entitled “The Oasis Development, Stoney Creek, Frankton- Natural Hazard Assessment Report”, dated May 2008.

Test pit and Scala Penetrometer locations and logs are contained in Appendix A and B respectively.

4 Subsurface Conditions

4.1 Geological Setting

The site is located in the Wakatipu basin, a feature formed predominantly by glacial advances. Published references indicate the last glacial event occurred in the region between 10,000 and 20,000 years ago. Glaciations have left deposits of glacial till, glacial outwash and lake sediments over ice–scoured bedrock. Post glacial times have been dominated by the erosion of the bedrock and glacial sediments, with deposition of alluvial gravels by local watercourses, and beach and lacustrine sediments during periods of high lake levels.

No active fault traces are known by GeoSolve to exist in the immediate vicinity of the site, although an inactive fault trace is inferred to be present approximately 200 m to the north. However, a significant seismic risk exists in the region from potentially strong ground shaking associated with rupture of the Alpine Fault which is located along the west coast of the South Island. There is a high probability that an earthquake with a magnitude greater than 8 will occur on the Alpine fault within the next 50 years.

4.2 Stratigraphy

The subsurface material observed during site investigations comprised:

- 0.0- 0.3m of **Topsoil**, overlying:
- 0.4 - 4.0m of **Fan Alluvium,** overlying:
- 1.6 – 5.3m of **Outwash Gravels**, overlying:
- 0.0 – 1.7m of **Glacial Till**, overlying:
- 0.0 – 0.9m of **Glacial Gravels**, overlying:
- **Schist bedrock** at depth (inferred).

Topsoil was observed at the surface of all test pits to depths of 0.3m, consisting of dark brown organic sandy silt with gravel and rootlets.

Fan alluvium has been identified at the test locations. These sediments generally comprise two distinct units. The two units are:

- **Gravels and Sandy Gravels** (Fan Alluvium) generally comprising medium dense to dense gravels and sandy gravels, with a variable constituent of silt, observed in TP1, TP4 to TP7 inclusive.
- **Sandy Silt** (Fan Alluvium) generally comprising stiff to very stiff non-plastic sandy silt, with a variable constituent of gravel, observed in TP2 and TP3 to a depth of 0.7 m bgl.

Outwash Gravels have been identified at the test locations. These sediments generally comprise dense bedded sandy gravels, with a variable component of silt, cobbles and

boulders. The base of the outwash gravels were not encountered in TP1, TP4 to TP7 inclusive.

Glacial Till has been identified at the location of TP5 and TP6. These sediments generally comprise generally comprising very stiff to hard non-plastic sandy silt. The lateral extent of these soils were not defined during the site investigations.

Glacial Gravels have been identified at the location of TP5 and TP6, generally comprising dense sandy gravels. The extent of the glacial gravels was not encountered in TP5 and TP6.

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

Schist bedrock is inferred to underlie the subject site at depth.

Figure 2a, 2b, 2c & 2d, Appendix A, provides a ground model through the reservoir area.

It should be noted that two machine boreholes were undertaken within the Stoney Creek Quarry as part of the liquefaction assessment for the Tonkin and Taylor May 2008 Geotechnical Report prepared for The Oasis development. The machine boreholes BH01 and BH02 were advanced to 10.5 m and 12 m respectively. Sandy gravels inferred to be outwash alluvium were encountered to the extent of the machine boreholes.

The machine borehole locations and logs are contained in Appendix A and B respectively.

Sandy gravels were also generally observed in the excavated walls of Stoney Quarry, located downslope of the subject site. The quarry walls were inferred to be up to 20 m in vertical height and comprised lenses of sand, silt and fine gravel within the alluvium.

4.2.1 Groundwater

The regional groundwater table was not intercepted in the test pitting investigation and previous machine borehole investigation. The regional groundwater table is expected to be at significant depth beneath the development.

Perched seepages where identified in test pits 4, 5 and 6. Flow rates of up to 2-4L/min were estimated in the field.

Perched water tables may generally occur at the contact of the fan alluvium and outwash gravels, or outwash gravels and glacial soils.

Perched seepages or the regional groundwater were not encountered within quarry walls, located immediately downslope of the subject site, indicating unsaturated sandy gravels extend beyond 20 m below the proposed building platforms.

5 Hazard Assessment

5.1 Landslide

5.1.1 Remarkables Terrace

An area of inferred landslide activity, which is shown on the QLDC hazard maps, lies to the north east (upslope) of the site boundary, as shown on Figure 1a, Appendix A. This landslide is classed by QLDC as "non-verified" This is sourced from IGNS QMAP 1:50,000 Compilation Sheets.

We understand that the mapping of the landslide feature at the site is based on a broad-brush aerial photography assessment. Detailed geomorphological field mapping and an aerial photography analysis has been conducted as part of the hazard assessment for the subject site.

The ground surface up slope of the site appears to naturally steepen locally at the locations of both aggregational terraces and degradational depressions. No deep seated, recent or active slope instability was observed by GeoSolve Ltd during the site walkover in the vicinity of the proposed building platform.

No evidence has been identified to date which indicates the site of the proposed building platform or accessway has experienced historic or recent geotechnical instability and associated ground movement.

Given the age of the soil deposits encountered during the test pit investigation (fan alluvium overlying outwash gravels), absence of subsurface landslide debris material and the lack of geomorphological evidence for movement, it is expected that the area of the proposed development has not been affected by slope instability. There is a nil to extremely low risk from the mapped landslide feature adversely affecting the stability of the proposed development.

These findings are generally in agreement with the visual appraisal conducted by Tonkin & Taylor for the May 2008 report. The report states:

> *"Engineering geological mapping and interpretation based on aerial photos and site walkover show no visible signs of current or historic slope instability (including landslide movements) occurring on the slopes between Kingston Road (SH6) and the toe of the Remarkables, and for at least 1km to the north and south of the site."*

5.1.2 Western Slopes of The Remarkables

A QLDC mapped non-verified landslide feature is located within the south facing catchment slopes of Stoney Creek, as shown on Figure 1a, Appendix A. This feature is located approximately 1000 m to the east of the proposed building platform. From the results of the aerial photography analysis the mapped extent of the instability is inferred to be historical and typical of a creeping schist landslide, likely to be activated by the ongoing incision of the toe of the slide by Stoney Creek and increases in porewater pressure.

It should be noted that recent fresh scarps are located in close proximity at the toe of the south facing slope, adjacent to Stoney Creek. Given the proximity of this feature from the subject site (approximately 1100 m) and relatively low angle topography along this

distance, there is a nil to extremely low risk from the mapped landslide feature adversely affecting the stability of the proposed development.

It should be noted that this landslide feature is a possible source area for material to discharge into Stoney Creek, contributing to a potential debris flow hazard from this source of instability within the catchment, further details of this hazard are discussed in Section 5.2 of this report.

5.2 Alluvial Fan

5.2.1 General

According to QLDC hazard mapping, the proposed development is mapped as a "less recently active fan" in the ORC alluvial fan mapping, as shown on Figure 1a, Appendix A.

An alluvial fan hazard assessment has been undertaken for the proposed development.

Stoney and Southerly Creeks have deeply incised the slope that the proposed development is sited on, located to the north and south of the proposed development respectively.

5.2.2 Stoney Creek

Stoney Creek is located to the north of the proposed development and is generally moderately to deeply incised. To the north east of the proposed building platform the channel transitions from being moderately incised to having a relatively flat bed, creating an area where avulsion could occur. It is inferred that flood flows could cause avulsion, similarly mobilisation of the identified landslide material into the channel could block the channel and enable a debris flood/flow situation.

Avulsion of the Stoney Creek channel could result in flow into the overland flow paths surrounding the main channel of the creek. These overland flow paths appear to have been subject to human modification as part of the quarry development in the northern part of the quarry and now converge into one main channel above the quarry, to the north of the subject site.

Access roads within the site are also likely to provide preferential flow paths during avulsion of the river channel.

The proposed building platform is separated from the "recently active" mapped alluvial fan hazard associated with Stoney Creek by elevated aggregational mound features. The proposed building platform appears to be sufficiently setback, approximately 250-300 m, to mitigate any potential alluvial fan hazard from the main channel of Stoney Creek.

A mapped "fan recently active" QLDC mapped hazard, inferred to be associated with the historical avulsion of Stoney Creek, is located upslope to the north east of the site, approximately 350-400 m of the proposed building platform. It is inferred that this channel is now abandoned and is not anticipated to affect the proposed development.

In summary, the avulsion of Stoney Creek is considered feasible, however, the reservoir site is assessed to be adequately protected by the existing natural landforms and slope contours directly upslope.

5.2.3 Southerly Creek

A deeply incised gully, Southern Gully, is located on the south of the site and the crest of this steeply sloping gully feature is approximately 20-25 metres from the proposed building platform. It is inferred that the southern gully will provide a preferential path for any upslope drainage and will mitigate any potential alluvial fan hazard from the south.

As discussed, it should be noted that the incision of the southern gully feature and Southerly Creek has formed a ridge feature between Southerly Creek and the proposed building platform. This ridge feature is observed to continue below the proposed building platform and the likelihood of an alluvial fan hazard from Southerly Creek affecting the site is considered very low.

In summary the natural landforms and slope contours provide sufficient protection to the reservoir site from activity associated with Southern Gully and Southerly Creek.

5.2.4 Building Platform

The building platform is generally lacking any features that would suggest recent alluvial fan activity.

It should be noted that the fan alluvium material is a relatively shallow, up to approximately 0.9 m below the existing ground surface at the location of the proposed building platform. The fan alluvium is underlain by outwash gravels or glacial soils generally encountered to the extent of the subsurface investigations, confirming that deposition at the site has been governed primarily by a glacial processes and alluvial fan deposition is limited to post-glacial fan deposition of incising drainage channels.

In general, significant topsoil development indicated a substantial passage of time since alluvial activity. This suggests the fan deposits are historic and their accumulation is not an active or recent process.

Based on the above, the risk of alluvial fan activity affecting the proposed development is considered to be very low and unlikely to affect the proposed development and no mitigation measures or further assessment is required for the proposed development with respect to this hazard.

Nevertheless, it is understood that the proposed protective bund located at the crest of the building platform batter slope excavation will provide mitigation to any sheet flow runoff that may be possible during periods of high rainfall.

5.3 Liquefaction

On the QLDC hazard mapping the site is classed as LIC 1 (P). This indicates the site has a probably low risk of liquefaction but requires specific investigations for a definitive assessment.

A site wide liquefaction risk review has been conducted for the purposes of this report.

The following comments are provided with respect to liquefaction.

- Discrete perched seepages were encountered in TP 4, 5 & 6 however all other test pits were dry. The regional groundwater table was not intercepted.

- Medium dense to dense/stiff to very stiff soils were intercepted in the test pit locations.
- Sandy gravels were generally observed in the excavated walls of Stoney Quarry located downslope of the subject site.
- Previous machine borehole undertaken in the floor of the Stoney Creek Quarry encountered sandy gravels to a maximum depth of 12 m.
- The previous machine boreholes did not encounter any sand or silt lenses, or the regional ground water level.
- The groundwater table is expected to be greater than 20m below ground surface at the site.
- A non-liquefiable crust is present below the proposed building platform.

Based on the above observations the risk of liquefaction is considered low at the site. No further engineering consideration is required with respect to this hazard.

5.4 Rockfall

The site is located proximity 1000 m from the toe of the steeply sloping Remarkables mountains, upslope of the eastern site boundary. No angular schist boulders indicative of rock fall debris were identified within or immediately upslope of the subject site.

A preliminary rock fall analysis has been undertaken to determine the spatial extent of a modelled rock fall event. A 3D statistical rock fall analysis has been undertaken using RAMMS (Rockfall) software.

The potential trajectories of the modelled rock falls for the Remarkables bluff systems, assuming no forest are shown on Figures 2 -3 below.

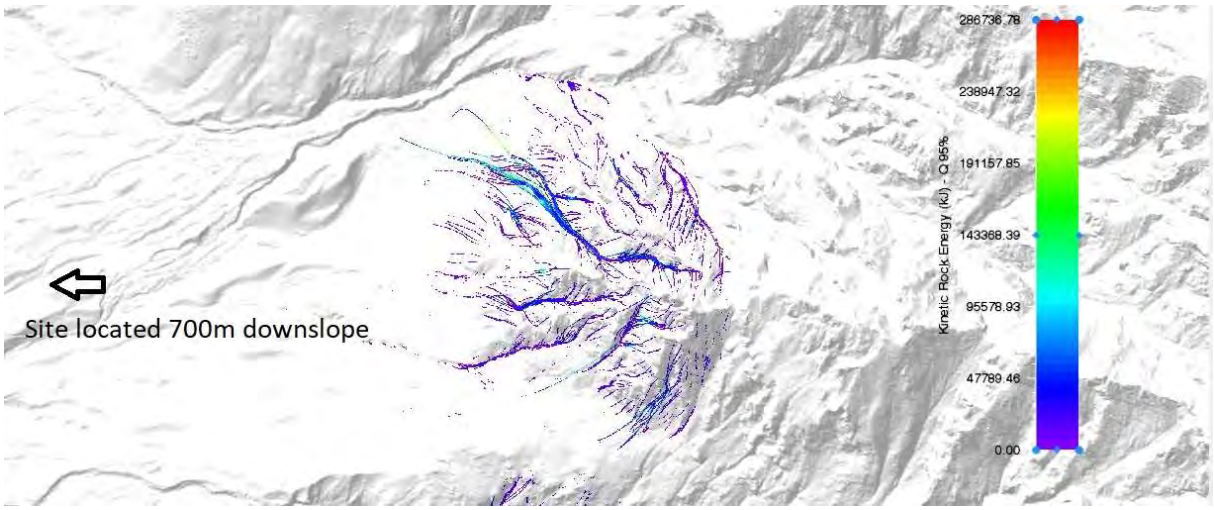


Figure 2: Screen shot showing theoretical trajectories of all modelled rock falls from an area release type (Remarkable Bluffs) with trees not present on the slopes beneath. The site is located downslope and is not shown.

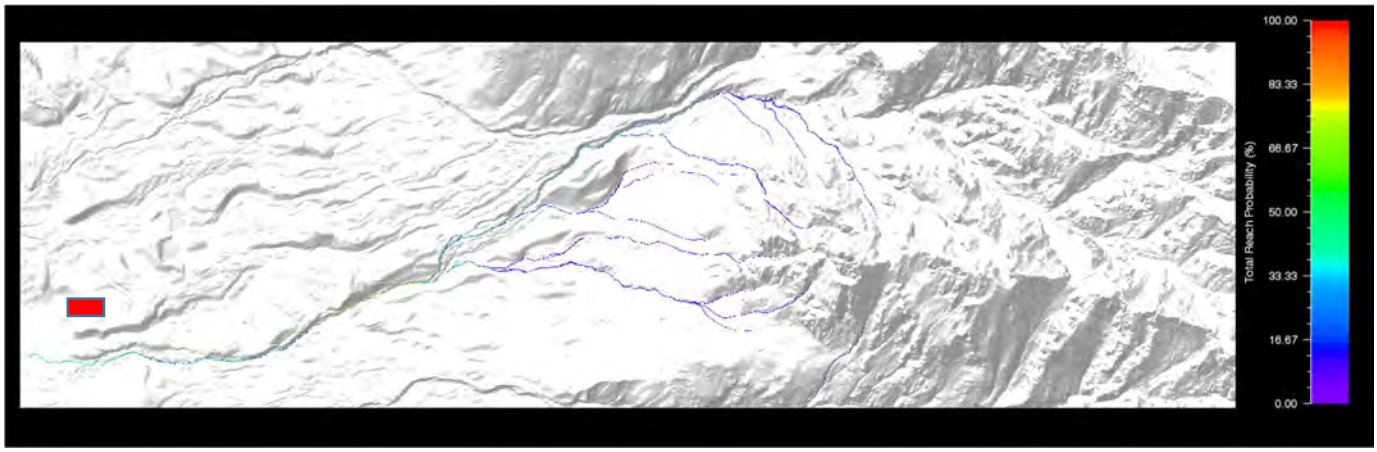


Figure 3: Screen shot showing the probability that a modelled rockfall will reach a given cell within the model (total reach probability) of all modelled rock falls from an area release type (Remarkable Bluffs) with trees not present on the slopes beneath. The site boundary of the site boundary is shown in red.

The results of the assessment suggest the slope topography significantly influences the run-out area and energy of the rock fall and that large rockfall boulders will funnel into existing incised drainage paths and will not runout into the subject site.

In general, we consider the risk of rock fall at the proposed site to be low based on our site walkover, mapping, and 3-D rock fall modelling.

We conclude that construction of the proposed development is feasible from a rock fall risk perspective and no mitigation works are required with respect to this hazard.

6 Engineering Considerations

6.1 General

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

6.2 Geotechnical Parameters

Table 1 provides a summary of the recommended geotechnical design parameters for the soils expected to be encountered during construction of the proposed new building platforms.

Table 1 - Recommended Geotechnical Design Parameters

Unit	Thickness (m)	Bulk Density γ (kN/m^3)	Effective Cohesion c´ (kPa)	Effective Friction ϕ´ (deg)	Elastic Modulus E (kPa)	Poissons Ratio ν
Topsoil (organic SILT)	0.3	To be removed beneath building platforms				
Engineered Fill	-	18	0	35 (TBC)	20,000-30,000	0.3
Fan Alluvium (medium dense to dense GRAVEL and sandy GRAVEL and stiff to very stiff sandy SILT)	0.4- 4.0	18	0	Sandy GRAVEL 32-34 SILT 30-32	5,000 - 20,000	0.3
Outwash Gravels & Glacial Gravels (dense, sandy GRAVEL with minor/trace cobbles and silt and trace boulders)	0.00-5.3+	19	0	35-36	30,000	0.3
Glacial Till (very stiff to hard sandy SILT)	0.0-1.7	18	2	34	20,000	0.3

6.3 Site Preparation

During earthworks operations all topsoil, organic matter, and other unsuitable soils should be removed from the construction areas in accordance with the recommendations of NZS 4431:1989.

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

Exposure to the elements should be limited for all soils and covering the soils with polythene sheeting will reduce degradation due to wind, rain and surface run-off. Excavations in soils should be left proud of the finished subgrade level by 200 to 300 mm if a delay prior to construction is expected. The final cut to grade should be performed immediately prior to foundation construction.

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

All fill that is utilised as bearing for foundations should be placed and compacted in accordance with the recommendations of NZS 4431:1989 and certification provided to that effect.

We recommend topsoil stripping and subsequent earthworks be undertaken only when a suitable interval of fair weather is expected, or during the earthworks construction season.

6.4 Excavations

Cut excavation excavations will be required for the construction of the proposed development. The cuts will be formed within fan alluvium and outwash gravels.

Recommendations for temporary slope batters are described in the following sections. Slopes that are required to be steeper or higher than those described below should be structurally retained or subject to specific geotechnical design.

A slope stability assessment has been undertaken for the proposed permanent cut slope batters associated with the proposed development, further details and recommendations are provided in Section 6.8 of this report.

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

Seepages were observed in the test pits and are likely to be encountered in areas of the excavation. Drainage measures, such as horizontal drains, will be required if excessive groundwater seepages are encountered during excavation (see Section 6.7). The final design and location of all sub-soil drainage works should be confirmed during construction by a suitably qualified and experienced Geotechnical Engineer or Engineering Geologist.

Table 2 summarises the recommended batter angles for temporary batter slopes up to 6 m high, which are formed in the soil materials identified at the site, not associated with the proposed building platform.

Table 2 Recommended maximum batter angles for cut slopes up to 6 m high in site soils.

Material Type	Recommended Maximum Batter Angles for Temporary Cut Slopes Formed in Soil (horizontal to vertical)	
	Dry Ground	Wet Ground
Topsoil Fan Alluvium	2H: 1V	3H: 1V
Fan Alluvium	1.5H: 1V	3H: 1V
Outwash Gravels & Glacial Gravels	1.0H: 1V	2H: 1V
Glacial till	0.5H: 1V	2H: 1V

The temporary batter slopes in wet soils are provisional only and should be inspected on a case by case basis.

6.5 Engineered Fill and Engineered Fill Slopes

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

The fan alluvium (sandy gravel) and outwash gravels could be used as engineered fill on site. The topsoil is not suitable for reuse as a fill source, however can be used for re-topsoiling and in landscaping areas. Due to the changeable grain size of the natural soil materials on site, a range of compaction reference tests will be required. Maximum density and optimum moisture content will vary. Additionally, due to the high proportion of fine-grained soil material observed within the site there should be a contingency in the earthworks programme and budget to strip wet and weaving layers and allow drying time following rainfall. Compaction of the fill sources at lab tested optimum moisture content is critical for these soil types. Cobbles and boulders over 100 mm in size will need to be screened from fill sources. Boulders up to 0.5 m in diameter were observed during the site investigations. Due to the fine-grained soil materials it is recommended that earthfills are completed during warmer months.

All fill slopes less than 3 m in height should be constructed with a maximum batter slope angle of 2.0H: 1.0V (horizontal to vertical) or flatter, if well drained and not structurally influencing the proposed reservoir or other associated structures. If fill slopes are required that do support a structure specific engineering design should be required.

A slope stability assessment has been undertaken for the proposed engineered fill slopes associated with the proposed development, further details are provided in Section 6.8 of this report.

Geogrid reinforced slopes can be considered if engineered fill batters need to be steeper than the above guidelines.

6.6 Ground Retention

All retaining walls should be designed by a Chartered Professional Engineer using the geotechnical parameters recommended in Table 1 of this report. Due allowance should be made during the detailed design of all retaining walls for forces such as surcharge due to the sloping ground surface behind the retaining walls, groundwater, seismic and traffic loads.

All temporary slopes for retaining wall construction should be battered in accordance with the recommendations outlined in Table 2 of this report. Where these batter slopes cannot be achieved temporary retaining will be required.

Groundwater seepage was regularly observed during investigations, infiltration of surface water behind retention structures, in particular as a result of heavy or prolonged rainfall, can occur. To ensure potential water seepage or flows are properly controlled behind retaining walls, the following recommendations are provided:

- A minimum 0.3 m width of durable free draining granular material should be placed behind all retaining structures;
- A heavy duty non-woven geotextile cloth, such as Bidim A14, should be installed between the natural ground surface and the free draining granular material to prevent siltation and blockage of the drainage media;
- A heavy-duty (TNZ F/2 Class 500) perforated pipe should be installed within the drainage material at the base of all retaining structures to minimise the risk of excessive groundwater pressures developing. This drainage pipe should be connected to the permanent piped storm water system, and;
- Comprehensive waterproofing measures should be provided to the back face of all retaining walls forming changes in floor level within the dwelling to remove groundwater seepage into the finished buildings.

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

6.7 Groundwater Issues

The regional water table is expected to lie well below the finished excavation and foundation levels. Dewatering or other groundwater-related construction issues are therefore unlikely to be required.

Perched groundwater was observed within Test Pits 4, 5 and 6, and is expected to be encountered during the bulk excavation. The presence of discrete seepages is likely to negatively impact on the stability of the soil slopes over time, and shallow slips, scour and erosion may develop. To control this risk the following options are recommended:

- All areas of seepage to be reviewed during the bulk earthworks by a geotechnical engineer/engineering geologist and, if appropriate, recommendations provided;
- A cut–off drain and swale upslope of the reservoir is recommended in the first instance. The drain (TNZ F/2 Class 500) will need to be located to the base of the proposed excavation and outfall away from the cut. The swale should intercept surface run-off. The final location and depth of the drain should be confirmed on-site. A detail for the cut-off drain can be provided if required;

- Locally re-grading the slopes to shallower angles and other drainage as considered necessary.

6.8 Slope Stability

6.8.1 Design Earthquakes

For the slope stability analysis the design earthquakes have been divided into 2 categories, as follows

- Slopes that can directly affect the building platform, assessed as importance level 4 (IL4), and;
- Slopes considered unable to significantly affect the platform, assessed as importance level 2 (IL2).

The importance level 4 slopes are listed as follows:

- The natural slope to the west of the platform, both with and without the visual mitigation mound;
- The natural slope to the south of the platform, down into Southern Gully, and;
- The proposed cut slope on the eastern (upslope) side of the platform.

In accordance with NZS1170 – Structural Design Actions[1], the following three earthquake scenarios have been considered for the IL4 slopes based on a 50-year design life.

- **Serviceability Limit State - IL 4 (SLS1)** – to avoid damage that would prevent the structure from being used as originally intended without repair (including structural and non-structural components);
- **Serviceability Limit State - IL4 (SLS2)** – the structure maintains operational continuity;
- **Ultimate Limit State - IL 4 (ULS)** – to avoid collapse of the structural system.

The earthquake scenarios used in our analyses of the IL4 slopes are presented in Table 3.

Table 3: Earthquake scenarios used in the slope stability assessment for the IL 4 slopes

	Serviceability Limit State (SLS1) design earthquake IL4	**Serviceability Limit State (SLS2) design earthquake IL4 (Only)**	**Ultimate Limit State (ULS) design earthquake IL4**
Return period (years)	25	500	2500
Moment Magnitude, Mw	6.3	6.3	6.5
Peak horizontal ground acceleration, PGA	0.10g	0.41g	0.74g

[1] *NZS1170-5 (2004) Structural Design Actions, Part 5: Earthquake Actions – New Zealand.*

Slopes considered unable to significantly impact the building platform should failure occur have been assessed as IL2 structures. In this case the visual mitigation mound proposed on the western side of the reservoir platform is the only slope in this category. Using a 50-year design life the earthquake scenarios are presented in Table 4.

Table 4: Earthquake scenarios used in the slope stability assessment for IL 2 Slopes.

	Serviceability Limit State (SLS1) design earthquake IL2	Ultimate Limit State (ULS) design earthquake IL2
Return period (years)	25	500
Moment Magnitude, Mw	6.3	6.3
Peak horizontal ground acceleration, PGA	0.10g	0.41g

In terms of NZS 1170, for both importance cases, Class C sub-soil conditions (shallow soils) are considered to underlie the site. Class D, deep soils, may be present however Class C provides a more conservative assessment.

All slopes have been analysed using the software programme Slope/W and the impact on the proposed development assessed.

6.8.2 Design and Analysis Considerations

We have assumed dry conditions for analysis, and that the proposed cut-off drain will intercept the encountered seepage and that a design flood event will not saturate the excavated building platform.

Saturation of the proposed building platform and southern gully from the overflow discharge channel or flooding event has not been assessed for the purpose of the slope stability analysis described herein.

Saturation of the building platform and surrounding slopes will negatively influence the stability of the site. It is recommended that consideration be given to a flood event, for the building platform and southern gully, at detailed design.

We have assumed the current location of Stoney Creek Quarry for our slope stability analysis. It is understood there is an approved consent enabling quarrying to advance upslope from the crest of the existing quarry, i.e. closer to the proposed reservoir site. It is recommended that additional slope stability analysis is conducted if quarrying earthworks are undertaken closer than 50 m from the toe of the terrace slope.

6.8.3 Stability Analysis Results IL4 Slopes

6.8.3.1 Permanent batter slope – Upslope Cut

Permanent soil cuts, up to approximately 7.0 m in depth and formed at 2H:1.0V, are proposed on the eastern, upslope side of the building platform. A protective mound, up to 1.25 m in vertical height, is proposed adjacent to the crest of this slope. The Slope/W results are provided in Table 5 below.

Table 5: Slope/W analysis results for the Building Platform Batter slope

Stability Case	Target Factors of Safety	Result
Static	> 1.5	1.21-1.46
SLS 1	> 1.2	0.98-1.16
SLS 2	> 1.2	0.56-0.66
ULS	No Target. Magnitude of ground displacements to be estimated.	130-500 mm

The results indicate the stability of the slope does not meet the requirements of the building code with respect to the static, SLS1 and SLS2 cases.

In order to meet the requirement of the building code the slope would need to be regraded to a shallower angle, preliminary assessment of this regrade shows that slope angles will need to be shallower than 3.0H: 1.0V. Due to the sloping nature of the site a 3.0H:1.0V is unlikely to be practical and alternative options are:

- Structural retention, or;
- constructing the slope at the proposed 2H:1.0V and ensure an adequate setback from the slope toe to the reservoir structure is provided.

Should instability of the 2H:1V slope occur the shear plane is expected to exit the slope close to the toe potentially resulting in uplift. A minimum set back of 4 m is recommended in the first instance, sufficient to enable vehicle access between the slope toe and the reservoir structure. In the event of a ULS earthquake some remedial works on the slope may be required however the reservoir should not be adversely affected if sufficiently set-back from the toe.

6.8.3.2 Downslope Terrace Slope

Approximately 30 m to the west, or downslope of the building platform, the crest of a steep terrace slope is present. The terrace slope topographically separates the site from Stoney Creek Quarry. A visual protection mound is proposed adjacent to the crest of the sloping terrace slope. Fill earthworks up to approximately 10.5 m in depth are required for the construction of this mound.

The stability of the terrace slope, with and without the visual mitigation mound, and the impact on the building platform assessed and the Slope/W results are provided in Tables 6 and 7 below.

Table 6: Slope/W analysis results for the terrace slope without visual mitigation mound

Stability Case	Target Factors of Safety	Result
Static	> 1.5	2.25-2.46
SLS 1	> 1.2	1.58-1.87
SLS 2	> 1.2	0.82-0.93
ULS	No Target. Magnitude of ground displacements to be estimated.	15-25 mm

Table 7: Slope/W analysis results for the terrace slope with visual mitigation mound

Stability Case	Target Factors of Safety	Result
Static	> 1.5	1.98-2.38
SLS 1	> 1.2	1.52-1.74
SLS 2	> 1.2	0.80-0.91
ULS	No Target. Magnitude of ground displacements to be estimated.	15-30mm

The results indicate the stability of the terrace slope, with and without the visual mitigation mound, does not meet the requirements of the building code with respect to the SLS2 case. Under ULS loading ground displacements of up to 30 mm are expected to occur in close proximity (< 2 m) to the tank foundation area.

In order to mitigate this downslope slope instability several remedial options, or combination of options, are available to address the identified slope stability issues and include;

- Construction of a dense granular geogrid reinforced raft beneath the building platform and/or a geogrid reinforced slope crest;
- Structure strengthening to accommodate expected displacements;
- Construct an in-ground wall along the crest of the slope;
- Construct affected areas of the structure on pile foundations, and;
- Increase platform set-backs from sloping areas.

The stability of the visual mitigation mound is discussed in Section 6.8.3 below.

6.8.3.3 Southern Gully

The stability of the southern gully slope has been analysed and the results are provided in Table 8 below.

Table 8: Slope/W analysis results for the southern gully slope

Stability Case	Target Factors of Safety	Result
Static	> 1.5	3.04
SLS 1	> 1.2	1.96
SLS 2	> 1.2	1.029
ULS	No Target. Magnitude of ground displacements to be estimated.	10-15 mm

The results indicate the stability of the gully slope, do not meet the requirements of the building code with respect to the SLS2 case. Low level levels of ground displacement are calculated to occur in close proximity (< 2 m) to the proposed tank location.

It is recommended that the slope stability of the proposed building platform is reassessed at detailed design stage to confirm if modification of the southern gully slope or specific design of the foundations system is required. The recommendation outlined above in Section 6.8.8.2 are considered appropriate.

6.8.4 Stability Analysis Results – IL2 Slopes

The stability of the visual mitigation mound has also been assessed. The results show that the mound does not meet the requirements of the building code with respect to the static and SLS cases. It is likely that a reduction of the batter slope and/or a geogrid reinforcement will be required to achieve long-term stability of the mound with the proposed batters. To achieve long term stability batter slopes of approximately 3H:1V will be required, assuming the fill comprises well graded granular materials. If 2H:1V batters are unachievable, then geogrid reinforcement will provide an appropriate solution to steepen batters. The final design solution should be subject to specific engineering design during the detailed design phase of the project.

If displacement of the mound is considered acceptable, i.e. maintenance will be undertaken should displacement occur during a seismic event, then batter slopes of 2H:1V are provided for unreinforced slopes.

6.8.5 Slope Stability Summary

A summary of the slope stability analysis is provided in Table 9 below.

The parameters used in the analysis are considered to be conservative. If desired, improvements in the slope stability results are expected to be achievable at the detailed design stage and would require detailed analysis of the surrounding quarry slopes, and/or completion of further ground investigation. Overall ULS Displacements are relatively low and considered to be manageable. Measures to provide a stable tank foundation, e.g. structural engineering, ground improvement or set-back from the slopes, are expected to be readily achievable for the development.

Table 9: Summary of the slope stability results.

Scenario	Level of Importance	Proposed Design Detail	Slope Stability Result	Design Options
Building Platform Batter Slope (upslope of structure)	IL4	2(H):1(V)	Static, SLS 1 & SLS 2 failure. ULS displacements 130-500mm	Regrade to < 3(H):1(V) Or Expect displacement & set-back structure from toe of slope (~4m)
Terrace Slope without Visual Mitigation Mound (downslope of structure)	IL4	Natural ~25-30°	SLS 2 failure. ULS displacements 15-20mm Failure surface ~1-2m from platform	Expect displacement & design structure and/or platform to accommodate ground movement Or Increase structure set-backs from the slope crest
Terrace Slope with Visual Mitigation Mond (downslope of structure)	IL4	Natural ~25-30°	SLS 2 failure. ULS displacements ~30mm Failure surface ~1-2m from platform	Expect displacement & design structure and/or platform to accommodate ground movement Or Increase structure set-backs from the slope crest
Southern Gully Slope (south of structure)	IL4	Natural ~30°	No Static, SLS 1 or SLS 2 failure (FOS 1.029) ULS displacements ~10-15mm Failure surface ~1-2m from platform	Expect displacement & design structure and/or platform to accommodate ground movement Or Increase structure set-backs from the slope crest
Visual Mitigation Mond	IL2	Various	Static and SLS failure. ULS displacements 90+ mm	Regrade to 3(H):1(V)- TBC at DD Or Geogrid reinforcement in the mound

6.9 Foundations

6.9.1 General

The reservoir foundations are expected to comprise a concrete slab founded at shallow depths. The final foundation solutions should include any requirements determined from the slope stability analysis at detailed design, if appropriate. Where shallow foundations are constructed they should bear on outwash gravels or engineered fill. Topsoil, uncontrolled fill and colluvium will not be suitable for foundation bearing and should be removed from beneath foundation areas.

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

It is recommended the foundation excavations be inspected by a suitably qualified and experienced geotechnical specialist to confirm the conditions are in accordance with the assumptions and recommendations provided in this report.

6.9.2 Shallow Footings

Figure6.1 below summarises the recommended working stresses for shallow footings, which bear upon outwash gravel and engineered fill. It should be noted the foundation

working stresses presented on Figure 6.1 are governed by bearing capacity in the case of narrow footings and settlement in the case of wide footings.

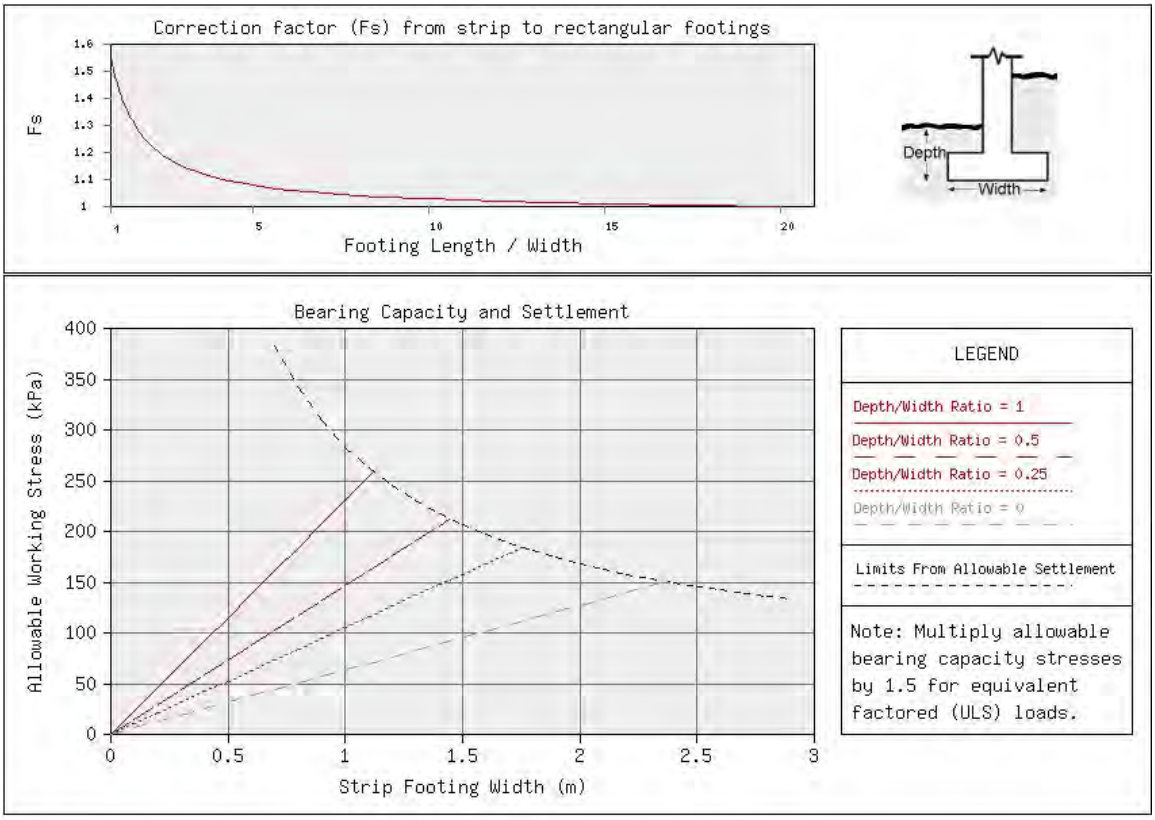


Figure 6.1. Recommended Bearing for Shallow Footings on outwash gravels or engineered fill.

From Figure 6.1 it can be seen an allowable working stress of approximately 100 kPa is recommended for a 400 mm wide by 400 mm deep strip footing founded within outwash gravels and engineered fill. This corresponds to a factored (ULS) bearing capacity of approximately 150 kPa and an ultimate geotechnical bearing capacity of 300 kPa.

It should be noted that the bearing capacities presented above assume that the loads are vertical with no horizontal loads or moments applied to the foundations. Reduction factors to account for eccentric and/or horizontal loads can be provided during detailed design.

6.9.3 Foundation Options

Under static loadings, shallow strip and pad foundations founded on outwash gravels would be expected to perform adequately at the site.

However, due to the risk of slope displacement, it is considered that discrete shallow foundations alone could not be designed to meet the requirements of the building code, or the performance expectations of the stakeholders.

The following foundation options may also be suitable depending on the requirement of the foundations to accommodate displacement:

- A geogrid reinforced granular or cement stabilised raft underlying a reinforced concrete raft
- Stone Columns

- CFA or Bored Piles

6.9.4 Foundation Selection

Ultimately the foundation decision must be made in conjunction with the client to ensure that the residual site risks meet the building code, are understood and are accepted by all parties.

Selection of the foundation system should be made in collaboration by the structural engineer, the geotechnical engineer, and the client (and their insurers), based on an appraisal of the client's seismic performance expectations, financial constraints, and constructability issues.

6.10 Stormwater & Overland Flow Paths

Numerous small gully overland flow path features (shown on Figures 1b, Appendix A) are present within, or adjacent to, the proposed lot areas. These small gullies will act as overland flow paths for surface storm water runoff.

Sufficient stormwater drainage of the site is required before construction can begin in any areas in close proximity to the indicative overland flow paths.

A stormwater drainage design is recommended at detailed design stage.

All sources of slope saturation should be eliminated by cut-off drains, swale drains and bunds and redirected around building platforms and access roads.

A geotechnical practitioner should inspect any seepage, spring flow or under-runners that may be encountered during construction of the proposed building platform.

6.11 Accessway

Depending on the final location and extent of the accessway cuts, possibly requiring retaining may be required, and should be reviewed by a geotechnical practitioner to confirm any geotechnical requirements. Underlying fan alluvium and outwash gravels, where not softened by water, are expected to provide CBR values of 10% + with respect to pavement design.

6.12 Site Subsoil Category

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

The site is likely to be Class C (Shallow soil site) in most locations, however Class D areas are possible. Class D is the conservative assumption and should be considered for detailed design. Specific investigations can be undertaken to confirm the class if critical design elements are present.

6.13 Additional Investigations

If piling is considered, then a sonic borehole will be required to confirm the presence of an adequate bearing stratum and pile design parameters.

It is recommended the foundation subgrade be inspected during construction/platform earthworks by a suitably qualified and experienced geotechnical practitioner to confirm the conditions are in accordance with the assumptions and recommendations provided in this report and future detailed foundation investigation and design.

7 Hazards/Neighbouring Structures

Natural Hazards: Known seismic hazards affecting the development are detailed in Section 4.1 and appropriate allowance should be made for seismic loading during detailed design of any proposed building, retaining walls and foundations.

The reservoir is located close to mapped landslide hazards. The risk of future movement affecting the reservoir is assessed as low, as discussed in Section 5.1.

Alluvial fan hazard present on the QLDC hazard mapping is considered in Section 5.2.

The regional groundwater level is anticipated to lie at moderate depth below the site and therefore the liquefaction risk is considered to be low for the proposed building platforms, as discussed in Section 5.3.

Construction of the proposed development is feasible from a rock fall risk perspective and no mitigation works are required, as discussed in Section 5.4.

Distances to adjoining structures: The subject property is bounded by a commercial quarry to the east and north, farmland to the south and a residential building platform to the west. No adverse effects are considered likely to neighbouring properties as long as silt, dust and noise control measures are instigated during construction.

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

Erosion and Sediment Control: The site presents some potential to generate silt runoff and this would naturally drain downslope. Effective systems for erosion control are runoff diversion drains and contour drains, while for sediment control, options are earth bunds, silt fences, hay bales, vegetation buffer strips and sediment ponds. Only the least amount of subsoil should be exposed at any stage and surfacing established as soon as practical. Details for implementation are given. Works should be completed in accordance with QLDC's Land Development and Sub-division Code of Practice, 'A Guide to Earthworks in the Queenstown Lakes District.

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

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

Vibration: No vibration induced settlement is expected in the foundation soil types.

8 Conclusions and Recommendations

- Construction of the proposed reservoir is considered acceptable from a geotechnical perspective provided the recommendations of this report are followed;
- The stratigraphy beneath the proposed building platforms comprise surficial layers of topsoil, fan alluvium and outwash gravels overlying glacial soils;
- Groundwater seepage was observed within TPs 4, 5 and 6. Seepages were observed as minor to moderate;
- The regional groundwater table is expected to be at significant depth beneath the development;
- A natural hazard assessment has been undertaken for the mapped hazards affecting the site including landslide, alluvial fan, liquefaction and rockfall. We conclude that construction of the proposed development is feasible from a natural hazard risk perspective and no mitigation works are required;
- Temporary batters within the observed site soils are provided in Table 2, Section 6.4;
- Permanent slope batters that are associated with the proposed building platform are subject to specific geotechnical design;
- Fan alluvium (sandy gravel) and outwash gravels could be used as engineered fill however only during warmer months. The implications and considerations of using fan alluvium as engineered fill is discussed in Section 6.5;
- Permanent engineered fill slopes associated with the proposed building platform are subject to specific geotechnical design;
- Due allowance should be made during the detailed design of all retaining walls for forces such as surcharge due to the sloping ground surface behind the retaining walls, groundwater, seismic and traffic loads;
- Perched groundwater was observed within Test pits 4, 5 and 6, and is expected to be encountered during the bulk excavation. The presence of discrete seepages is likely to negatively impact on the stability of the soil slopes over time, and shallow slips, scour and erosion may develop;
- A slope stability assessment has been undertaken for the proposed building platform and engineered fill slopes associated with the proposed development, further details are provided in Section 6.8 of this report;
- Slopes able to impact the building platform should failure occur have been assessed as importance level 4. Due to the high seismic loads, stability criteria are not me in some cases and consideration will need to be given to final slope batters, structure set-backs, foundations and/or preparation of the building platform to achieve adequate long-term stability;
- The visual mitigation mound has been assessed as importance level 2. The proposed batters do not meet stability criteria. To achieve long term stability geogrid reinforcement, or regrading to a shallower, more stable batter will be required.
- The parameters used in the analysis are considered to be conservative. If desired, improvements in the slope stability results are expected to be achievable at the detailed design stage and would require detailed analysis of the surrounding quarry slopes, and/or completion of further ground investigation. Overall ULS Displacements are relatively low and considered to be manageable. Measures to

provide a stable tank foundation, e.g. structural engineering, ground improvement or set-back from the slopes, are expected to be readily achievable for the development.

- It is recommended that additional slope stability analysis is conducted if quarrying earthworks is proposed to be undertaken closer than 50 m from the toe of the terrace slope;
- It is recommended that the slope stability of the proposed building platform is reassessed at detailed design stage to confirm the recommendations of this assessment are adequately covered;
- All sources of slope saturation should be eliminated by cut off drain's upslope of the cuts and no storm water, wastewater and overflow water should be discharged directly to steep slopes. A stormwater drainage design is recommended at detailed design stage to ensure the platform are remains well drained;
- All unsuitable materials identified in foundation excavations, particularly those softened by exposure to water, should be undercut and replaced with engineered fill during construction. Any fill that is utilised as bearing for foundations should be placed and compacted in accordance with NZS 4431:1989 and certification provided to that effect;
- The soils present at the site will provide adequate bearing for foundations. Recommendations are provided in Section 6.9;
- It is recommended the foundation excavations be inspected by a suitably qualified and experienced geotechnical specialist to confirm the conditions are in accordance with the assumptions and recommendations provided in this report;
- A geotechnical practitioner should inspect any seepage, spring flow or under-runners that may be encountered during construction of the proposed new building platforms;

9 Applicability

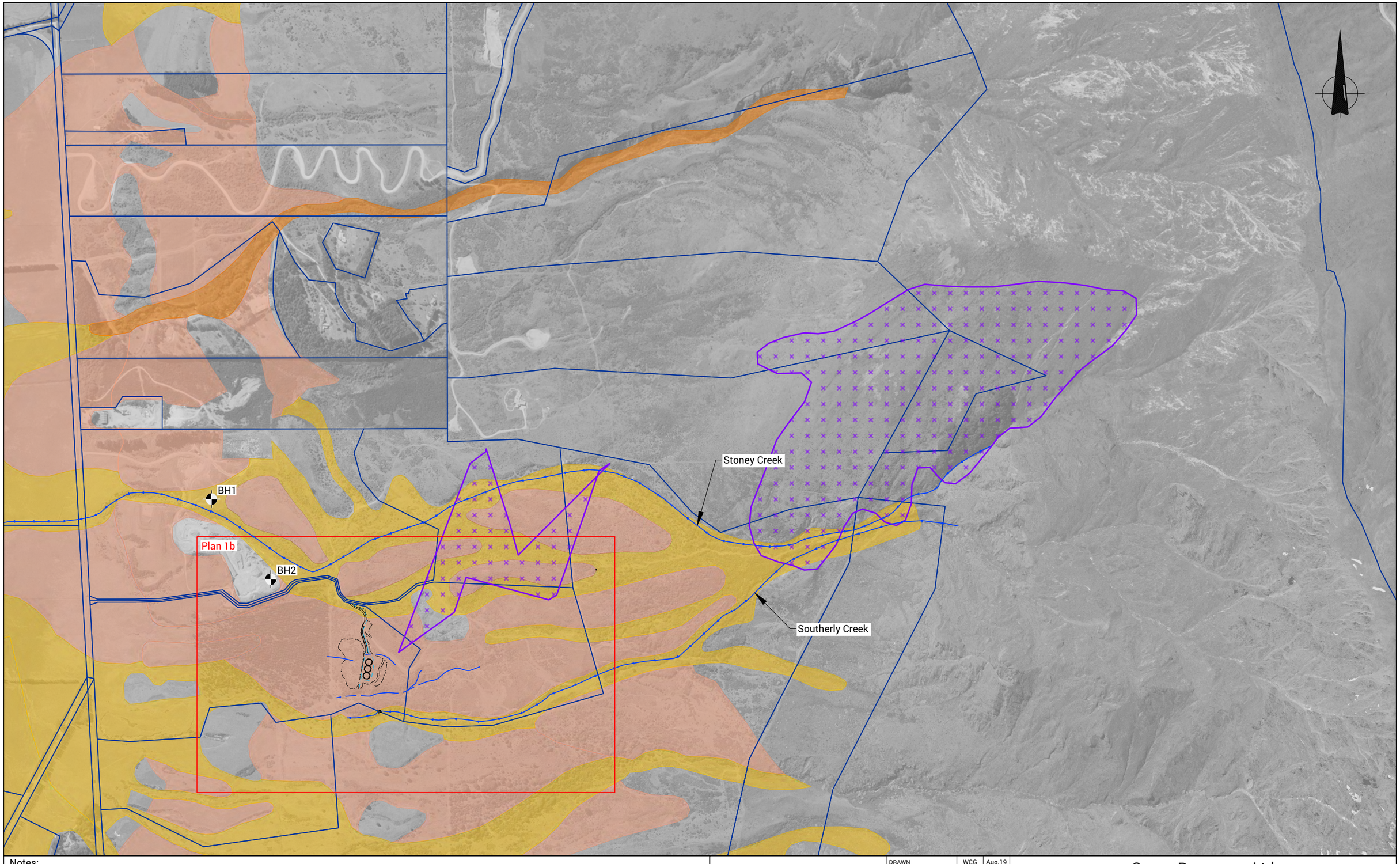
This report has been prepared for the benefit of Scope Resources Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

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

Please do not hesitate to contact the undersigned if we can provide any further assistance with this project.

Report prepared by:	Reviewed for GeoSolve Ltd by:
	
.....	.....
Simon Reeves Engineering Geologist	Paul Faulkner Senior Engineering Geologist

Appendix A: Site Investigation Plans and Cross-Sections



Notes:
1. These drawings have been prepared for the benefit of Scope Resources Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Legend:

- Machine Borehole (put down for Tonkin & Taylor May 2008 report for liquefaction assessment)
- Alluvial Fan - Active Bed (ORC)
- Alluvial Fan - Less Recently Active(ORC)
- Alluvial Fan - Recently Active (ORC)
- Landslide Areas - non verified (QLDC)

SCALE 1:10,000

0 100 200 300 400 500 (m)

GEOSOLVE
Level 1, 70 MacAndrew Road, South Dunedin
www.geosolve.co.nz

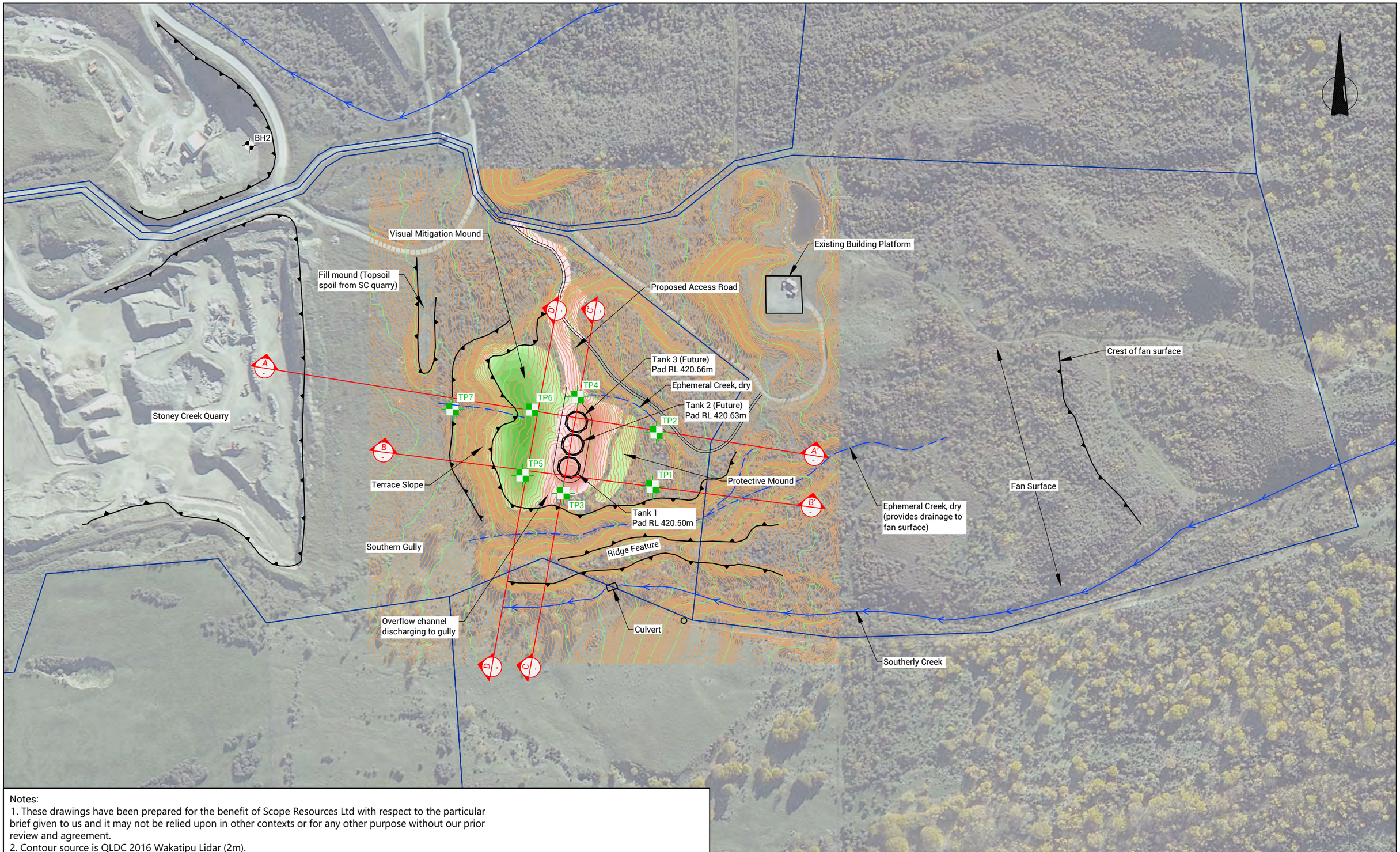
DRAWN	WCG	Aug.19
DRAFTING CHECKED	SR	Aug.19
APPROVED	PGF	Aug.19
CADFILE: 190413.dwg		
SCALES (AT A3 SIZE): 1:10,000		
PROJECT No: 190413	FIG No: Figure 1a	REV. 0

Scope Resources Ltd

Water Reservoir Coneburn

Geotechnical Investigations

Hazards Plan



Notes:
1. These drawings have been prepared for the benefit of Scope Resources Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.
2. Contour source is QLDC 2016 Wakatipu Lidar (2m).

Legend:

- TP1 — GeoSolve Test Pit
- A — Geological Cross Section
- Machine Borehole (put down for Tonkin & Taylor May 2008 report for liquefaction assessment)
- Proposed Excavation
- Proposed Filling
- Change in Slope
- Approximate location of creek
- Overland flowpath

SCALE 1:3000

0 30 60 90 120 150 (m)

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DRAWN	WCG	Aug.19
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APPROVED	PGF	Aug.19
CADFILE: 190413.dwg		
SCALES (AT A3 SIZE): 1:3000		
PROJECT No: 190413		

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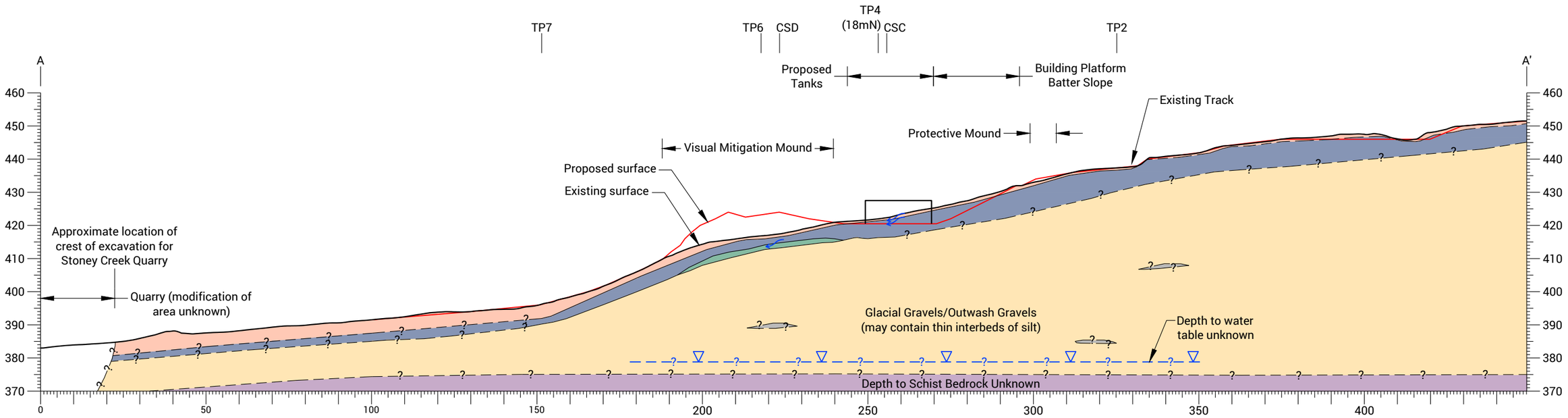
Water Reservoir Coneburn

Geotechnical Investigations

Investigation Plan

FIG No: Figure 1b

REV. 0



Legend:

- Fan Alluvium
- Glacial Till
- Outwash Gravels
- Outwash Gravels/Glacial Gravels
- Schist Bedrock
- Observed Seepage

Notes:

1. These drawings have been prepared for the benefit of Scope Resources Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

SCALE 1:1250

0 12.5 25.0 37.5 50.0 62.5 (m)

GEOSOLVE
Level 1, 70 MacAndrew Road, South Dunedin
www.geosolve.co.nz

DRAWN	WCG	Aug.19
DRAFTING CHECKED	SR	Aug.19
APPROVED	PGF	Aug.19
CADFILE: 190413.dwg		
SCALES (AT A3 SIZE): 1:1250		
PROJECT No: 190413		

Scope Resources Ltd

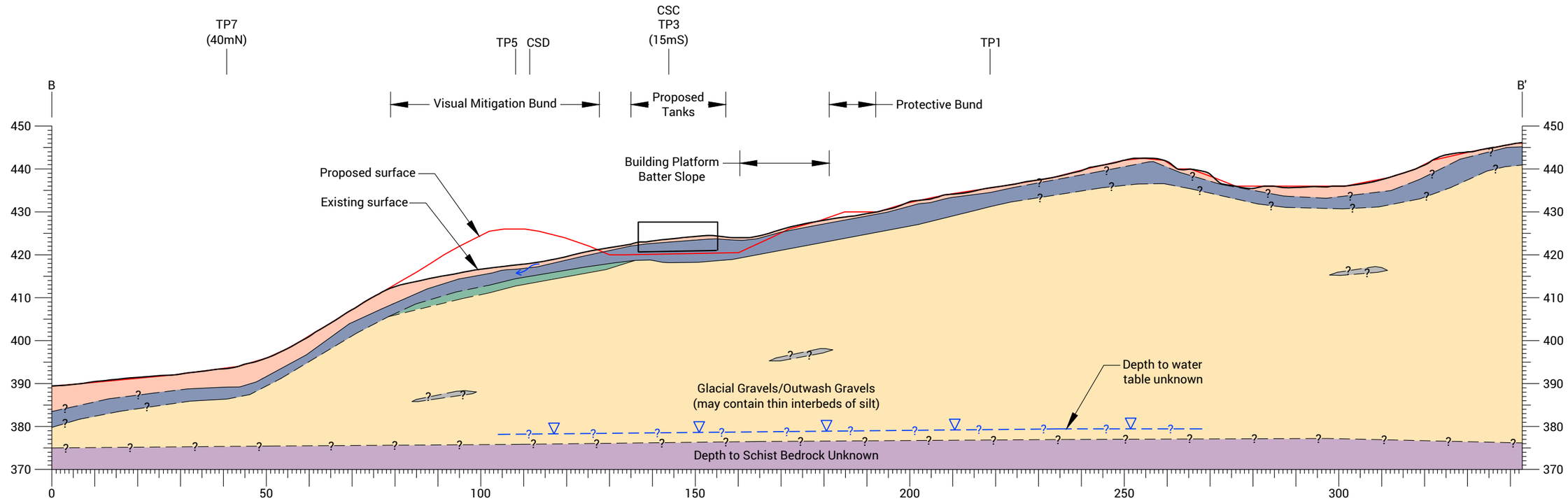
Water Reservoir Coneburn

Geotechnical Investigations

Cross Section A

FIG No: Figure 2a

REV. 0



Legend:

- Fan Alluvium
- Glacial Till
- Outwash Gravels
- Outwash Gravels/Glacial Gravels
- Schist Bedrock
- Observed Seepage

Notes:

1. These drawings have been prepared for the benefit of Scope Resources Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

SCALE 1:1000

0 10 20 30 40 50 (m)

GEOSOLVE
Level 1, 70 MacAndrew Road, South Dunedin
www.geosolve.co.nz

DRAWN	WCG	Aug.19
DRAFTING CHECKED	SR	Aug.19
APPROVED	PGF	Aug.19
CADFILE: 190413.dwg		
SCALES (AT A3 SIZE): 1:1000		
PROJECT No: 190413		

Scope Resources Ltd

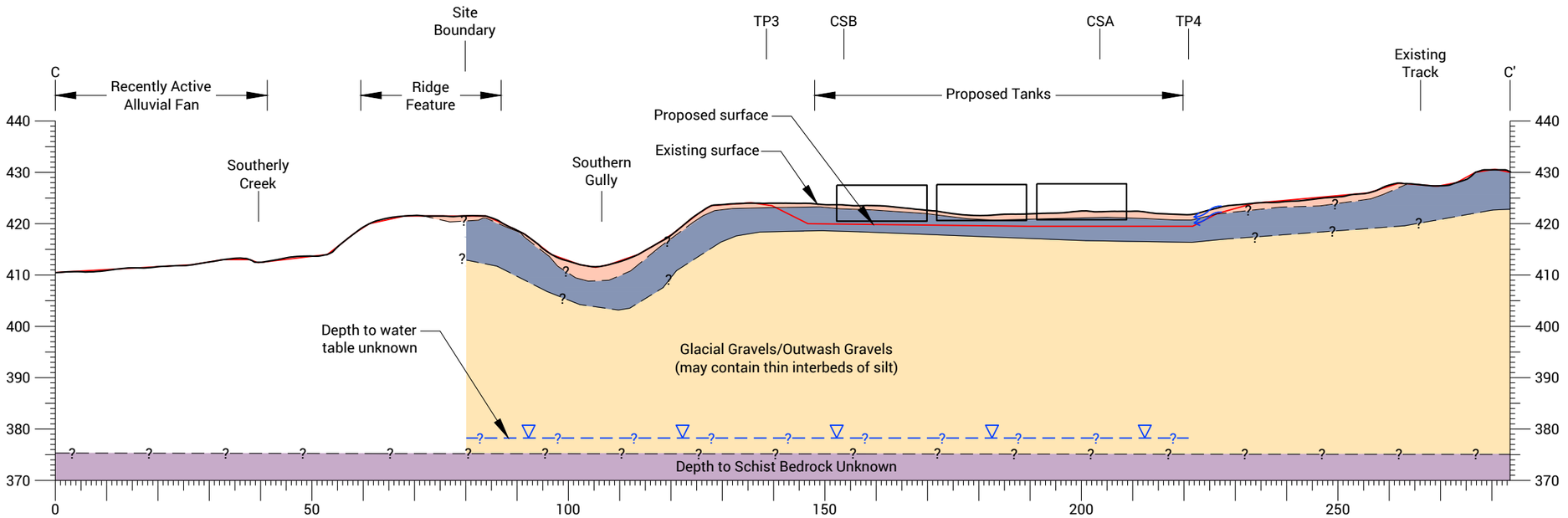
Water Reservoir Coneburn

Geotechnical Investigations

Cross Section B

FIG No: Figure 2b

REV: 0



Legend:

- Fan Alluvium
- Glacial Till
- Outwash Gravels
- Outwash Gravels/Glacial Gravels
- Schist Bedrock
- Observed Seepage

Notes:

1. These drawings have been prepared for the benefit of Scope Resources Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

SCALE 1:1000

0 10 20 30 40 50 (m)

GEOSOLVE
Level 1, 70 MacAndrew Road, South Dunedin
www.geosolve.co.nz

DRAWN	WCG	Aug.19
DRAFTING CHECKED	SR	Aug.19
APPROVED	PGF	Aug.19
CADFILE: 190413.dwg		
SCALES (AT A3 SIZE): 1:1000		
PROJECT No: 190413		

Scope Resources Ltd

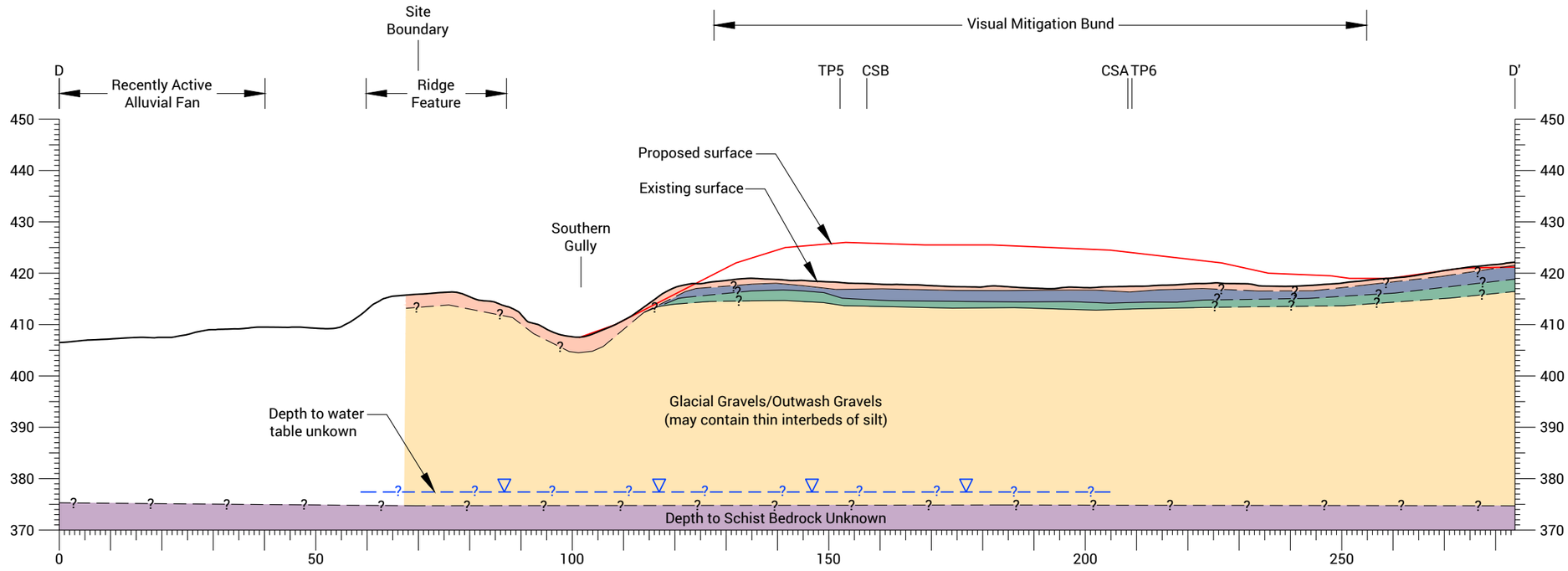
Water Reservoir Coneburn

Geotechnical Investigations

Cross Section C

FIG No: Figure 2c

REV. 0



Legend:

- Fan Alluvium
- Glacial Till
- Outwash Gravels
- Outwash Gravels/Glacial Gravels
- Schist Bedrock
- Observed Seepage

Notes:

1. These drawings have been prepared for the benefit of Scope Resources Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

SCALE 1:1000

0 10 20 30 40 50 (m)

GEOSOLVE
Level 1, 70 MacAndrew Road, South Dunedin
www.geosolve.co.nz

DRAWN	WCG	Aug.19
DRAFTING CHECKED	SR	Aug.19
APPROVED	PGF	Aug.19

CADFILE: 190413.dwg

SCALES (AT A3 SIZE): 1:1000

PROJECT No: 190413

FIG No: Figure 2e

REV.: 0

Scope Resources Ltd

Water Reservoir Coneburn

Geotechnical Investigations

Cross Section E

Appendix B: Investigation Data

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 1**

PROJECT:	Coneburn Reservoir	JOB NUMBER:	190413
LOCATION:	See Site Plan — INCLINATION: Vertical		

EASTING:		mE	EQUIPMENT:	20t excavator	OPERATOR:	Warren
NORTHING:		mN	INFOMAP NO.		COMPANY:	Beaver Contractors
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	24-Jul-19
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	24-Jul-19

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 5 10 15)
0.3	TOPSOIL		Dark brown, sandy SILT, organic, some gravel & rootlets. Sand is fine to medium. Gravel is fine to coarse; sub-rounded. Soft to Firm. Massive. Moist.			
0.7	FAN ALLUVIUM		Greyish brown, sandy GRAVEL, some silt with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Medium Dense. Bedded. Moist.			
1.1	FAN ALLUVIUM		Greyish brown, sandy GRAVEL, trace of silt with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Dense. Bedded. Moist.			
1.15	BURIED TOPSOIL/FAN ALLUVIUM		Dark brown, gravelly SILT with minor sand & rootlets. Gravel is fine to medium; sub-rounded. Sand is fine to medium. Stiff. Moist.			
4.4	OUTWASH GRAVEL		Brownish grey, mottled orange, sandy GRAVEL, trace of silt with occasional cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Boulders up to 500mm. Very Dense. Well bedded. Moist.		NO SEEPAGE	

Total Depth = 4.4 m

COMMENT: Walls remained stable, test pit dry. Hard digging at base of excavation.

Logged By: SR

Checked Date:

Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 2**

PROJECT:	Coneburn Reservoir	JOB NUMBER:	190413
LOCATION:	See Site Plan — INCLINATION: Vertical		

EASTING:		mE	EQUIPMENT:	20t excavator	OPERATOR:	Warren
NORTHING:		mN	INFOMAP NO.		COMPANY:	Beaver Contractors
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	24-Jul-19
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	24-Jul-19

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 5 10 15)
0.3	TOPSOIL		Dark brown, sandy SILT with trace of gravel. Sand is fine to medium. Gravel is fine to coarse; sub-rounded. Soft to Firm.			
0.7	FAN ALLUVIUM		Orange brown, SILT with some sand & gravel. Silt is non-plastic. Oxidised. Sand is fine to medium. Gravel is fine to medium; sub-rounded. Stiff to Very Stiff. Massive. Moist.			
6.0	OUTWASH GRAVEL		Grey, sandy GRAVEL, trace of silt with occasional cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Boulders up to 500mm. Dense to Very Dense. Well bedded. Moist.		NO SEEPAGE	

Total Depth = 6 m

COMMENT: Walls remained stable, test pit dry.

Logged By: SR

Checked Date:

Sheet: 1 of 1

EXCAVATION LOG

EXCAVATION NUMBER: **TP 3**

PROJECT:	Coneburn Reservoir	JOB NUMBER:	190413
LOCATION:	See Site Plan — INCLINATION: Vertical		

EASTING:		mE	EQUIPMENT:	20t excavator	OPERATOR:	Warren
NORTHING:		mN	INFOMAP NO.		COMPANY:	Beaver Contractors
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	24-Jul-19
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	24-Jul-19

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.3	TOPSOIL		Dark brown, sandy SILT, organic with trace of gravel & rootlets. Sand is fine to medium. Gravel is fine to medium; sub-rounded.		
0.7	FAN ALLUVIUM		Brown, sandy SILT with some gravel. Silt is non-plastic. Sand is fine to medium. Gravel is fine to coarse; sub-rounded. Stiff to Very Stiff. Massive. Moist.		
5.5	OUTWASH GRAVEL		Grey to mottled orange, sandy GRAVEL, minor silt with occasional cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Boulders up to 500mm. Medium Dense to Very Dense. Moderately bedded. Moist.		NO SEEPAGE

SCALA PENETROMETER

Blows per 100mm

0 5 10 15

Total Depth = 5.5 m

COMMENT: Walls remained stable, test pit dry.

Logged By: SR

Checked Date:

Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 4**

PROJECT:	Coneburn Reservoir	JOB NUMBER:	190413
LOCATION:	See Site Plan — INCLINATION: Vertical		

EASTING:		mE	EQUIPMENT:	20t excavator	OPERATOR:	Warren
NORTHING:		mN	INFOMAP NO.		COMPANY:	Beaver Contractors
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	24-Jul-19
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	24-Jul-19

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 5 10 15)
0.3	TOPSOIL		Dark brown, sandy SILT, organic with trace of gravel & rootlets. Sand is fine to medium. Gravel is fine to medium; sub-rounded.		Seepage @ 0.9 m	
0.9	FAN ALLUVIUM		Brown to mottled orange, sand silty GRAVEL with iron staining. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded. Cobbles approx. 200mm. Medium Dense to Dense. Moderately bedded sub horizontal. Wet.		Seepage @ 1.4 m	
5.7	OUTWASH GRAVEL		Brownish grey, sandy GRAVEL, minor silt with cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Boulders up to 500mm. Dense to Very Dense. Moderately bedded sub horizontal. Wet. At 1.5m becomes moist.			

Total Depth = 5.7 m

COMMENT: Walls remained stable unless in contact with seepage. Test pit in overland flow path. Seepage at 0.9 & 1.4m ~0.75 litres per min.

Logged By: SR

Checked Date:

Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 5**

PROJECT:	Coneburn Reservoir	JOB NUMBER:	190413
LOCATION:	See Site Plan — INCLINATION: Vertical		

EASTING:		mE	EQUIPMENT:	20t excavator	OPERATOR:	Warren
NORTHING:		mN	INFOMAP NO.		COMPANY:	Beaver Contractors
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	24-Jul-19
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	24-Jul-19

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 5 10 15)
0.3	TOPSOIL		Dark brown, sandy SILT, organic with trace of gravel & rootlets. Sand is fine to medium. Gravel is fine to medium; sub-rounded. Soft. Moist.		Seepage @ 2.1 m	
1.0	FAN ALLUVIUM		Brown to mottled orange, GRAVEL, minor silt, trace of sand & cobbles. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded. Cobbles up to 200mm. Medium Dense to Dense. Moderately bedded. Moist.			
3.2	OUTWASH GRAVEL		Brownish grey, sandy GRAVEL, minor silt with cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Boulders up to 500mm. Dense to Very Dense. Moderately bedded. Moist, Wet @ 2.1m.			
4.9	GLACIAL TILL		Brown, sandy SILT. Sand is fine to medium. Silt is non-plastic. Very Stiff to Hard. Massive. Dry to Moist.			
5.3	GLACIAL GRAVEL		Greyish brown, sandy GRAVEL with cobbles & trace of silt. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Cobbles up to 200mm. Dense to Very Dense. Moist.			

Total Depth = 5.3 m

COMMENT: Walls remained stable unless in contact with seepage. Seepage in upslope wall at 2.1m bgl. Very minor.

Logged By: SR

Checked Date:

Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 6**

PROJECT:	Coneburn Reservoir	JOB NUMBER:	190413
LOCATION:	See Site Plan INCLINATION: Vertical		

EASTING:		mE	EQUIPMENT:	20t excavator	OPERATOR:	Warren
NORTHING:		mN	INFOMAP NO.		COMPANY:	Beaver Contractors
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	24-Jul-19
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	24-Jul-19

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE
0.3	TOPSOIL		Dark brown, sandy SILT, organic with trace of gravel & rootlets. Sand is fine to medium. Gravel is fine to medium; sub-rounded.		
0.9	FAN ALLUVIUM		Brown, sandy GRAVEL with some silt & cobbles. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded. Cobbles up to 200mm. Medium Dense to Dense. Moderately bedded. Moist.		
1.2	FAN ALLUVIUM		Greyish brown, sandy GRAVEL with trace of silt & cobbles. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded. Cobbles up to 200mm. Medium Dense to Dense. Moist.		
2.6	OUTWASH GRAVEL		Grey, sandy GRAVEL, minor silt with cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Boulders up to 500mm. Dense to Very Dense. Moderately bedded. Moist.		
2.8	OUTWASH GRAVEL		Grey, sandy GRAVEL, minor silt with cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Boulders up to 500mm. Dense to Very Dense. Moderately bedded. Wet.		Seepage @ 2.8 m
4.2	GLACIAL TILL		Brown, sandy SILT. Sand is fine to medium. Silt is non-plastic. Very Stiff to Hard. Massive. Moist to Wet.		
5.1	GLACIAL GRAVEL		Greyish brown, sandy GRAVEL with cobbles & trace of silt. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Cobbles up to 200mm. Dense to Very Dense. Moist to Wet.		

SCALA PENETROMETER

Blows per 100mm

0 5 10 15

Total Depth = 5.1 m

COMMENT: Test pit walls remained stable unless in contact with seepage. Test pit on true right bank of overland flow path. Seepage at 2.8m on upslope side of test pit - 2-4 litres per min.

Logged By: SR

Checked Date:

Sheet: 1 of 1

GEOSOLVE

EXCAVATION LOG

EXCAVATION NUMBER: **TP 7**

PROJECT:	Coneburn Reservoir	JOB NUMBER:	190413
LOCATION:	See Site Plan — INCLINATION: Vertical		

EASTING:		mE	EQUIPMENT:	20t excavator	OPERATOR:	Warren
NORTHING:		mN	INFOMAP NO.		COMPANY:	Beaver Contractors
ELEVATION:		m	DIMENSIONS:		HOLE STARTED:	24-Jul-19
METHOD:			EXCAV. DATUM:		HOLE FINISHED:	24-Jul-19

DEPTH (m)	SOIL / ROCK TYPE	GRAPHIC LOG	DESCRIPTION	USCS GROUP	GROUNDWATER / SEEPAGE	SCALA PENETROMETER Blows per 100mm (0 5 10 15)
0.3	TOPSOIL		Dark brown, sandy SILT, organic with trace of gravel & rootlets. Sand is fine to medium. Gravel is fine to medium; sub-rounded.			
1.8	FAN ALLUVIUM		Greyish brown, sandy GRAVEL with trace of silt & occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Cobbles up to 200mm. Medium Dense. Moist.			
4.3	FAN ALLUVIUM		Brown, sandy GRAVEL with trace of silt & occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Cobbles up to 200mm. Medium Dense. Bedded. Moist.			
6.0	OUTWASH GRAVEL		Grey, sandy GRAVEL with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse; sub-rounded to sub-angular. Cobbles up to 200mm. Medium Dense to Dense. Moderately bedded. Moist.		NO SEEPAGE	

Total Depth = 6 m

COMMENT: Walls remained stable. Test pit dry.

Logged By: SR

Checked Date:

Sheet: 1 of 1

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No: BH01
Hole Location:

SHEET 1 OF 1

PROJECT: CFM Stoney Oasis		LOCATION: Stoney Creek, Frankton	JOB No: 880077.100
CO-ORDINATES	mN mE	DRILL TYPE: UDR650	HOLE STARTED: 20/2/08
		DRILL METHOD: TUBEX	HOLE FINISHED: 20/2/08
R.L.	m		DRILLED BY: McNEIL
DATUM		DRILL FLUID:	LOGGED BY: SCWW CHECKED:

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 20 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 2 5 20 50 100 200	DEFECT SPACING (mm) 60 200 600 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
Glacial outwash gravels		Dry	N/A	TBX					1 2 3 4 5 6 7 8 9 10			DRY	MD - D				Coarse Silty Gravels
									11 12 13 14 15								End of borehole - 10.5 m

TONKIN & TAYLOR LTD

BOREHOLE LOG

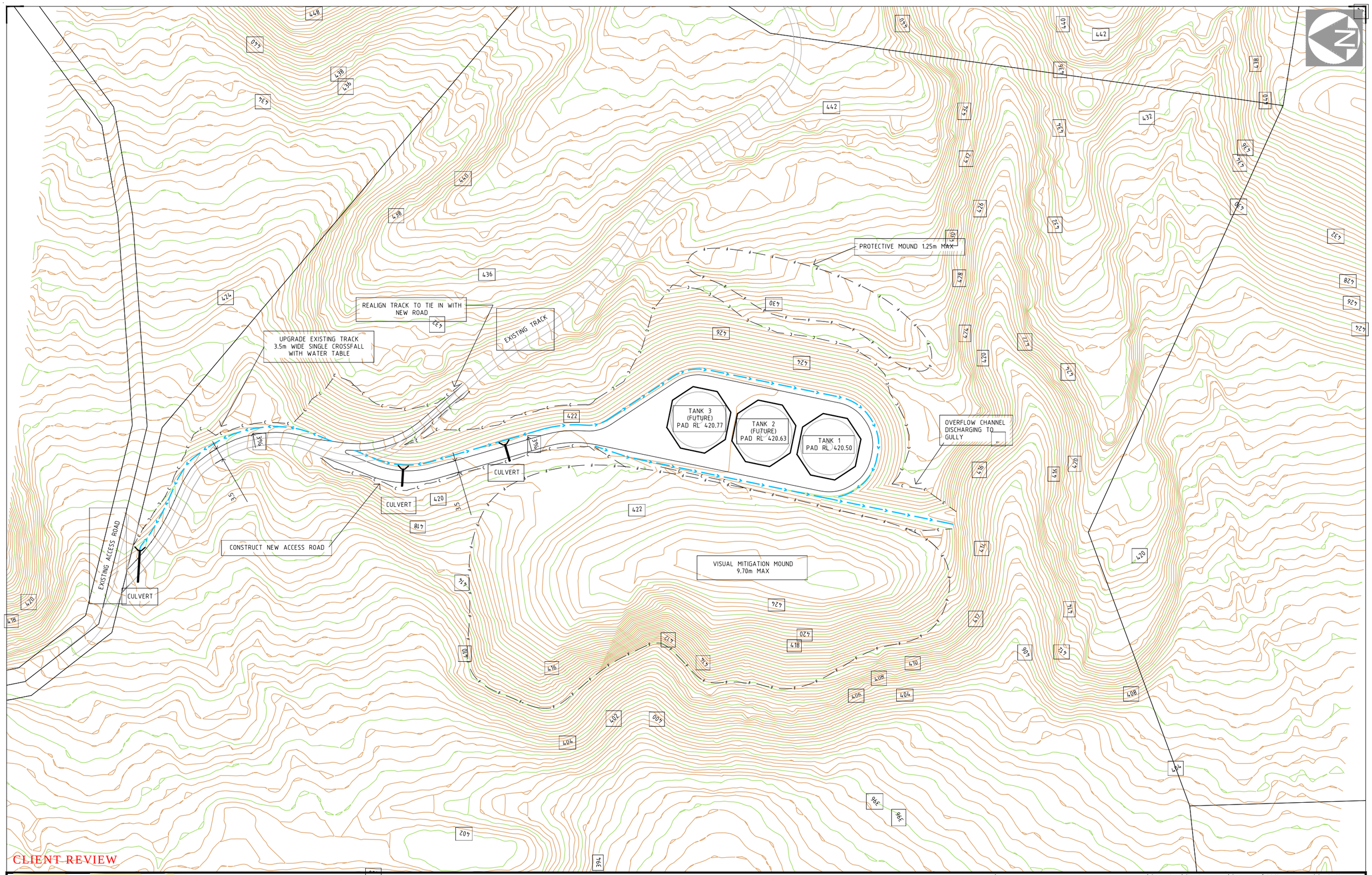
BOREHOLE No: BH02
Hole Location:

SHEET....1..... OF....1.....

PROJECT: CFM Stoney Oasis		LOCATION: Stoney Creek, Frankton	JOB No: 880077.100
CO-ORDINATES	mN mE	DRILL TYPE: UDR650	HOLE STARTED: 20/2/08
R.L.	m	DRILL METHOD: TUBEX	HOLE FINISHED: 20/2/08
DATUM		DRILL FLUID:	DRILLED BY: McNEIL
			LOGGED BY: SCWW CHECKED:

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 200	DEFECT SPACING (mm) 50 200 1000 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
Glacial outwash gravels		DRY	N/A	TBX					1 2 3 4 5 6			DRY	MD - D				Coarse Silty Gravels
Boulder									6								Boulder
Glacial outwash gravels									7 8 9 10 11 12								Coarse Silty Gravels
									12 13 14 15								End of borehole - 12 m

Appendix C: Earthworks Plan



Shotover Design Limited trading as
Clark Fortune McDonald & Associates
Licensed Cadastral Surveyors - Land Development - Planning Consultants
309 Lower Shotover Road, P.O.Box 553 Queenstown
Tel. (03)441-6044, Fax (03)442-1066, Email admin@cfma.co.nz
21 Reece Crescent, P.O.Box 550, Wanaka
Tel. (03)443-4448, Fax (03)443-4445, Email admin@cfma.co.nz
Unit 6B, Level 1, 480 Moray Place, P.O. Box 5960, Dunedin
Tel. (03)470-1582, Fax (03)470-1583, Email admin@cfma.co.nz

Rev.	Date	Revision Details	By
-	-	-	-

SCOPE RESOURCES
PROPOSED ACCESS ROAD, WATER TANKS AND MOUNDING
137

Client: SCOPE RESOURCES LTD

Notes:
All dimensions shown are in meters unless shown otherwise.
Any person using Clark Fortune McDonald drawings and other data accepts the risk of:
- Using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions.

Surveyed	Signed	Date	
Drawn: DH	Signed	Date: 05/19	
Designed: DH	Signed	Date: 05/19	

Job No. 11014
Drawing No. 15 SHEET 001
Scale 1:500 @ A1, 1:1000 @ A3
Datum & Level MSL
Rev. A

LEGEND

EARTHWORKS

Fill Material
- 9.0m to 10.5m
- 7.5m to 9.0m
- 6.0m to 7.5m
- 4.5m to 6.0m
- 3.0m to 4.5m
- 1.5m to 3.0m
- 0.0m to 1.5m

Cut Material
- 0.0m to -1.0m
- -1.0m to -2.0m
- -2.0m to -3.0m
- -3.0m to -4.0m
- -4.0m to -5.0m
- -5.0m to -6.0m
- -6.0m to -7.0m

Earthworks Volume

Area	14,200 m²
Cut (solid)	9,900 m³
Cut (bulk)	11,900 m³
Fill	31,250 m³
Excess	19,350 m³

CLIENT REVIEW

Shotover Design Limited trading as
Clark Fortune McDonald & Associates
Licensed Cadastral Surveyors - Land Development - Planning Consultants
309 Lower Shotover Road, P.O.Box 553 Queenstown
Tel. (03)441-6044, Fax (03)442-1066, Email admin@cfma.co.nz
21 Reece Crescent, P.O.Box 550, Wanaka
Tel. (03)443-4448, Fax (03)443-4445, Email admin@cfma.co.nz
Unit 6B, Level 1, 480 Moray Place, P.O. Box 5960, Dunedin
Tel. (03)470-1582, Fax (03)470-1583, Email admin@cfma.co.nz

Rev.	Date	Revision Details	By
-	-	-	-

SCOPE RESOURCES
EARTHWORKS VOLUMES

138

Client: SCOPE RESOURCES LTD

Notes:
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Surveyed	Signed	Date	
Drawn: DH	Signed	Date: 05/19	
Designed: DH	Signed	Date: 05/19	

Job No. 11014

Drawing No. 15 SHEET 002

Scale: 1:500 @ A1, 1:1000 @ A3

Datum & Level: MSL

Rev. A

GOLDER
MEMBER OF WSP

02 September 2021 Reference No. 21490001_7407-001-LR-RevA_DRAFT

Luke Place
Queenstown Lakes District Council
Level 1
74 Shotover Street
Queenstown 9348

REVIEW OF NATURAL HAZARD ASSESSMENTS FOR PROPOSED CONEBURN INDUSTRIAL AREA PLAN CHANGE

Dear Luke

Introduction

Queenstown Lakes District Council (QLDC) has engaged WSP New Zealand Limited (WSP) to undertake a review of existing hazard assessments by others that support an application for a district plan amendment associated with the proposed Coneburn Industrial Area, Kingston Road (State Highway 1), Queenstown south of Frankton (see Figure 1). The development is proposed to be a dedicated industrial and service zone with a mix of compatible activities that excludes residential, standalone offices and most retail. In 2021 WSP acquired Golder Associates (NZ) Limited (Golder) and Golder has completed this review under the existing WSP contract for QLDC (WSP file/ref 6-XQ090.11)[1].

[1] This letter report is provided subject to the attached Report Limitations.

Golder Associates (NZ) Limited
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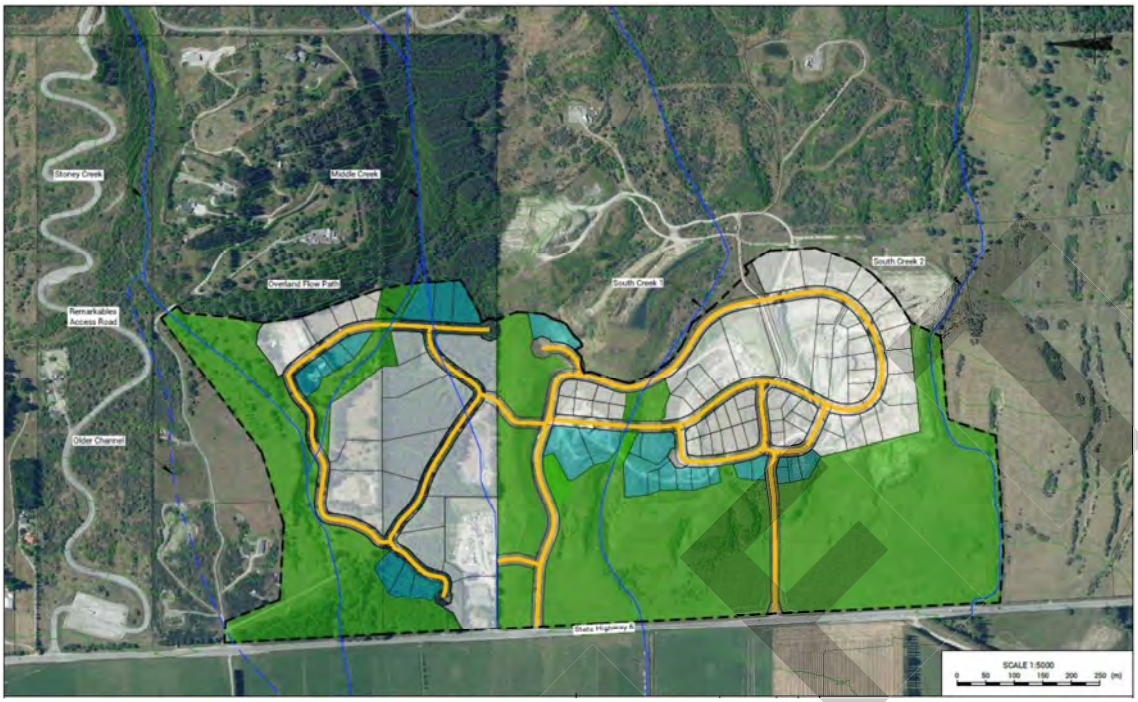

Figure 1: Proposed Coneburn Industrial Zone site plan (Figure 1a in Geosolve report July 2021).

As part of the review we have been provided with the following technical documents:

1) May 2008 Tonkin + Taylor Natural Hazard Assessment Report for The Oasis Development, Stoney Creek, Frankton. Ref: 880077.100.

2) Sept 2019 Geosolve Geotechnical Report for Resource Consent (for water tanks). Ref: 190413.

3) 5 Nov 2019 Geosolve Geotechnical Slope Stability Assessment Coneburn Water Reservoir. Ref: 190413.

4) 2 June 2021 WSP memorandum Coneburn Industrial Area Proposed District Plan Change. Ref: 6-XQ090.11.

5) July 2021 Geosolve Request for Information – Natural Hazard Assessment. Ref: 190413.01, which includes as an appendix:
   Oct 2015 Lowe Environmental Impact Coneburn Industrial Park – Water Infrastructure Option Viability Report.

The Geosolve primary author (Simon Reeves) was contacted by Golder reviewer Matt Howard on 17 August 2021 for clarification of some aspects of the assessment. Geosolve presented photographs of exposed materials in water courses to support their debris flow assessment, which are attached to this letter for reference.

To support our understanding of the site and the regulatory requirements we have also viewed the following:

1) Publicly available historical aerial photographs (Retrolens - Historical Imagery Resource).

2) January 2021 Dunedin City Council Second Generation District Plan (2GP).

3) June 2021 Otago Regional Council Proposed Otago Regional Policy Statement (RPS).

This review considers whether the risks posed by the natural hazards have been adequately identified and assessed by Geosolve and whether they can be mitigated at the detailed design stage of the project (i.e., at the Resource Consent application stage). This review is related to natural hazards only. Information relating to other engineering aspects of the proposed development have not been considered.

Proposed Development

From Geosolve (2021):

The site is located on the gently to moderately sloping western aspect (lower slopes of the Remarkables Range), approximately 1100-1200 metres from the toe of the steeply sloping Remarkables mountain range. The subject site is generally sited on discontinuous terraced slopes formed by alluvial depositions of material adjacent to the glacial margins. These slopes have since been modified (post-glacial) by erosion, deposition and incision of various creeks. The various creeks drain from the steep Remarkables range and more moderately sloping intermediate slopes, upslope of the proposed development. Four main creeks appear to enter the upslope site boundary. Stoney Creek, the combined Middle Creek Channel and South Creek 1 & 2.

Natural Hazards Assessed by Geosolve

WSP (2021), on behalf of QLDC, concluded that existing reports (i.e., pre-2021) were inadequate to support the proposed District Plan change and listed the expected components that a natural hazard assessment should contain. These included an evaluation of the following:

- Rockfall hazard
- Alluvial fan hazard
- Cut and fill slope stability
- Debris flow hazard
- Flooding hazard
- Liquefaction hazard
- Hazard to the development posed by the proposed upstream water reservoir tanks

The Golder review refers exclusively to Geosolve (2021) and its appended report (Lowe, 2015). Previous reports offer beneficial background information for various iterations of the proposed development; however, they are generally less detailed or specific with respect to the assessment outlined in WSP (2021).

Risk Assessment Methodology

Two methods of semi-quantitative risk assessment have been used by Geosolve for each of the natural hazards. Both methods assume the hazard is not mitigated. The Dunedin City Council 2GP has five likelihood categories and three consequence categories that calculate a risk that is very low, low, moderate or high. The Otago Regional Council's RPS has the same number of likelihood categories, but five consequence categories with different descriptions. The risk categories are listed as acceptable, tolerable and significant. The two risk descriptions approximately overlap, with the 2GP's very low to low and moderate/high corresponding respectively with the RPS's acceptable and significant. It should be noted that the consequence descriptions in the RPS describe numerous applications to buildings as well as health and safety and the 2GP requires two of a list of hazard outcomes.

The use of the two risk assessment approaches is considered by Golder/WSP to be appropriate as they are similar and comply with district and regional guidance. For the RPS a more detailed quantitative approach is appropriate where the initial risk is 'significant'.

The completed assessment did not, however, identify any "significant" risks for any of the natural hazards considered. The results from both methods are reproduced in Figure 2 and Figure 3 below.

Area	Debris Flood	Flooding	Rockfall	Landslide	Liquefaction
Proposed Development Area	-	-	Very Low to Low Risk	Very Low to Low Risk	Low Risk
Stoney Creek	Low to Moderate Risk	Low to Moderate Risk	-	-	-
Stoney Creek Overbank Area	Low Risk	Low Risk	-	-	-
Middle Creek Combined Channel	Very Low to Low Risk	Low to Moderate Risk	-	-	-
Middle Creek Combined Channel Overbank Area	-	Low Risk	-	-	-
South Creek 1	Low Risk	Low to Moderate Risk	-	-	-
South Creek 1 Overbank Area	-	Low Risk	-	-	-
South Creek 2	Low Risk	Low to Moderate Risk	-	-	-
South Creek 2 Overbank Area	-	Low Risk	-	-	-

Figure 2: Risk assessment results using methodology of Dunedin City Council's 2GP (colour added by Geosolve).

Area	Debris Flood	Flooding	Rockfall	Landslide	Liquefaction
Proposed Development Area	-	-	Acceptable Risk	Acceptable Risk	Acceptable Risk
Stoney Creek channel corridor	Acceptable to Tolerable Risk	Acceptable to Tolerable Risk	-	-	-
Stoney Creek Overbank Area	Acceptable Risk	Acceptable Risk	-	-	-
Middle Creek Combined Channel	Acceptable Risk	Acceptable to Tolerable Risk	-	-	-
Middle Creek Combined Channel Overbank Area	-	Acceptable Risk	-	-	-
South Creek 1	Acceptable Risk	Acceptable to Tolerable Risk	-	-	-
South Creek 1 Overbank Area	-	Acceptable Risk	-	-	-
South Creek 2	Acceptable Risk	Acceptable to Tolerable Risk	-	-	-
South Creek 2 Overbank Area	-	Acceptable Risk	-	-	-

Figure 3: Risk assessment results using methodology of Otago Regional Council's RPS (APP6 criteria).

Review of Geohazard Assessment

The following headings match those in the risk table above, which approximate the geohazards to be addressed as suggested by WSP (2021), listed above.

Debris Flow

- Geosolve has conducted a debris flow assessment for the four creeks that pass through the proposed development. They have correctly stated that there is no single, accepted criteria to definitively quantify debris flow hazard. The adopted approach is to observe the topography and geomorphology of the catchment, consider the likely sediment/debris input and apply empirical relationships. This is supported by RAMMS debris flow modelling.
- The site is located on an alluvial fan and is estimated to be potentially subject to debris floods due to the relatively low surface slope angle on and above the proposed development and the limited potential for sediment generation within the catchment. Compared to debris flows, debris floods typically contain finer sediment and do not have sufficient energy to entrain larger, more damaging boulders. Geosolve has inferred that debris flood flows increase the bulk of clearwater flows by a factor of 2.5.
- A debris flood environment is supported by empirical studies of landslide runout, which suggest that the catchment height and the low angle of fan slope at the proposed development are indicative of a relatively low stormwater energy environment. This is supported by site photographs of exposed material attached to this letter[2] that show generally small-sized material in creek banks (in Photograph 5 in South Creek 2, large boulders are interpreted to be glacially deposited and not carried by modern storms).
- The creeks on the area approximately 1 km upstream of the proposed development are currently located in relatively shallow, wide creeks when compared to the incised channels further upstream. Avulsion has

[2] Attachment provided as a supplement from Geosolve on 19/08/21 following phone conversation between S. Reeves and M. Howard.

the potential to occur from the shallower channels and mitigative earthworks would be required to protect the proposed development.

- The larger, steeper catchment of Stoney Creek is estimated to pose the greatest debris flood hazard, with RAMMS modelling showing flows up to approximately 0.5 m deep tens of metres either side of the channel in its present condition. South Creeks 1 and 2 has debris flood potential, but is estimated to carry less debris at the proposed development. Middle Creek is estimated to be dominated by muddy stormwater.

Reviewer Comment:

- For clarity it would be beneficial to have graphical cross sections cut along modelled creek channels to show the proposed development boundary, the elevation that is referred to in the text, geology and downslope extent/depth of modelled debris flow.
- It is difficult to represent the many uncertain variables in a debris flow/flood event scenario (water flow, debris volume, type, speed debris enters the water flow, percentage of debris etc). Geosolve's conclusions regarding the potential for debris flood (not debris flow) are consistent with empirical studies, including a separate source shown in Figure 4.
- RAMMS is a useful visualisation tool for potential flood behaviour but does not quantify hazard without substantial analysis supported by historical studies. Geosolve infers a credible hazard from the modelling, particularly for Stoney Creek and South Creeks 1 and 2.
- We concur with the assessed risk by Geosolve. However, the debris flood model is considered preliminary as stormwater and conveyance structures will be developed during detailed design, requiring additional assessment. We agree that debris flood is possible and mitigation will be necessary for the proposed development. It is good engineering practice to mitigate the effects of natural hazards to as low as reasonably practicable, especially due to the inherently uncertain nature of debris-related hazards. Detailed design will occur at the Resource Consent stage and may take the form of training or containment structures (engineered earth and/or concrete) along the margins of susceptible creeks, and possibly on the upslope boundary of the proposed development.

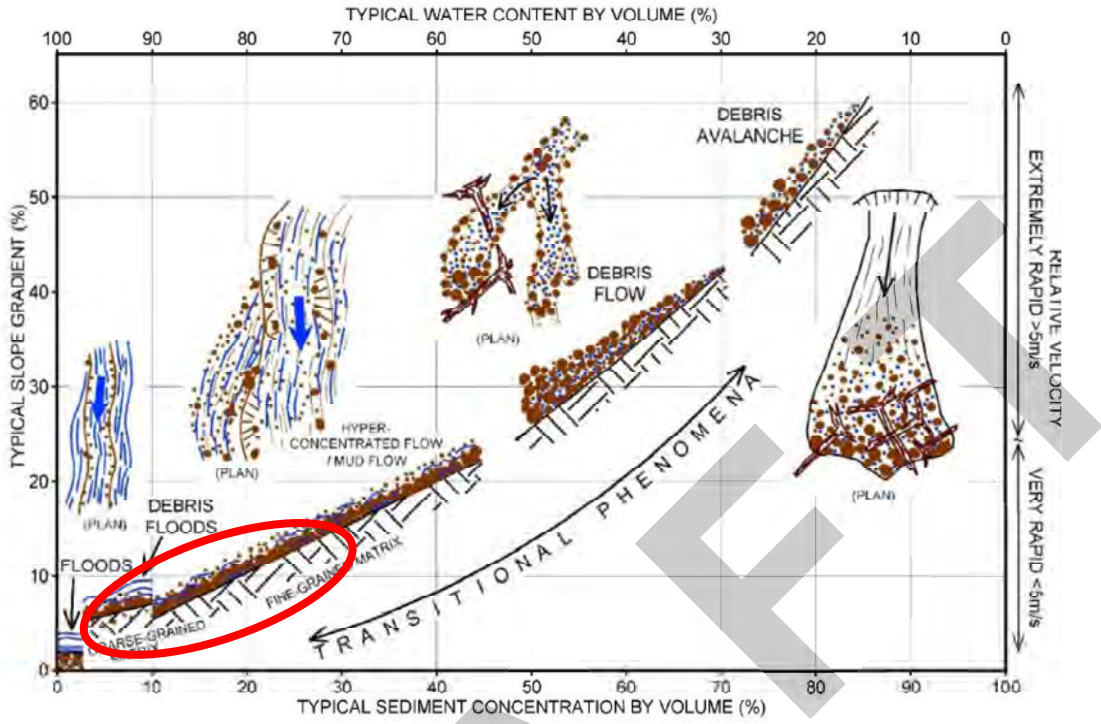

Figure 4: Debris flow/flood diagram indicating effect of slope on flow type. Red zone is likely to be consistent with Coneburn development conditions. After BGC (2020)[3].

Fluvial Flooding and Stormwater

- The Lowe (2015) stormwater assessment is the primary catchment study for the proposed development. It identifies the four existing water courses that enter the site. It is informed by appended geological characterisation of the area.
- Building lots are proposed outside of the natural water courses, with zones either side specified as 'Open Space – no buildings or structures' in Geosolve's Figure 1a.
- The stormwater assessment considers a 200-year return period event, which is more conservative than QLDC's requirement for a 100-year return period event. Flood estimation uses the "Flood Frequency In New Zealand" method by McKerchar and Pearson. In the assessed scenario overbank inundation from stream avulsion is expected in the unmitigated condition.
- The catchments that flow through the site (Catchment B – Middle Creeks, and Catchment C – South Creek 1) are estimated to have a Q_{200} of less than 10 m^3/s (cumecs), which corresponds to channel dimensions of 2-3 m wide at the base and 0.5-1 m deep, depending on channel slope. Doubling of flow due to avulsion from one channel to another would require a doubling of channel depth.
- Lowe (2015) notes that flood protection earthworks already exist upstream of the proposed development (e.g., Stoney Creek) and these should be re-assessed and upgraded as appropriate in the future.

[3] BGC Engineering Inc., 10 April 2020: Squamish-Lillooet Regional District – Geohazard Risk Prioritization - FINAL. Project No.: 1358007. Report prepared for Squamish-Lillooet Regional District.

Reviewer comment:

- The stormwater modelling appears to correctly assess the catchment size and relevant properties appropriately; however, we have not recalculated the expected flow values.
- It is our opinion that the flooding risks associated with the four creeks that pass through the site require detailed assessment with the potential inclusion of upstream and on-site mitigation to reduce the impacts of surface flooding. It is recommended that any stormwater management options be reviewed by an appropriate stormwater design engineer.

Rockfall

- The primary evidence for judging rockfall hazard is the observation of previous fallen boulders. Geosolve noted large boulders near the bottom of the steep Remarkables Range slopes (the rockfall source), but these were not observed further downslope in the approximately 1 km wide zone of flatter topography uphill of the proposed development.
- Three dimensional rockfall simulation modelling was undertaken using RAMMS software. The simulation modelled an elongated-to-tabular boulder of 5.1 m^3 to represent the 95th percentile boulder. This was selected by noting the size of the largest boulder at the toe of the steep slope below.
- The RAMMS modelling indicated fallen boulders would come to rest at the base of the steep Remarkables Range slopes and would not travel on the flatter, alluvial surface uphill of the proposed development.

Reviewer comment:

- Geosolve has correctly identified the likely rockfall source in the slopes above the proposed development and the selected boulder size of 5.1 m^3 is justified.
- The primary evidence for judging rockfall hazard is the observation of previously fallen boulders. The absence of large boulders having rolled onto the flatter alluvial surface uphill of the proposed development is a strong indicator that the rockfall hazard is negligible.
- Rockfall simulation is a supplement to the primary evidence. We have not undertaken a similar exercise, nor assessed the parameters used, however, the RAMMS simulation appear to be an appropriate proxy for a realistic rockfall scenario.
- The assessed negligible hazard is judged to be appropriate.

Slope Stability (landslide)

- Geosolve has acknowledged the presence of landslides of several hundred metres in maximum length in the headwaters of Stoney Creek, as shown on QLDC hazard maps. They note the absence of features during field inspection that would indicate recent or highly active movement, such as vegetation disruption or recently exposed subsurface materials (e.g., opening of tension cracks). Additionally, the landslide is more than 1 km upstream of the proposed development.

Reviewer comment:

- The identified landslide appears to be a relict feature or is moving very slowly - such features are common in Otago schist. The assessed benign hazard is judged to be appropriate.

Liquefaction

- Geosolve has identified granular material underlying areas of the site and consider this can be assumed to underlie the proposed development. Groundwater is considered to be 20 m below ground level across the site.

Reviewer comment:

- Liquefaction of foundation soil is not feasible above the water table and therefore beyond the likely influence zone of large, heavy buildings (i.e., upper 20 m of ground). This should be confirmed at detailed design stage by intrusive geotechnical investigations, which will be required to support structure design and to support Building Consent.

Engineering Considerations

- Geosolve recommend that the stability of natural and cut slopes be subjected to slope stability analysis at the detailed design stage and they list some remedial options.
- The proposed reservoir will be designed to the performance criteria of the building code as part of Building Consent application.
- Overland stormwater conveyance will be engineered and the hazard mitigated by the appropriate application of design criteria at the time of Resource Consent.

Reviewer comment:

- This is an appropriate approach for slope stability given the dominant presence of granular materials and water table at a depth unlikely to influence slope stability.
- Structures and stormwater conveyance and mitigation can be adequately managed at detailed design. The present risk is acceptably low and engineering controls are unlikely to be prohibitively expensive.

Conclusion

We conclude that the Geosolve (2021) report adequately addresses the geohazards for the proposed Coneburn development to a level appropriate for District Plan land use change. The assessed risk uses the appropriate methods and are Moderate risk or lower (using Dunedin City Council's 2GP) or Tolerable or lower (using Otago Regional Council's RPS APP6 criteria). Good engineering practice requires the effects of natural hazards to be managed to as low as reasonably practicable; therefore, it is expected that mitigation works will be required to manage flood and debris flood hazard. Mitigation can be more accurately assessed and specified at the detailed design stage as part of the Resource Consent application for the final site layout. The risk assessment should be also be updated to reflect the 'as designed' development.

Yours sincerely
GOLDER ASSOCIATES (NZ) LIMITED

Matt Howard
Principal Engineering Geologist

Tim McMorran
***Principal** Engineering Geologist*
CMENGNZ (PENGGEOL) 176867

MEH/TJM/jsb

Attachments: Report Limitations
Geosolve channel exposure photos for debris flow assessment (19 August 2021)

https://golderassociates.sharepoint.com/sites/151445/project files/6 deliverables/001 lr-geohazard review/reva_draft/21490001_7407-001-lr-reva-coneburn_draft.docx

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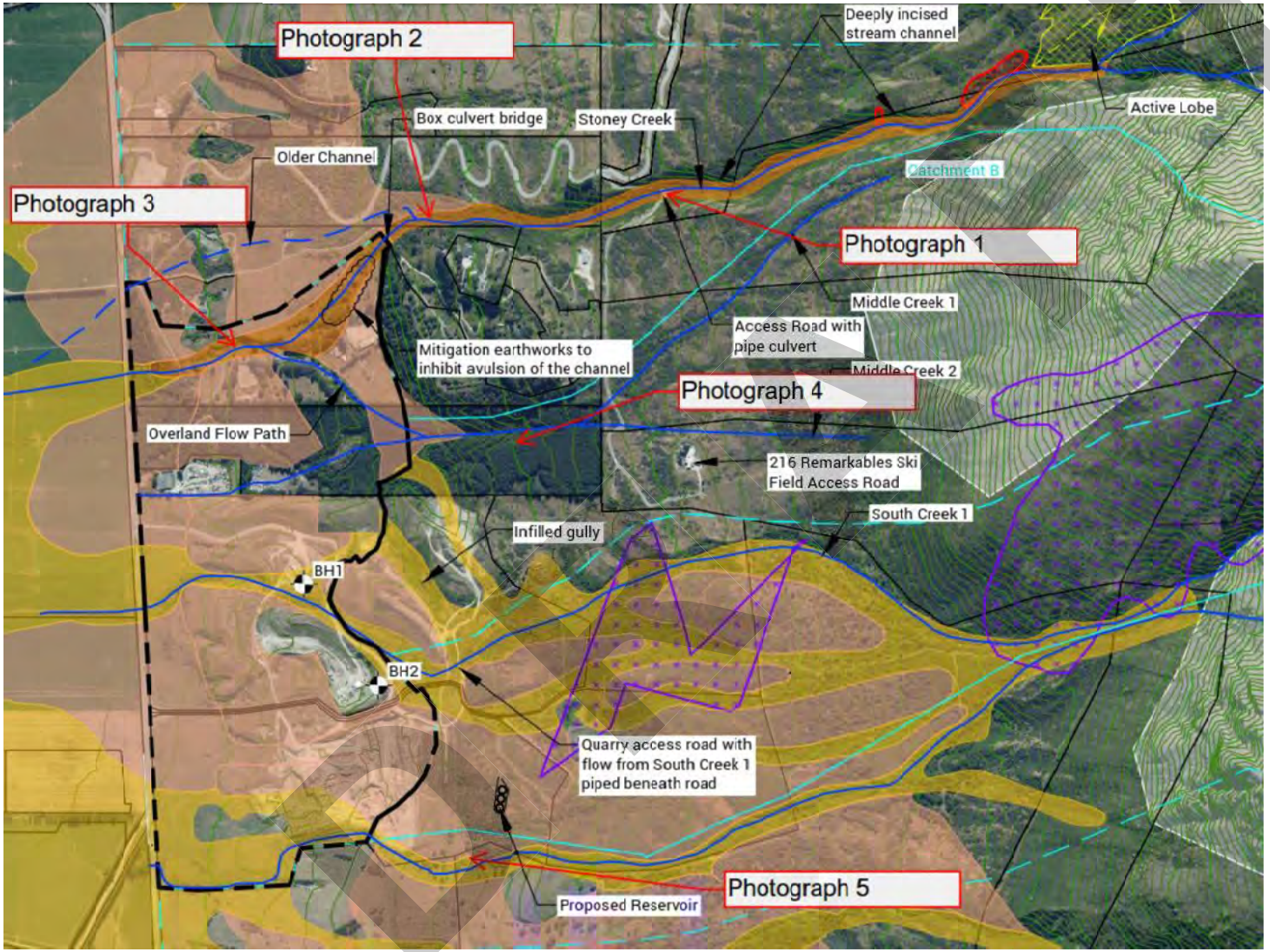
Channel Exposure Photograph Request:

Figure 1: Location of Photograph for Stoney Creek channel exposures



Stoney Creek:

Photograph 1: Road cut for access to 216 Remarkables Ski Field Access Road. RL ~520 above the site. Showing coarser material with cobbles & boulders inferred from debris flow/flood deposition in the higher elevation transfer zone.

Photograph 2: Incised Stoney Creek channel. RL ~440 above the site. Showing finer material with cobbles from material debris flow deposition in the lower elevation transfer zone

Photograph 3: Stoney Creek channel. RL ~340 within the site. Showing limited coarse material from debris flood deposition in the depositional zone.

Combined Middle Creek Channel:

Photograph 4: Middle Creek channel. RL ~430 above the site. Showing limited coarse material from debris flood deposition in the depositional zone.

South Creek 2:

Photograph 5: South Creek 2 channel. RL ~400 above the site. Showing limited coarse material from debris flood deposition in the depositional zone.

South Creek 1= No photographs- Generally vegetated similar in nature to South Creek 2.

REPORT

SCOPE RESOURCES LTD.

**The Oasis Development,
Stoney Creek, Frankton**

**Natural Hazard
Assessment Report**

Report prepared for:

SCOPE RESOURCES LTD.

Report prepared by:

TONKIN & TAYLOR LTD

Distribution:

SCOPE RESOURCES LTD.	3 copies
TONKIN & TAYLOR LTD (FILE)	1 copy

May 2008

T&T Ref: 880077.100

Table of Contents

1 Introduction

1.1 General

This report presents the results of a geotechnical and hydrological assessment that has been undertaken by Tonkin & Taylor Ltd (T&T) for the proposed "Oasis" residential development within the Stoney Creek Quarry, Frankton.

This investigation and report was completed for Scope Resources Ltd. (SRL) at the request of Chris Ferguson of Clark Fortune McDonald (CFD), Queenstown. T&T's proposal dated 21 December 2007 outlines the scope of work and conditions of engagement for this report. Permission to proceed with the work described in this report was provided by Mr Grant Hensman, of SRL, on 2 January 2008.

The site visits and investigations for this report were undertaken by T&T staff in November 2007, January 2008 and February 2008.

This report should be read as an addendum to our assessment of the site hazards and geotechnical constraints that is presented in the previously issued T&T report "Proposed Stoney Creek Development Natural Hazards Assessment" dated December 2007 (T&T Ref No 880077.000).

1.2 Previous Geotechnical Reporting

1.2.1 HCL Assessment

Hadley Consultants Limited (HCL) prepared a report on the geotechnical feasibility of the proposed site layout and earthworks in July 2007. This work included a site assessment and a review of the proposed plans.

The HCL report recommended a maximum unretained batter slope for both cut and engineered fill slopes of 1.5H:1V and recognised that additional retaining measures would be required to form the proposed building platforms. Specific engineering advice was recommended where areas of fill and sloping batters fell within the proposed building platforms. The HCL report also recommended appropriate storm water control measures be constructed to protect the batters from erosion and the cut batters be revegetated after formation.

We understand the HCL report was issued to Otago Regional Council (ORC) during August 2007 as part of the application for resource consent . This application was subsequently opposed by ORC due to the potential impacts of natural hazards.

1.2.2 T&T Natural Hazard Assessment

T&T issued a natural hazard assessment report for the Oasis development during December 2007 (T&T Ref No 880077.000). This report identified that small scale landslide/slope instability, flood and debris flow hazards had the potential to affect the proposed development in some way. This report also indicated appropriate remedial/mitigation measures could be designed to mitigate the potential consequences of the natural hazards and manage the level of risk posed to the proposed development to an acceptable level.

ORC reviewed the T&T natural hazard assessment report during early 2008 and advised SRL that they will continue to oppose the resource consent application until additional quantitative analysis of the natural hazards, including, landslides, rock falls, flooding, debris flows, ground shaking and liquefaction, has been completed.

1.3 Scope of Work

The purpose of this report is to confirm the geotechnical feasibility of the proposed Oasis development and where appropriate provide concept designs for works to mitigate and manage the risks that are associated with the natural hazards that were identified in the December 2007 T&T report.

The following scope of work has been completed for the purposes of this report:

- Engineering geological mapping and detailed interpretation of the glacial and post glacial surfical geology.
- An assessment of the medium to large scale landslide hazard that is associated with the site.
- Analysis of the small scale landslide and slope instability hazard within the immediate area of the proposed development.
- Analysis of the site rockfall hazard.
- An assessment of the site liquefaction and ground shaking hazards.
- Analysis of the site debris flow hazard.
- Analysis of the site flooding hazard, and,
- Issue of this report which summarises the results of the above tasks and provides preliminary recommendations and concept designs, as appropriate, for works to mitigate and manage the risks that are associated with the natural hazards.

1.4 Site Description and Development

The site is located on Kingston Road (SH6) approximately 4 kilometres south of Frankton, Otago. The local topography comprises gently to moderately steeply sloping ground located at the base of the Remarkables mountain range. Figure 1, Appendix A, shows the location of the development site.

The site has a northerly and westerly aspect, with natural slopes varying from about 5 to 20^{o} towards the west over the 1.5km distance from the foot of the steep face of the Remarkables down to SH6 .

The site is currently operating as a quarry, extracting gravel from the slopes above SH6 that are traversed by Stoney Creek (Figure 2).

The surrounding area is predominantly rural, with rural subdivisions present to the north and east of the site. Vegetative cover currently comprises grass and tussocks, with stands of exotic trees and areas of regenerating native scrub and bush.

Stoney Creek flows through the development site. The Stoney Creek catchment is approximately 3.5km long and incorporates part of the steep Remarkables mountain range. The catchment area is approximately 147 ha.

The gradient in the upper reaches of the Stoney Creek channel is approximately 50%, reducing to about 15% across the glacial deposits in the 1.5km upslope of the site. The creek channel is deeply incised in bedrock and moderately incised on the glacial deposits, having abandoned multiple channels as incision has increased.

Immediately upslope and across the development site the gradient of the Stoney Creek bed flattens and the creek channel is not well incised, such that flood flows would have diverged in to several channels from a point upslope of the site (see Figure 5). Modification of the site during quarrying, and to provide access to upslope properties, has removed the flood channels across the site. As a result of this the Stoney Creek flood flows now need to be routed into a single main channel. Further discussion on the geomorphic features of Stoney Creek are provided in Section 2.1 below.

Clark Fortune McDonald have provided us with the following development plans which provide details of the proposed development;

- Original Ground Levels (1997) - Drawing 8350_27, dated March 2006
- Original Ground Levels (2005) - Drawing 8350_24, dated March 2006
- Proposed Access ways – Drawing 8350_48, dated March 2006
- The Oasis Scope Resources Ltd. - Sheet 2 – Concept Plan, dated 17 May 2006

The above drawings indicate the proposed Oasis development is to comprise 20 residential dwellings and associated parking building structures, access ways and landscaping features. The residential dwellings will comprise 8 stand-alone villas and 12 semi-detached units, known as the Snake building (see Figure 3).

The plans and cross sections indicate the stand alone villas will, for the most part, be constructed on relatively flat to moderately sloping land, while the units will be constructed against a steep batter face generally comprised of cut ground which slopes at 1.5H: 1V. Fill will be required to complete this batter slope in some locations where gravel has been excavated during quarry operations beyond the design profile.

The concept plan provides details of the proposed vegetation layout and shows an existing and proposed water course passing through the site.

2 Geology and Geomorphology

2.1 Mapping and Air Photo Observations

The published geological map of Wakatipu[1] indicates that the area is underlain by schist bedrock. Quaternary sediments comprising 71,000 to 59,000 year old (Q4) and 24,000 to 14,000,year old (Q2) glacial till material, as well as younger post glacial (PG) lake and flood plain material, comprising gravel sand and mud, are shown to overlie the bedrock.

To assist in the assessment of natural hazards we have produced a 1:10,000 scale interpretation of the glacial geology and geomorphology of the area surrounding the site (Figure 4). Key features of Figure 4 that impact on hazard assessment include:

- The broad slopes from the toe of the Remarkables mountain range to SH6 are formed predominantly by the glacial till of lateral moraines (Q4t), with later (post glacial) erosion modification by surface water runoff and gradual incision of creek channels. The broad slopes are not alluvial fan surfaces, but areas of erosion and incision by the side streams that rise on the flanks of the Remarkables.
- Glacial outwash alluvium (Q2a) has been deposited as erosion modified terraces between the Q4t and valley floor lake deposits (PGl). There are several small remnant hills of Q4t till shown within the outwash alluvium. The outwash alluvium is the deposit being quarried for aggregate at Stoney Creek.
- Alluvial fan deposits are relatively limited in extent, including Q4f incised fans at the foot of the Remarkables, Q2f fans deposited onto the Q2a alluvial terraces, and more wide spread PGf low angle (fine grained) fan deposits onto the valley floor. Several of the Q2f fans are interpreted to still be active (Q2f + PGf).
- Schist foliation dip slope landslides are mapped on the south facing slopes of Stoney Creek and the major creek to the north. The observed scarps are typical of 'creeping' schist landslides, with no evidence for a history of rapid movement of the slide mass.
- The subdued nature of the schist spurs north of Stoney Creek suggests gravitational relaxation (Sakung) during glaciation and ice retreat. The Q4t deposits are providing toe buttress support to the relaxed rock mass and there appears to be no significant postglacial development of active relaxation features such as uphill facing scarps.
- A rockfall field is identified to the south of Stoney Creek, with significant numbers of large schist blocks lying on the lower schist slope and extending out onto the Q4t till surface. Individual large blocks are highlighted on the Q4t surface, but may be 'insitu' till material rather than rocks fallen from the schist slopes above.
- The bed of Stoney Creek and the catchment immediately south are very close where they exit from the face of the Remarkables. Site observations indicate that Stoney Creek could overflow into the southerly catchment at this point, but the reverse cannot occur as the southerly creek is incised at least 5 metres below the level of Stoney Creek. Moving downstream, next to the bedrock landslide both creeks are incised about 8 metres below the general ground level.

[1] Turnbull, I.M. (compiler) 2000. Geology of the Wakatipu area. Institute of Geological and Nuclear Sciences 1:250 000 geological map 18. 1 Sheet + 72 p. Lower Hutt, New Zealand. Institute of Geological and Nuclear Sciences Limited.

Further geomorphic evidence relevant to flooding and debris flow hazards is provided on Figure 5, an annotated 1:5000 scale portion of the engineering geology map. The major observations on this map include:

- Stoney Creek and the southerly creek are both deeply incised (about 8 to 10 metrtes) for about 800 metres downstream from the point where Stoney Creek can avulse, or 'jump' into the southerly creek bed. Flow from these catchments has eroded channels in the Q4t till between the current creek beds. These channels are now abandoned by the main creeks and would only carry local storm runoff.
- The bed of Stoney Creek for about 600 metres across the Q4t slope is moderately incised (about 3 to 5 metres), with flood flows potentially spreading out to about 20 to 50 metres wide in places.
- Flows from Stoney Creek have deposited alluvial fans (Q2f and Q2f + PGf) immediately upslope of The Oasis site. These fans indicate the maximum extent of debris deposited from Stoney Creek in the past approximately 25,000 years. The main creek bed is incised into the upper part of the fan and appears to no longer flow to the northern Q2f. The small stream channel to the north is also headwards incised into the Q2f deposit, suggesting no significant debris depositing activity on this fan surface in post glacial time.
- The main Stoney Creek channel is poorly defined as it crosses the lower part of the Q2f + PGf. It is likely that debris has been deposited on this fan surface in the recent past. Large floods would have split into the 3 defined channels plus overland flow onto the lower PGf fan surface to the south of the site. The additional channels and overland flow routes have now been excavated out by the southern section of the gravel quarry.

2.2 Quarry and Creek Exposures

The existing quarry walls, cuts for access tracks and eroded creek banks provided exposure of Quaternary materials. Key observations in these areas include:

- The outwash alluvium that is mapped as Q2a predominantly comprises sandy and silty fine to coarse GRAVEL and COBBLES in metre thick indistinct beds. Bedding is sub-horizontal and the deposits are clast supported.
- Lacustrine sandy fine to coarse SILT beds up to 1 metre thick were observed on the edge of the Q2a terrace risers, overlying outwash gravel. In one location possible lake beach gravel overlies the silt deposits.
- Lenses comprising interbeds of SAND, SILT and fine GRAVEL were observed in the quarry walls within the Q2a gravel. Dimensions of lenses from the observed exposures are approximately 2 to 4 metres thick by 5 to 30 metres long and wide. Contacts were both gradational (conventional alluvium), and steep and contorted (glacial ice contact and deposition stage slumping).
- Exposures of till materials from the Q4t lateral moraines vary from silty GRAVEL to gravelly SILT with sand and boulders. The deposits are typically massive and matrix supported on the scale of exposure.

- The surface of the Q2a deposit in the area of the quarry is slightly weathered in the upper 1 metre and carries a very thin silt top soil.
- The Q4f deposit exposed across Stoney Creek at the foot of the Remarkables shows dipping beds of sandy GRAVEL (alluvium and debris flood) and thicker beds of massive sandy and silty GRAVEL (debris flows). There were no exposures observed of the lower level Q2f and PGf fan deposits.
- Fill materials observed in the quarry area comprise a mixture of scalpings form aggregate processing and reject gravels from the borrow areas. The overall composition is gravelly SAND and silty and sandy GRAVEL. The dumped angle of repose is about 35^{o}, and faces cut in this material are standing at an angle between 45 and 65^{o} to a height of between 4 and 5 metres.

2.3 Borehole Investigations

Two boreholes were drilled in the quarry area (see Figure 3) to assess the variation in materials and the depth to groundwater as part of the assessment of liquefaction risk for the proposed development.

Boreholes BH01 and BH02 were drilled to 10.5 and 12m respectively using an air driven down the hole hammer and steel casing. Disturbed samples were taken at 1-metre intervals and the drillers noted any specific change in drilling conditions as the holes advanced. Standpipe piezometers were installed in both boreholes.

The boreholes both encountered silty and sandy coarse GRAVEL over the entire depth of drilling. A boulder was drilled through at approximately 6.1 to 6.4m below ground level in BH02. No groundwater was encountered in either of the boreholes. The piezometers were dipped again on the 6th of March 2008 and again they were both found to be dry. Logs of boreholes BH01 and BH02 are attached in Appendix B.

3 Assessment of Hazards

3.1 Landslides

Engineering geological mapping and interpretation based on aerial photos and site walkover show no visible signs of current or historic slope instability (including landslide movements) occurring on the slopes between Kingston Road (SH6) and the toe of the Remarkables, and for at least 1km to the north and south of the site.

A landslide complex is mapped in schist bedrock on the lower slopes of the Remarkables (Figure 3), with potential to spill debris into Stoney Creek and contribute to debris flow hazard, as discussed in Section 3.7.

The potential for failure of gravitationally disturbed schist in the bedrock spurs east of the site does not pose a conceivable hazard to the proposed development.

3.2 Rock Falls

Rock fall from the face of the Remarkables does not pose a conceivable hazard to the proposed development. A rockfall field is identified below one area of bluffs to the southeast of the site, where maximum run out distance on to the Q4t surfaces is about 300 metres.

Analysis of potential rock fall behaviour on the Remarkables has been undertaken using the computer program ROCKFALL. The results are summarised in Figure B1 (Appendix B) and are in accordance with the observed rock fall activity. In summary individual rocks are capable of travelling 500 metres and more on the steep face of the Remarkables, and may leap some 10's of metres in the air, but they are not capable of travelling any significant distance out onto the gently sloping Q4t surface.

Rock fall or roll of gravel to boulder size clasts from cut and fill slopes of alluvium within the immediate development area is not feasible on the final slopes of less than 1.5(H):1.0(V). Where steeper, or subvertical cuts are proposed adjacent to structures they will be retained by engineered walls as part of the structure design.

3.3 Cut and Fill Slope Stability

3.3.1 General

The proposed Oasis development includes a final landform comprising modified quarry cuts, fills and natural slopes (Figure 3). Lots 1 to 8 are located on flat platforms adjacent to 2(H):1(V) and flatter slopes that are <4 metres high. Lots 9 to 20 form the 'Snake', a building proposed to be constructed on and parallel to a 1.5:1.0 slope ranging from 5 to 15 metres high. Landscaped fill slopes up to about 15 metres high are proposed at 2.0(H):1.0(V), with some cut slopes remaining at >1.0(H):1.0(V).

Slope stability analysis has been undertaken for typical slopes around the development using the limit equilibrium computer program SlopeW. The cross sections used for analysis are sections C to G, as shown on Figure 3. Cross section profiles are discussed in the Sections below and illustrated by typical SlopeW outputs presented in Appendix B.

3.3.2 Shear Strength Parameters

The model shear strength parameters for use in this study have been established from consideration of non-linear shear strength envelopes for the site materials.

In preliminary slope stability assessments and designs for structures such as retaining walls, granular materials like sand and gravel are usually considered to have a linear friction only strength under long term drained conditions and modest overburden depths (low confining pressures). Utilising this type of strength parameter is considered overly conservative for the site materials, which stand in vertical cuts from about 2 to 4 metres high, and up to 12 metres high at >60^{o} in the cut quarry walls.

The basis for non-linear shear strength of the on-site alluvial gravels is the 'interlocking' action of larger gravel and cobble clasts in a dense well graded material. At low confining pressures the clasts have to ride up and over each other, i.e. the soil has to dilate or expand in order to move in shear. The angle of dilation, which adds to the basic grain to grain friction to provide the shear strength, decreases as confining pressure increases. However as confining pressure increases shear strength becomes a combination of friction between grains and cohesion of the mass under confinement. This changing relationship creates the non-linear, or curved shear strength envelope.

In the case of on-site moist silt and silty sand materials, the ability to stand in vertical cuts is partly related to non-linear strength, but primarily to unsaturated void spaces between the grains, which create capillary or suction forces. These negative pore pressures can be accounted for in the material shear strength by including a cohesion term along with the frictional strength.

Shear strength parameters were derived from back analysis of the observed quarry slopes assuming an existing Factor of Safety (FoS). A bi-linear shear strength envelope is derived by considering friction only shear strength for shallow full slope failures and cohesion only shear strength for deeper seated full slope failures. Given the limited range of slope heights and simple drained slope models, a single shear strength parameter was selected approximating the tangential line at about 5 to 10 metres of overburden pressure. For the gravel materials the selected shear strength falls within the range of strengths for compacted rock fills with non linear shear strength behaviour, as described by Charles & Soares (1984) [2].

During the site survey a silt and sand lens was noted in the vicinity of proposed residential lots 15 and 16 and this was modelled in Section C only. Fill was modelled in Section D as the plans show that fill will be required to form the batter on which proposed residential lots 17 to1 9 will be constructed on. The sub-surface profile of Sections E and F consists of gravel material for the full height. Fill was modelled for the full height of Section G. The adopted parameters for the modelled sub-surface materials are provided in Table 3.1 below.

[2] Charles & Soares (1984), Geotechnique 34, No.1, 61-70)

Table 3.1: Adopted Analytical Parameters

Material	Bulk Density (γ, kN/m^3)	Effective Angle of Shearing Resistance (ϕ',degrees)	Effective Cohesion (c', kPa)
Gravel (in-situ outwash)	18	38	10
Sand and silt (in-situ lens modelled in Section C)	18	32	5
Fill (scalpings and reject gravel, sand and silt)	18	32	5

3.3.3 Stability Criteria

Each cross section was analysed for static conditions and for two seismic cases; the Serviceability Limit State (SLS), which assumes an earthquake with 1:25 year return period Predicted Ground Acceleration (PGA), and; the Ultimate Limit State (ULS), which assumes an earthquake with 1:500 year return period PGA. In all cases the sub-surface materials were considered drained (unsaturated). Table 3.2 summarises the load cases each cross section was analysed for.

Table 3.2: Load cases for slope stability analyses

Load case	Description	Seismic Coefficient	Groundwater	Target Factor of Safety (FoS)
LC1	Static	-	-	1.5
LC2	Seismic – SLS	0.11	-	1.2
LC3	Seismic - ULS	0.43	-	Displacement less than 100mm

An additional case was run for Section C where the sand/silt layer is temporarily saturated and there is a decrease in effective strength. If this occurs it will be a transient situation because the perched water will drain rapidly from the material, therefore a FoS >1 was adopted as acceptable.

3.3.4 Stability Analysis Results and Discussion

The results of slope stability analysis are summarised in Table 3.3 below. Examples of SlopeW output for each of the cross sections are presented in Appendix B.

Table 3.3: Load Cases for Slope Stability Analyses

Section	Model	Static FoS results	Seismic FoS results
C	Gravel with upper sand/silt lens. Behind Snake building. 1.5(H):1(V)	1.85, dry 1.08, wet sand	1.56, SLS 1.03, ULS
D	Gravel with upper fill layer. Behind Snake building. 1.5(H):1(V)	1.67, fill only 1.77, whole slope	1.40, SLS 0.92, ULS (10mm displacement)
E	Maximum height gravel slope. Behind Snake building. 1.5(H):1(V)	1.56	1.36, SLS 0.94, ULS (10mm displacement)
F	High Gravel cut below accessway 1. Cut to fill profile (see Figure 6). 1:1 and 1.5(H):1(V)	1.54	1.31, SLS 0.88, ULS (30mm displacement)
G	High fill slope over quarry cut slope. 2(H):1(V)	1.77	1.45, SLS 0.90, ULS (10mm displacement)

The proposed 1.5(H):1(V) cut slopes in gravel, sand/silt and fill all have design FoS greater than the acceptance criteria outlined in Table 3.2. General fill slopes proposed at 2.0(H):1.0(V), as represented by section G also have design FoS greater than the acceptance criteria.

The high and steep gravel cut, as modelled on section F is recommended to be modified to a cut to fill slope with 1.0:1.0 upper cut and 1.5(H):1.0(V) lower fill batter (Figure 6). In this configuration the slope design FoS is greater than the acceptance criteria.

All the analysed sections have acceptable design earthquake performance.

In modelling fill beneath the building we have used fill thickness indicated on the cross sections supplied to us. This corresponds to a maximum fill thickness of 6.5 metres in Section D. Additional thicknesses of fill beneath the proposed structures will require further analysis at building design stage, as it may decrease the factor of safety below

acceptable levels. We recommend that only select sandy fine to coarse GRAVEL be used as structural fill below the building footprint.

Areas of minor surface erosion were noted on bare ground, generally limited to steep unfinished cut and fill slopes and areas adjacent to water courses which had little or no vegetative cover. The potential for erosion of the site materials is assessed to have no material affect on stability of the proposed finished slopes.

The level of erosion as observed can be controlled by the construction of engineered storm water drains and by the planting of appropriate vegetative cover. The proposed plans indicate the area will be extensively landscaped and re-vegetated.

3.4 Ground Shaking

Ground shaking hazards associated with the stability of the existing quarry slopes and proposed batter slopes are addressed as part of the cut and fill slope stability assessment in Section 3.3 above.

For the design of structures in accordance with the recommendations of NZS 1170.5:2004, Class C ground conditions (shallow soil site) should be assumed to exist.

3.5 Liquefaction

Liquefaction is a potential hazard under strong earthquake shaking in areas of loose, sandy soils and a shallow groundwater table. The bases for assessing liquefaction potential at this site include:

- Susceptibility based on visual grading of on-site materials.
- Observed distribution and expected occurrence of soil units based on the geological model for the site.
- Depth to groundwater, and,
- Depth of the non-liquefiable surface layer over any potentially liquefied layer.

The geology of the site has been interpreted as outwash alluvium, associated with the lateral margins of the retreating Wakatipu glacier. The predominantly gravel and cobble deposits contain lenses of silt and sand associated with features such as small temporary lakes, input from side streams off the Remarkables, and ponded overbank flood waters.

The geological model suggests that lenses of sand and silt can occur at any location within the outwash deposits, while observation of the exposed lenses show individual units of 0.5 to 2 metres thickness with grading and density susceptible to liquefaction. The groundwater table is expected to be about 15 to 20m or greater below ground surface across the site.

Based on the above interpretation of the geology it is considered very unlikely that wide spread liquefaction will occur on the site. Even if there are some restricted lenses of silt and sand beneath the quarry floor and below the groundwater table capable of liquefying

there would be no deformation observed at the ground surface due to the thickness of the overlying non-liquefiable layer.

Boreholes BH01 and BH02 were drilled to test the nature of the materials underlying the quarry floor, but more importantly the depth to groundwater, as all materials above the groundwater table are, by definition, non-liquefiable. The depth of the boreholes was based on the potential thickness of non-liquefiable layer required to prevent surface manifestation of deformation. In this case the empirical relationships developed by Ishihara in Kramer[3] indicate a surface non-liquefiable layer of about 5 to 8 metres is required for a liquefying layer about 2 to 4 metres thick under the site ULS seismic event (0.43g).

The boreholes did not encounter any sand or silt lenses, and show groundwater levels are >12 metres below the base of the quarry, confirming the lack of any wide spread sand/silt layer below the site, and a non-liquefiable surface layer exists on site which is at least 12 metres thick.

Based on the above information we conclude that liquefaction does not pose a significant hazard to the proposed development and does not require further engineering consideration.

3.6 Flooding

3.6.1 General

Stoney Creek provides a potential flooding hazard to the proposed development due to the steep, high energy flow path, and 'flash flood' nature of the catchment on the side of step mountain range. The hazard is exacerbated by the routing of the main channel of the creek through the development with 2 changes of direction while upslope of the main accessway and development areas.

The unmitigated flooding risk is considered relatively high relative to the risk of other natural hazards identified for the site due to the relatively significant consequences of large volumes of fast flowing (high energy) water impacting onto structures and dwellings if flows overtop the channel. Structures could be severely damaged and there is an element of risk to life. Therefore the nature and scale of the hazard requires careful consideration, along with robust mitigation measures that provide some level of redundancy in routing design flood flows.

3.6.2 Catchment Characteristics

The Stoney Creek Catchment is located on the western face of the Remarkables mountain range, just south of Kelvin Peninsula and beside Lake Wakatipu. The 147 ha catchment is narrow and steep, with an average slope greater than 10%, and is potentially prone to flash floods due to the relatively short time for water to travel from the catchment into Stoney Creek. The elevation of the catchment varies from RL380 mASL at the Oasis development site to RL1780 mASL at the ridgeline of the Remarkables; an elevation difference of 1400 m.

[3] Kramer., Steven, L. (1996) Geotechnical Earthquake Engineering, pp. 654, Prentice Hall, New Jersey

The catchment has been characterised by three main sections; the Upper, Middle and Lower, all of approximately equal area (i.e. 49 ha each).

- The Upper section is very steep with an average slope greater than 50%, and is Schist bedrock with a light covering of scrub.
- The Middle section is steep with an average slope between 20 and 50%, and has Upland Orthic Brown soil with moderate drainage and an average of 10% gravels. The Middle section is covered by a mixture of pasture, scrub and weed.
- The Lower section is of moderate slope (on average 8 to 15%), with shallow (20 to 45 cm deep) fine sandy loam Pigburn soils, and a cover of pasture, scrub and weed.

Rainfall data was obtained from HIRDS Version 2. This data may not accurately reflect the significant change in rainfall with elevation (the Upper section is likely to receive greater rainfall than the Lower section due to orographic effects), but is considered adequate for this assessment of the magnitude of flooding hazard and feasibility of mitigation measures.

Time of concentration for the catchment is estimated as 20 to 30 minutes. The 30 minute duration rainfall from HIRDS Version 2 was used to calculate the peak flow.

Table 3.4 contains the design flood peak flows for relevant Annual Return Interval (ARI) storms as determined from NIWA's HIRDS Version 2 data, and catchment properties as discussed previously.

Table 3.4: Design Flood Peak Flows

Annual Return Interval (ARI)	*years*	10	20	50	100	150	500
Design flood peak flow – SCS Unit Hydrograph method	m^3/sec	5	6	10	15	19	- (1)
Design flood peak flow - Rational Method	m^3/sec	5	6	8	11	13	- (1)

(1) Due to the Stoney Creek catchment properties, and lack of data, a 500 year ARI flood peak could not be determined

Based on industry practices and considering the unique development situation and potential impacts of flooding, we consider the 20 year ARI to be suitable for primary flood path design, and the 100 year ARI suitable for secondary flow path analysis. We have also considered the larger 150 year ARI flood for comparison with the design for the 100 year ARI flood.

Site photos were used to estimate the likely hydraulic roughness of the channel. Mannings n values of 0.045 and 0.060 were adopted for the channel base and flood bank areas respectively.

3.6.3 Hydraulic Analysis and Assessment

Using the creek bed cross-sections (see Figure 7) surveyed by CFD at locations requested by T&T, a preliminary HEC-RAS hydraulic model has been created for the reach of Stoney Creek that runs through the proposed Oasis development (see Appendix C).

Key findings from analysis of the HEC-RAS model (see Appendix C) include:

- The 15 cumecs maximum design flow will generally flow within the primary channel.
- The natural channel will flow less than the 20 year ARI design flow of 6 cumecs in the vicinity of surveyed section 6. This is the location where natural flood flows would have split into the main channel, 2 flood channels and overland flow to the PGf fan south of the site (See Figure 5), prior to modification by the quarry and accessways.
- A nominal 1-metre high bund or stop bank located along the true left bank of the channel (Figure 7 and section 6, Appendix C) is sufficient to confine the design peak flows within the channel.
- The proposed location of accessway 1 across the main channel (see Figure 3) is potentially problematic in terms of passing design peak flows by the primary channel and/or secondary flow paths. The proposed location and vertical alignment of the accessway make it difficult to pass all design flows under the road, and when there is overflow it is difficult to keep that flow from spilling into Lots 2 to 5 via accessway 2. This is unacceptable due to the significant consequences for property damage and potential risk to life under uncontrolled, high volume, high energy flows.
- Several alternatives have been explored for accessway 1. The proposed realignment as shown on Figure 7, and as the culvert sections in Appendix C is an acceptable solution. The proposed 2.1m 'helcor' culvert can accept a design flow of flow approximately 10.5 cumecs at the point of overtopping the accessway pavement at 268.4mRL. The realignment places the accessway further into the incised creek channel and therefore any overtopping flow can be accommodated within the channel, rather than spilling to accessway 2.
- Flow has been modelled for a completely blocked culvert on the proposed realignment of accessway 1. The maximum 100 year ARI design flow of 15 cumecs results in a flow depth of 400mm over the accessway pavement. The ability to take large flows without the culvert operating is considered to provide a suitable degree of redundancy for the 'flash flood' type characteristics of the Stoney Creek catchment.
- Modelling has indicated high channel velocities (>3 m/sec) in the creek bed, and given the typically narrow and incised flow channel profile, significant channel erosion is likely to occur under design peak flood flows. This erosion is expected to be highest in the steeper reaches of the channel. Provisions for erosion (such as channel armouring with suitably sized stone) will be required in critical sections of the channel such as constructed bunds to prevent excessive erosion damage.

The recommended mitigation measures to contain 100 year ARI peak flood flows within the main channel of Stoney Creek are shown on Figure 7.

The proposed bund between sections 7 and 4 provides 'training' of flood waters around the bend in the channel where historically the flood flows would have diverged into several flow paths. The realignment of accessway 1 will allow design flows to pass

through the culvert with minimal (<300mm) overtopping of the accessway. Detailed design is required at both locations to finalise levels, start and finish locations of the bund and the extent/type of erosion protection required.

Additional work to reform the original channel section is recommended (see Figure 7) between sections 3 and 4, and sections 11 to 13, where existing access tracks constrain the original channel profile.

Provided the above flood control measures are undertaken we consider that the flood hazard to the proposed development is mitigated to a standard acceptable under current interpretation of the New Zealand codes and regulations applicable to subdivision and building development.

3.7 Debris Flows

On first assessment the Stoney Creek catchment has the potential to generate debris flows that could affect the proposed Oasis development as follows:

- A source area where the existing bedrock landslide features can provide debris to potentially block the channel.
- A steep slope (>10%) with erodible gravel bed and banks.
- Landslide debris mobilised by flood water can be added to by channel erosion in the mid reaches.
- 'Broad fan' areas on the lower slopes provide locations for debris deposition.

Closer investigation of the geomorphology of the area indicates that the evidence for debris flow activity is relatively limited, especially in terms of depositional fans. The 'broad fan' areas are a combination of erosion modified glacial moraines, outwash alluvial surfaces and alluvial (debris) fans. Figures 4 and 5 show some key features related to the extent of past debris flows, including:

- Active lobes of the bedrock landslide (Figure 4) have the potential to deposit debris into the deeply incised Stoney Creek channel. The landslide toe slope does not show evidence for relatively large scale rapid movements (evacuated scarps would be expected). More likely are episodic (inferred return periods of 10 to 100 years) creep movements that deposit 10's to 100's of m^3 into the channel at any one time.
- The area between Stoney Creek and the major creek to the south is not a large alluvial fan. It is the eroded surface of a series of lateral moraines.
- The middle reaches of Stoney Creek are moderately incised into the moraine materials with 1 or 2 degradational terraces combining to give a flood plain ranging from about 15 to 50 metres wide. There is poor/indeterminate evidence for recent debris deposition onto the terraces and main channel.
- The Oasis development site is located on outwash alluvium and 2 relatively small fan deposits, now mostly removed by quarrying.
- The small fan deposits are interpreted as mostly deposited between 25,000 and 10,000 years ago (Q2). The incision of channels across the Q2a surface and the Q2f fans suggests that the northern fan has not been active for some time. The interpreted limits of more recent fan activity (approx 10,000 years to present) are indicated in red on Figure 5.

In assessing the potential for future debris flow activity to affect the proposed development we have commenced by assessing the potential flow path and deposition

zone, and consequences for the development assuming that a debris flow will occur. We have not attempted to assess qualitative or quantitative risk at this stage due the difficulty of deriving sensible and testable estimates for debris flow size and recurrence.
Two methods of estimating debris flow run out distance have been utilised, Hunter & Fell (2000)[4] and Fannin & Bowman (2007)[5]. Figure 5 indicates an assumed starting volume of 1400m^3 (conservatively greater than our assessment of landslide activity) and shows approximate 600m, 1200m and 1400m distances from the upstream debris start point.
The Hunter & Fell estimates are based on empirical relationships derived from the study of landslides in Hong Kong, Canada, and the UK. For debris under confined run out conditions on Stoney Creek the travel distance is estimated as 1400 to 2400m, effectively traversing the proposed development site and across SH6.
The Fannin & Bowman paper refers to an empirical based computer program on the University of British Columbia web site called 'UBC D flow'. It is based on studies of catchments in forest logging areas in BC, not dissimilar in profile, length and gravel materials to Stoney Creek. The program allows entry of information for different reaches of the stream, being length, width, slope angle and azimuth.
Stoney Creek has been divided into 6 reaches for assessment of alternative cases in UBC D flow. In the upper reach from 0 to 600m erosion occurs and the debris volume becomes greater. The middle reach from 600 to 1200m is a transition flow between erosion and deposition, which is sensitive to the width of the channel (degree of confinement). Deposition is indicated for lower reaches below 1200m. Alternative cases have been assessed as follows.

Table 3.5: Results of 'UBC D flow' assessments of debris flow travel distance

Case	Reach (m)	Width of channel (m)	Debris Travel Distance (m)
Moderately confined middle reach	600 to 1200 1200 to 1400	15 50	1400
Flow spread out on middle reach	600 to 1200 1200 to 1400	30 50	1200

The results, predicting maximum travel distance from about 1200 to 1400m (Figure 5) correlate closely with the observations and interpretation of past activity on the mapped Q2f + PGf fan (Figure 4 and 5).

The model debris flow, based on mapping interpretation of past activity and the predictions of 'UBC D flow', would be about 1000 to 2000m^3 of gravel, sand and silt, suspended in flood water, travelling about 1000m down Stoney Creek before starting to slow and the deposit onto the creek bed and fan areas. All coarse debris will have dropped out by the maximum travel distance.

[4] Hunter, G. & Fell, R, 2000. Estimation of Travel Distance For Landslides in Soil Slopes. In AGS Vol 37 No2 May 2002.
[5] Fannin, J. & Bowman, E, 2007. Debris Flows – Entrainment, Deposition and Travel Distance. Geotechnical News December 2007, pp 43 – 46.

For cases where debris extends to 1400m, and possibly beyond, there is a potential for direct impact on the proposed development. In these cases it will be necessary to keep the remaining debris and flood water within the defined channel so it does not spill out into the development.

The proposed flood mitigation measures described in Section 3.6 and shown on Figure 7 are considered sufficiently robust to cope with the model debris flow. The proposed bund running from about 1350m to 1450m debris distance (as defined on Figure 5), which results in a channel capable of flowing >19 cumecs of flood water, would also be capable of accepting the distal portion of the model debris flow, where debris would be about 0.5m deep. Channel capacity would be reduced by debris deposition and would require periodic excavation to maintain future flood capacity. The realigned accessway 1 and culvert (Figure 7) is designed to withstand overtopping of the road by flood waters. In the unlikely event that the 2.1m diameter culvert was completely blocked by debris there is sufficient freeboard to take design flood flows of at least 19 cumecs over accessway 1 without spilling into other areas of the proposed development.

In summary, our assessment is that there is the potential for a debris flow to occur. Although the likelihood/risk of a debris flow has not been calculated, the proposed flood mitigation measures (Figure 7) are considered suitably robust to control the path and deposition of a model debris flow which is of similar, or larger magnitude to probable past events. Therefore we consider the debris flow hazard to be mitigated to at least a similar standard to the flood hazard.

4 Conclusions and Recommendations

The proposed Oasis development, which incorporates the hazard mitigation measures recommended in this report, is considered technically feasible from a natural hazard and geotechnical perspective, provided it is properly designed and constructed in accordance with the appropriate New Zealand Codes and Standards.

Investigation and analysis has shown that several natural hazards pose a nil to negligible risk to the proposed development, including:

- Landslide movements on the steep bedrock slopes of the Remarkables, and on the natural slopes in glacial deposits in the immediate vicinity of the development.
- Rock falls, and,
- Liquefaction.

Analysis by limit equilibrium methods has indicated the stability of the proposed cut and fill slopes within the development area is acceptable for the proposed 1.5(H):1.0(V) and 2.0(H):1.0(V) slopes. The exception to this is the steep cut slope in the vicinity of section F (Figure 3), where a cut to fill slope is recommended (Figure 6) to provide adequate design stability. It is also recommended that a fill buttress be constructed at the toe of the 1.5(H):1.0(V) slope at section D (Figure 3), and this fill comprise select sandy Gravel from the quarry borrow area.

The flooding hazard from Stoney Creek has been assessed from the results of a HEC-RAS model developed for the channel which passes upstream of, and through the site. Flood mitigation measures as shown on Figure 7 are required to train the design flood peak flows down the main channel. These flood mitigation measures include:

- A channel training bund nominally 1m high (plus freeboard and erosion protection to be determined) in the area upstream of the site. This location is where natural flood flows would have spread out into channels that have been cut off by the quarry development.
- A realignment of accessway 1 to lower the vertical alignment into the existing main channel, allowing flows up to about 10.5 cumecs to pass through a 2.1m diameter culvert, with overflow passing over the accessway pavement and remaining in the main channel. Detail of the culvert and pavement levels and extent of erosion protection are to be determined during detailed design for building consent.
- The original channel section should be reformed where it is constrained by quarry access and ROW crossings at locations upstream (channel section 3 to 4) and downstream (Channel sections 11 to 13) of the site.

The hazard of channelized debris flow on Stoney Creek has been assessed qualitatively from geomorphic evidence, with potential deposition and travel distance analysed by the University of British Columbia program 'UBC D flow'. The modelled design debris flow, which is based on the probable size of past events that have built up the observed fan deposits, stops in the area immediately upstream of the site. The proposed flood mitigation measures will also work in training the distal portion of the design debris flow

deposits and associated flood waters, resulting in insignificant consequences and therefore acceptable risk to the proposed development.

The development design plans which have been provided to us do not include details of structural foundations or retaining walls. Detailed design of these components should be completed by a suitably qualified and experienced engineer.

- Design of all foundations which are to be constructed in the vicinity of a cut or fill slope will require specific consideration of the foundation and slope interaction.
- All retaining walls which are to be constructed as part of the proposed development should be designed by and constructed under the supervision of a suitably qualified and experienced engineer.
- For structural design purposes the magnitude of seismic acceleration should be estimated in accordance with the recommendations of NZS 1170.5:2004 assuming Class C ground conditions (Shallow soil site) exist beneath the proposed buildings.
- All fill required to support engineered structures, such as roads, residential buildings, and any other structures and services should be placed and compacted in accordance with NZS 4431:1989 and certified in accordance with QLDC standards.

5 Applicability

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

TONKIN & TAYLOR LTD

Environmental and Engineering Consultants

Report prepared by:

.....

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Engineering Geologist

Report reviewed by:

.....

Barry McDowell

Senior Engineering Geologist

Authorised for Tonkin & Taylor by:

.....

Anthony Fairclough

Senior Geotechnical Engineer

scww

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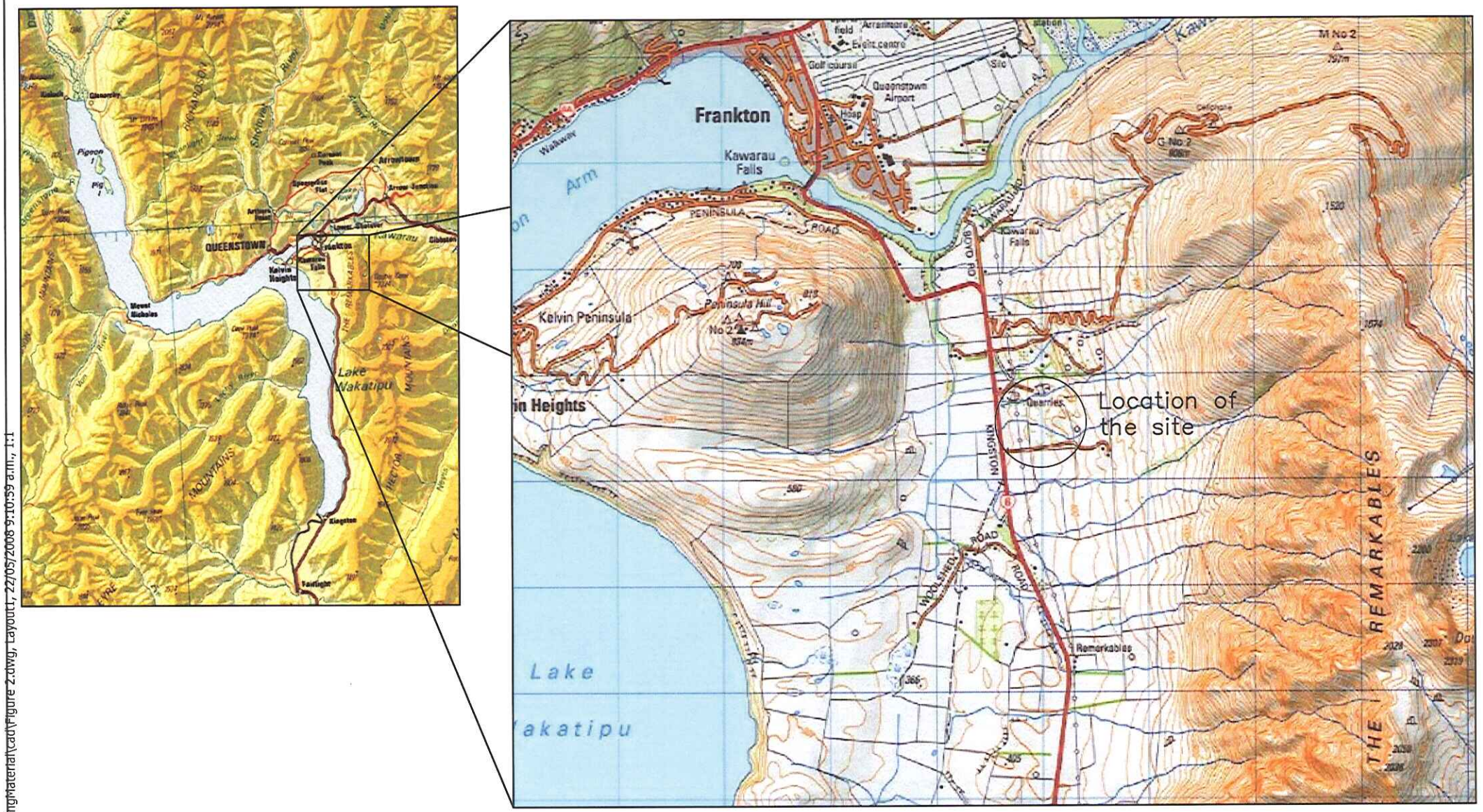
Appendix A: Figures

- **Figure 1 – Site Location**
- **Figure 2 – Stoney Creek Catchment**
- **Figure 3 –Site Plan and Development**
- **Figure 4 – Engineering Geology Map**
- **Figure 5 – Flood & Debris Flow Hazard**
- **Figure 6 - Steep Slope Design Section F**
- **Figure 7 – Stoney Creek Flood Mitigation Concepts**



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APPROVED		
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SCALES (AT A4 SIZE) NOT TO SCALE		
PROJECT No. 880077.001		

Tonkin & Taylor
Environmental & Engineering Consultants
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□ Auckland □ Hamilton
□ Nelson □ Wellington □ Whangarei

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THE OASIS DEVELOPMENT
STONEY CREEK, FRANKTON
Site location plan

FIG. No. Figure 1

REV. 0

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SCALE 1: 10,000
0 100 200 300 400 500 (m)

Image, contours, streams, roads, boundaries from Terraview 2008

Tonkin & Taylor
Environmental & Engineering Consultants
☐Auckland ☐Dunedin ■Christchurch ☐Hamilton ☐Nelson ☐Wellington ☐Tauranga

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APPROVED		
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SCALES (AT A3 SIZE) NOT TO SCALE		
PROJECT No. 880077.001		

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THE OASIS DEVELOPMENT
STONEY CREEK, FRANKTON
Stoney Creek Catchment

FIG. No. Figure 2 REV. 0

KINGSTON ROAD - S.H.6.

LEGAL ROAD (20.12)

PROPERTY BOUNDARY

ACCESSWAY 1

ACCESSWAY 2

ACCESSWAY 3

ACCESSWAY 4

ACCESSWAY 5

ACCESSWAY 7

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

SECTION G

SECTION H

SECTION B

SECTION C

SECTION D

SECTION E

SECTION F

'Snake' Building (units 9 to 20)

BH 1

BH 2

ROW

ROW by RM 010184

Lot 101
(ACCESS LOT)
Lot 1 RM010184

Lot 103
Lot 3 RM010184

LEGEND

. . . . . CUT / FILL BATTER EXTENT.
MINOR CONTOUR (INTERVAL 1m)
MAJOR CONTOUR (INTERVAL 5m)
PROPOSED SEALED CARRIAGEWAY

NOTE: CONTOURS WITHIN THE BATTER EXTENTS INDICATE FINISHED SUBGRADE LEVEL.

ADDITIONAL EARTHWORKS REQUIRED FOR 'SNAKE' & ROADWAYS IN ADDITION TO QUARRY CONSENT.

LEGEND

Cross section for stability Analysis

BH 1 Borehole for liquefaction assessment

Approximate area of fill for proposed final landform

Limits of major cut area (ex-quarry) in proposed final landform

Stoney Creek main channel

Contours show proposed final landform

SCALE 1: 2000

0 20 40 60 80 100 (m)

Based on Drawing 8350_48 Rev D 6/3/08 by CLARK FORTUNE McDONALD & ASSOCIATES

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Environmental & Engineering Consultants
Auckland Christchurch Hamilton
Nelson Wellington Whangarei

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APPROVED		
CADFILE : Figure 3.dwg		
SCALES (AT A3 SIZE) 1: 2000		
PROJECT No. 880077.001		

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THE OASIS DEVELOPMENT
STONEY CREEK, FRANKTON
Site plan and Development

FIG. No. Figure 3 REV. 0

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Q4t
Possible gravitational disturbance of schist
Schist Yc
N
Q2a
Q4t
Q4f + Q2a
PGf
Q4t
Source: Airphoto SN884 D/8 1956.
Geology: 1:250,000 geological map sheet 18, Wakatipu (2000).
Q2a
PGf
Q2f + PGf
Q4f
Q4t
Q4t
Schist Yc
Possible gravitational disturbance of schist
PGf
Q2a
Q4t
Q4t
Q2a
Q2a
Q2f
Q4t
Q4t
Schist Yc
PGf
Stoney Creek
Proposed Oasis
Q2f + PGf
Q4t
Q4t
Q4f
Q4t
Q4f
Schist Yc
PGf
Q2a
PGf
Q2a
PGf
Q4t
Rockfall field?
PGf
Q2t?
Q2f + PGf
Q4t
Scale: Approx 1:10,000

Legend

- Geological Contact
- Terrace Riser or steep slope.
- Alluvial Fan
- Weak Scarp — Dormant or slowly creeping landslide
- Subdued Scarp — Possibly active landslide
- Fresh Scarp — Active landslide lobe
- PG — Post Glacial
- Q2 — Quaternary 2 14-24 kyr
- Q4 — Quaternary 4 5-7-11 kyr
- l — lake sediments
- f — fan alluvium
- a — outwash alluvium
- t — till
- Proposed Oasis Building Lots

Tonkin & Taylor Environmental & Engineering Consultants (Auckland, Nelson, Christchurch, Wellington, Hamilton, Whangarei)	DRAWN	DRM APR 08
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	APPROVED	
	CADFILE : Figure 4-5.dwg	
	SCALES (AT A3 SIZE) 1: 10000	
	PROJECT No. 880077.100	

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THE OASIS DEVELOPMENT
STONEY CREEK, FRANKTON
Engineering Geology Map

FIG. No. Figure 4 — REV. 0

Approx 1:5000
0 100 200 300m

N

Debris Flow Modelling
Started with 1400m³
at 0m distance.

~1200m
~600m

Q4t

Stoney Creek

Moderate incision upto 50m Floodplain

Deeply Incised

Schist
Yc

Northern stream
Incised into Q2f

Main Proposed Channel

Oasis

1400m

'old' Flood Channels

Q2a
Q2f
Q4t
Q2f + Pgf
Pgf

Possible limits of 'recent' debris deposition

Channels Abandoned by incision of creeks

Southerly Creek

Deeply Incised

Rockfall fi

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	APPROVED	
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	SCALES (AT A3 SIZE) 1: 5000	
	PROJECT No. 880077. 100	

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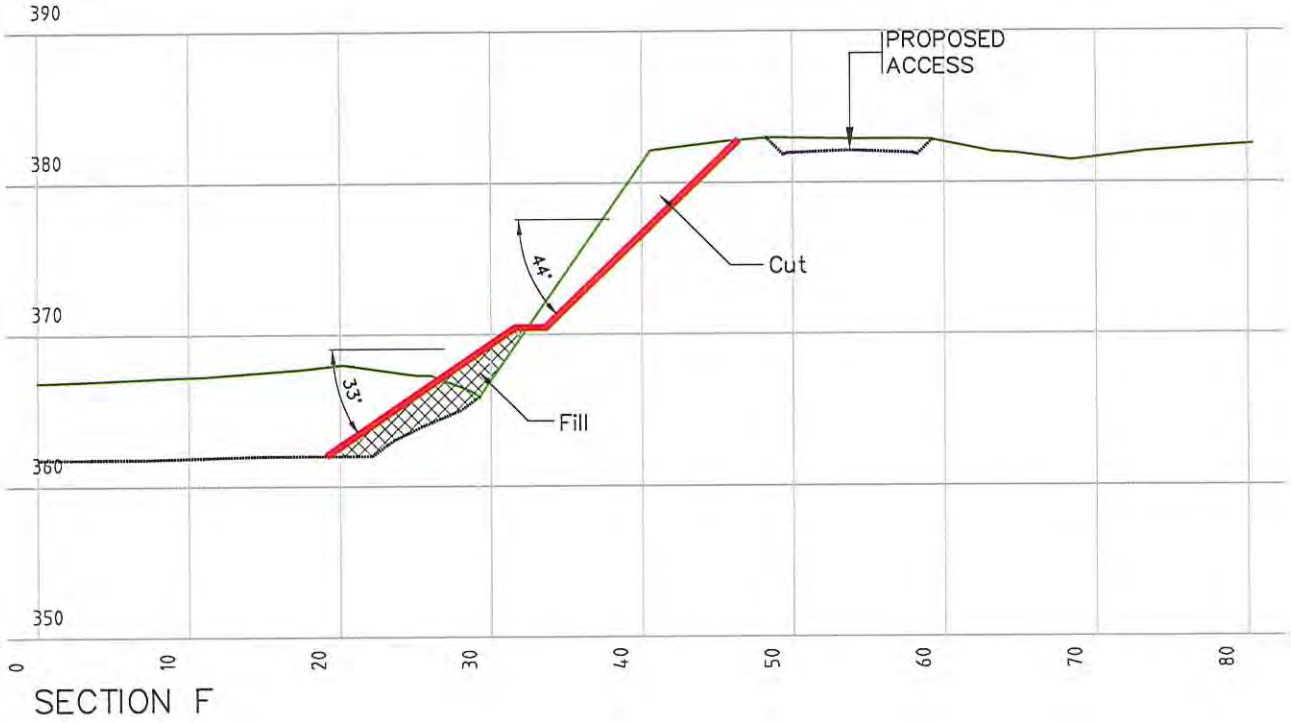
THE OASIS DEVELOPMENT
STONEY CREEK, FRANKTON
Flood & Debris Flow Hazard

FIG. No. Figure 5 REV. 0



SECTION F

LEGEND

GROUND LEVELS AS AT DECEMBER 2005

EXCAVATION LINE IN ACCORDANCE WITH QUARRY CONSENT

PROPOSED CUT & FILL LINE BASED OF SLOPE STABILITY ANALYSIS

SCALE 1:500

0 5 10 15 20 25 (m)

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Nelson Wellington Whangarei

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CADFILE : Figure 6.dwg		
SCALES (AT A4 SIZE) 1:500		
PROJECT No. 880077.001		

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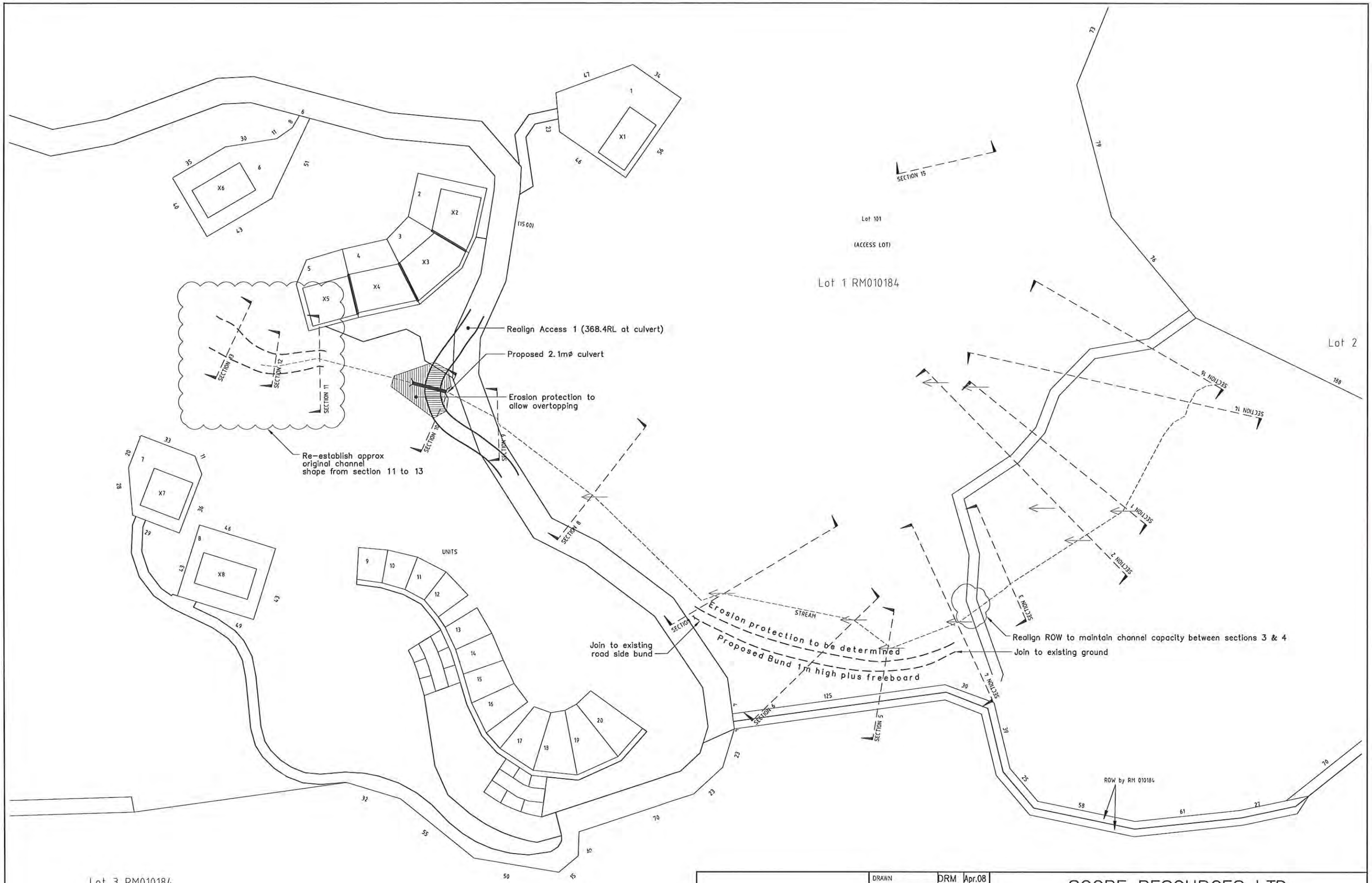
THE OASIS DEVELOPMENT
STONEY CREEK, FRANKTON
Steep Slope Design Section F

FIG. No. Figure 6

REV. 0



Drawing supplied by
CLARK FORTUNE McDONALD
& ASSOCIATES (dwg 8350_59, 27/02/08)

Tonkin & Taylor Environmental & Engineering Consultants ■ Christchurch □ Auckland □ Hamilton □ Nelson □ Wellington □ Whangarei	DRAWN	DRM	Apr.08
	DRAFTING CHECKED		
	APPROVED		
	CADFILE : FIGURE 7.dwg		
	SCALES (AT A3 SIZE) 1: 2000		
	PROJECT No. 880077.001		

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THE OASIS DEVELOPMENT
STONEY CREEK, FRANKTON
Stoney Creek Flood Mitigation Concepts

FIG. No. Figure 7 REV. 0

Appendix B: Investigation and Slope Stability

- **Borehole Logs BH01 and BH02 (2 pages)**
- **Figure B1 – Rock Fall Analysis**
- **SlopeW example outputs (11 pages)**

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BOREHOLE LOG

BOREHOLE No: BH01
Hole Location:

SHEET 1 OF 1

PROJECT: CFM Stoney Oasis		LOCATION: Stoney Creek, Frankton	JOB No: 880077.100
CO-ORDINATES	mN mE	DRILL TYPE: UDR650	HOLE STARTED: 20/2/08
		DRILL METHOD: TUBEX	HOLE FINISHED: 20/2/08
R.L.	m		DRILLED BY: McNEIL
DATUM		DRILL FLUID:	LOGGED BY: SCWW CHECKED:

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 20 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 2 5 20 50 100 200	DEFECT SPACING (mm) 600 200 1000 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
Glacial outwash gravels		Dry	N/A	TBX					1 2 3 4 5 6 7 8 9 10			DRY	MD - D				Coarse Silty Gravels
									11 12 13 14 15								End of borehole - 10.5 m

BORELOG_TT 880077.100.GPJ 5/3/08

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BOREHOLE LOG

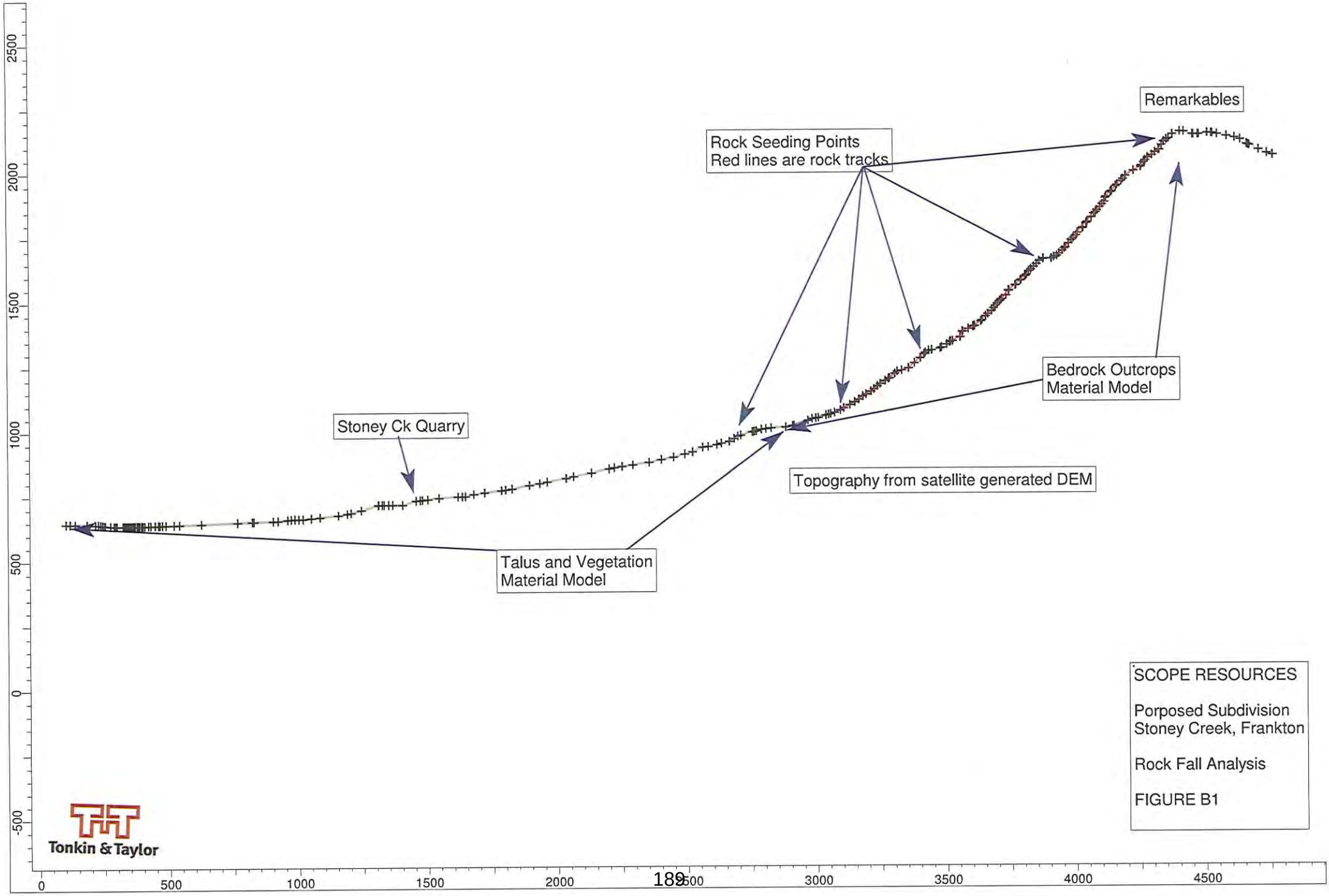
BOREHOLE No: BH02
Hole Location:

SHEET....1..... OF....1.....

PROJECT: CFM Stoney Oasis		LOCATION: Stoney Creek, Frankton	JOB No: 880077.100
CO-ORDINATES	mN mE	DRILL TYPE: UDR650	HOLE STARTED: 20/2/08
		DRILL METHOD: TUBEX	HOLE FINISHED: 20/2/08
R.L.	m		DRILLED BY: McNEIL
DATUM		DRILL FLUID:	LOGGED BY: SCWW CHECKED:

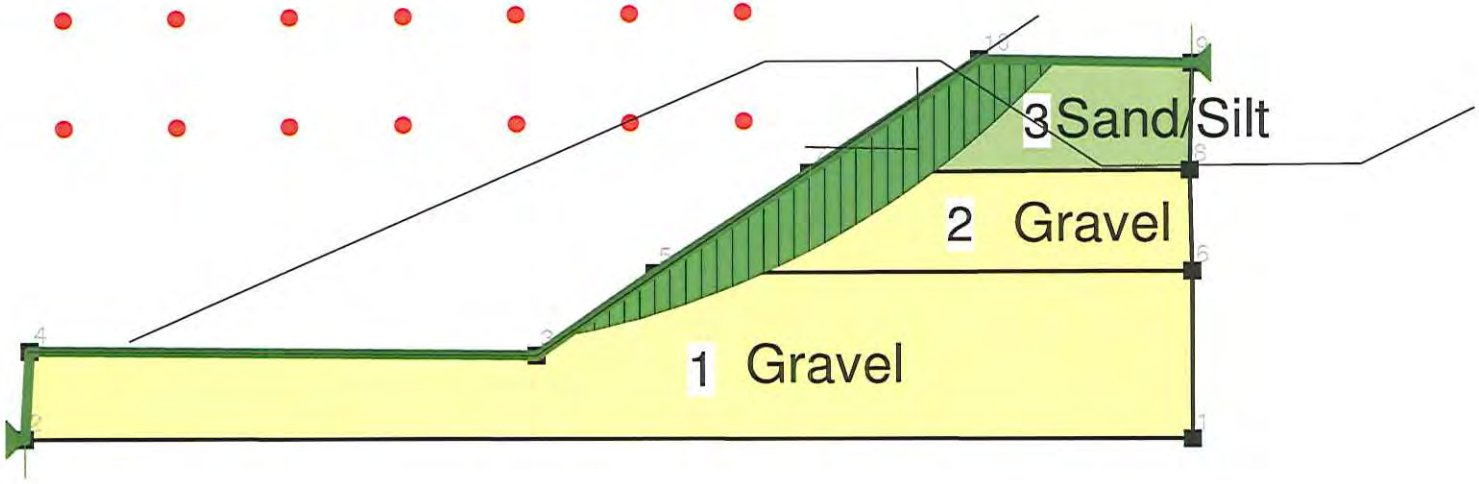
GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 200	DEFECT SPACING (mm) 50 200 1000 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
Glacial outwash gravels		DRY	N/A	TBX					0			DRY	MD - D				Coarse Silty Gravels
									1								
									2								
									3								
									4								
									5								
									6								
Boulder																	Boulder
Glacial outwash gravels																	Coarse Silty Gravels
									7								
									8								
									9								
									10								
									11								
									12								End of borehole - 12 m
									13								
									14								
									15								

BORELOG_TT 880077.100.GPJ 5/3/08


Remarkables
Rock Seeding Points
Red lines are rock tracks
Bedrock Outcrops
Material Model
Stoney Ck Quarry
Topography from satellite generated DEM
Talus and Vegetation
Material Model
2500
2000
1500
1000
500
0
-500
0
500
1000
1500
2000
2500
3000
3500
4000
4500
SCOPE RESOURCES
Porposed Subdivision
Stoney Creek, Frankton
Rock Fall Analysis
FIGURE B1
Tonkin & Taylor

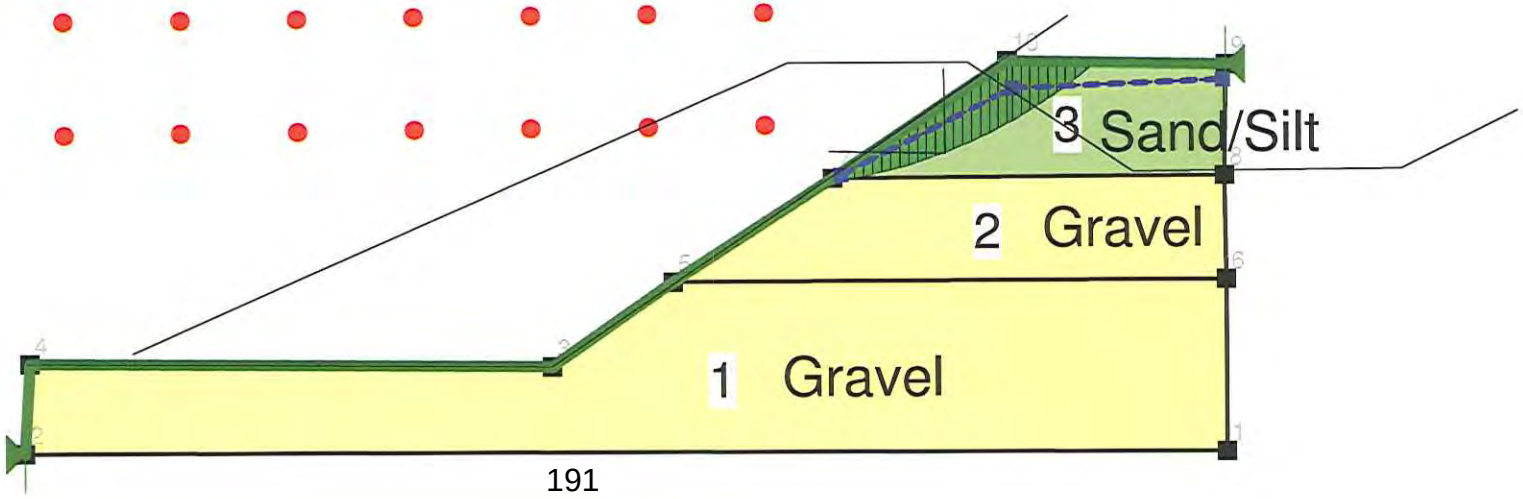
1.850

The Oasis
Section C
Static case



The Oasis
Section C
Saturated Sand/Silt

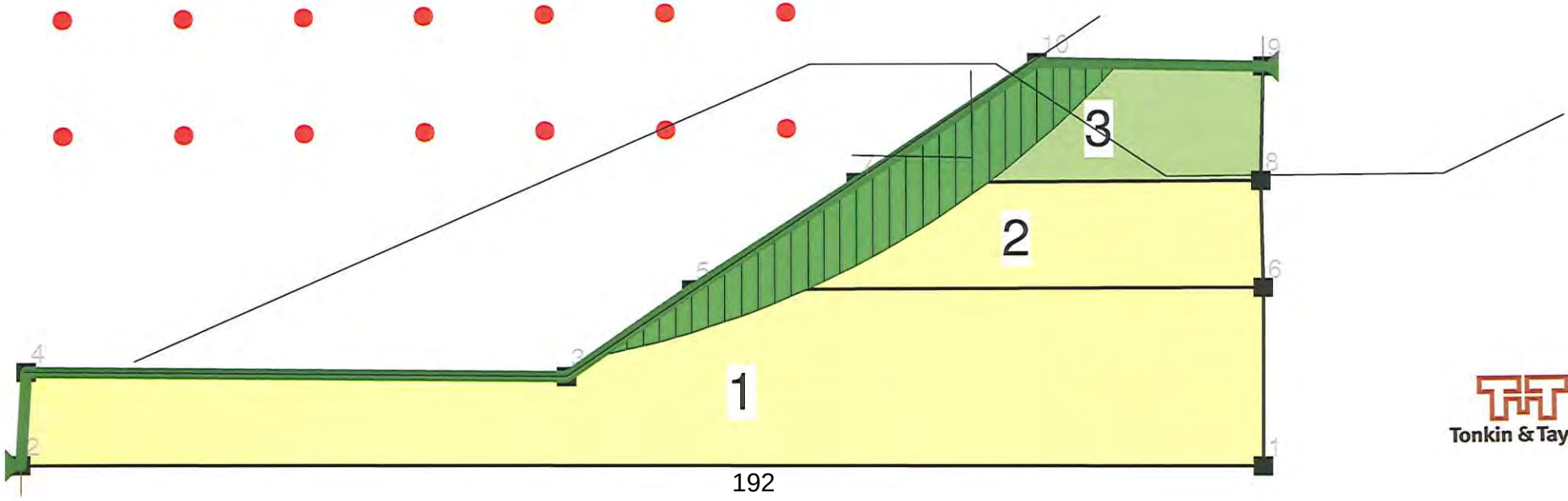
1.084



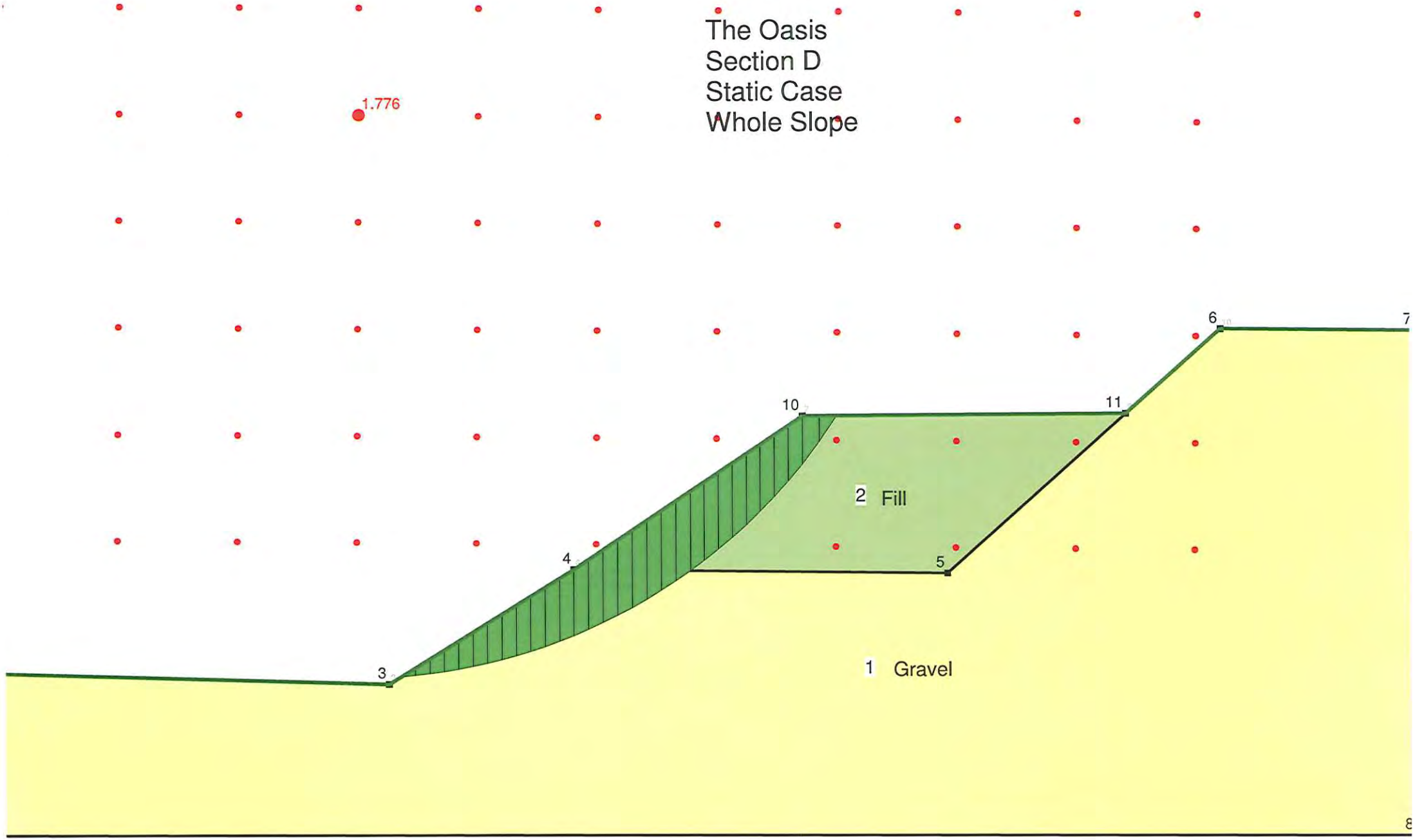
Tonkin & Taylor

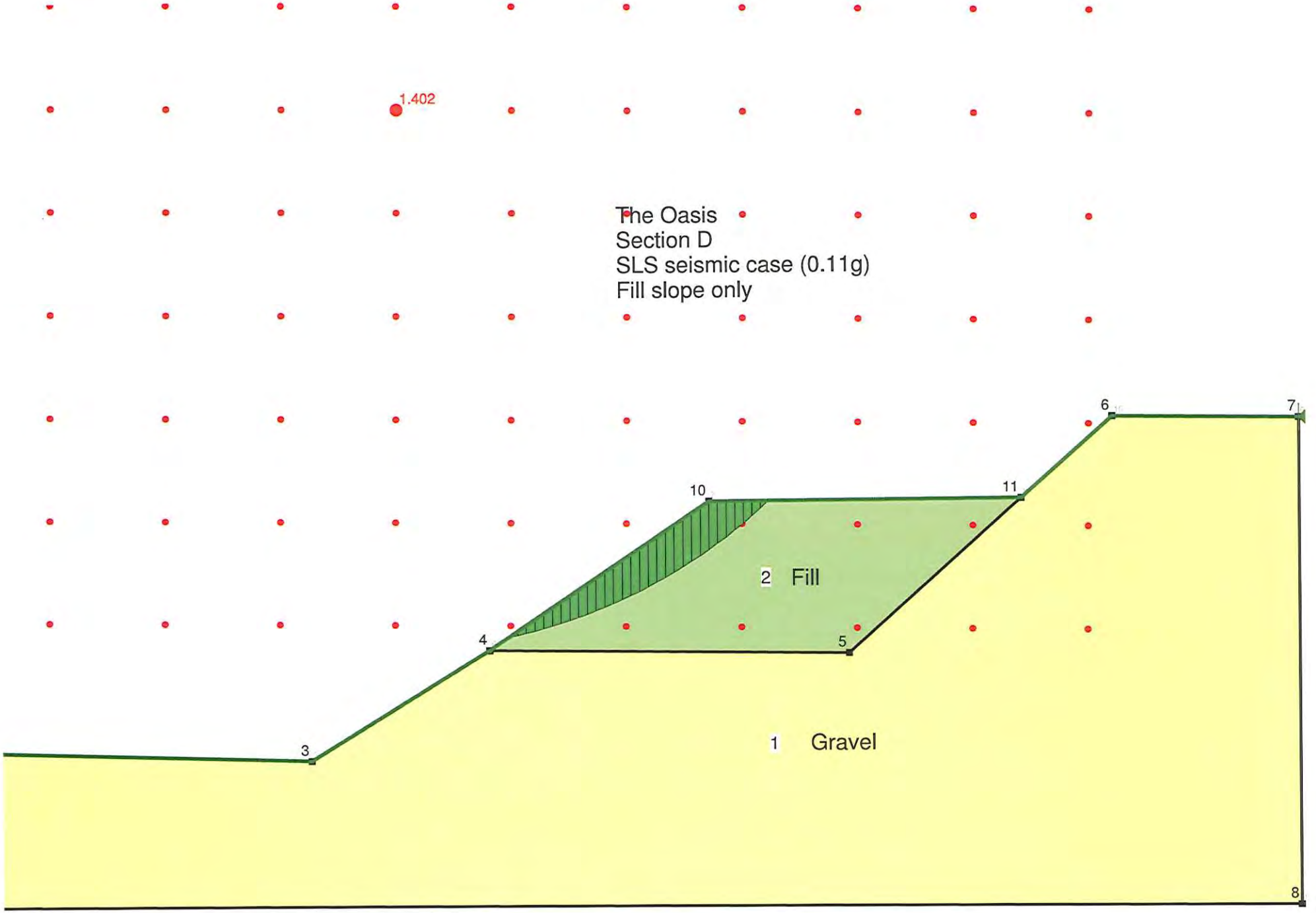
1.564

The Oasis
Section C
SLS seismic case (0.11g)

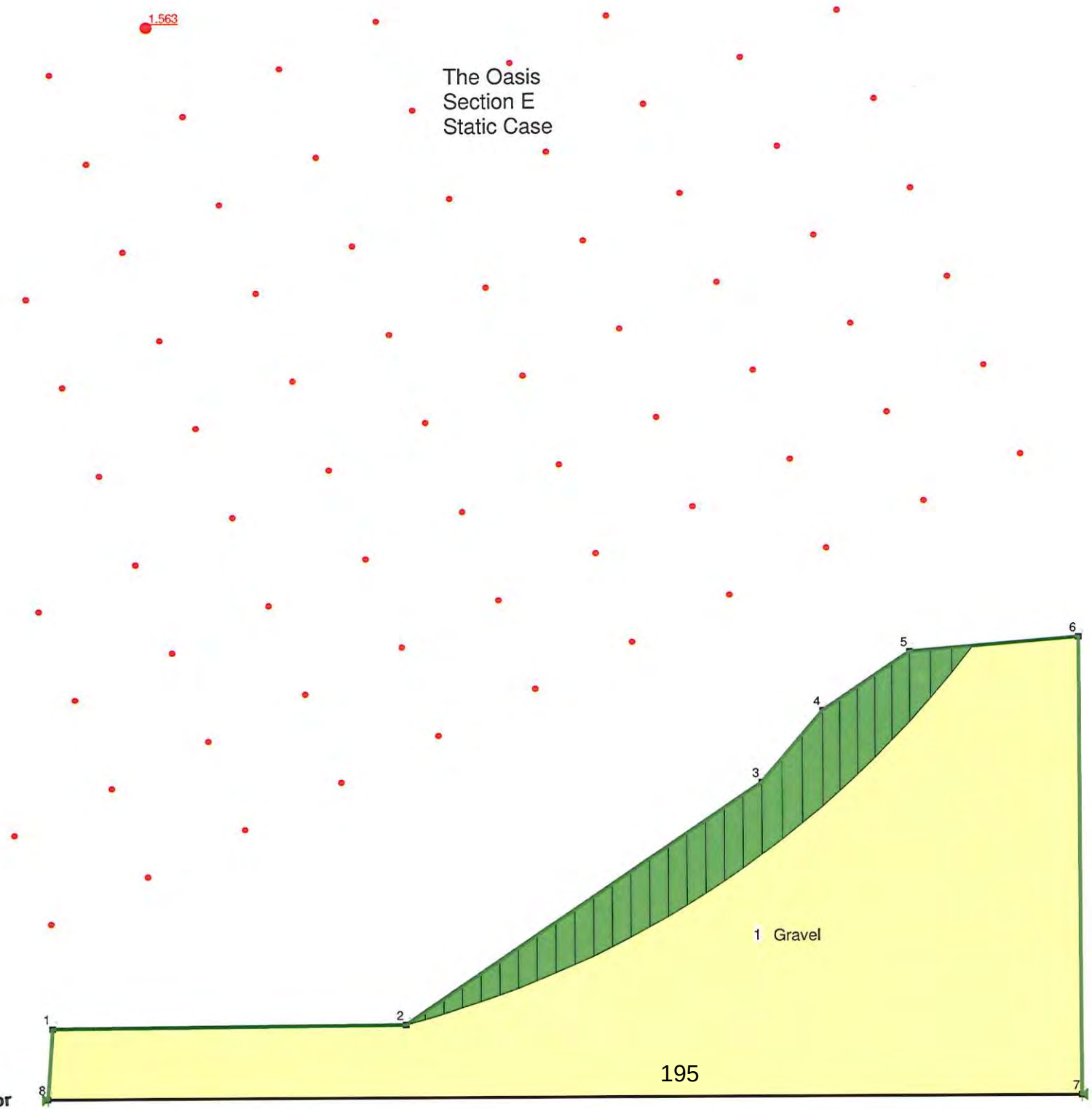


Tonkin & Taylor


The Oasis
Section D
Static Case
Whole Slope
1.776
10
11
6
7
2 Fill
4
5
3
1 Gravel
8



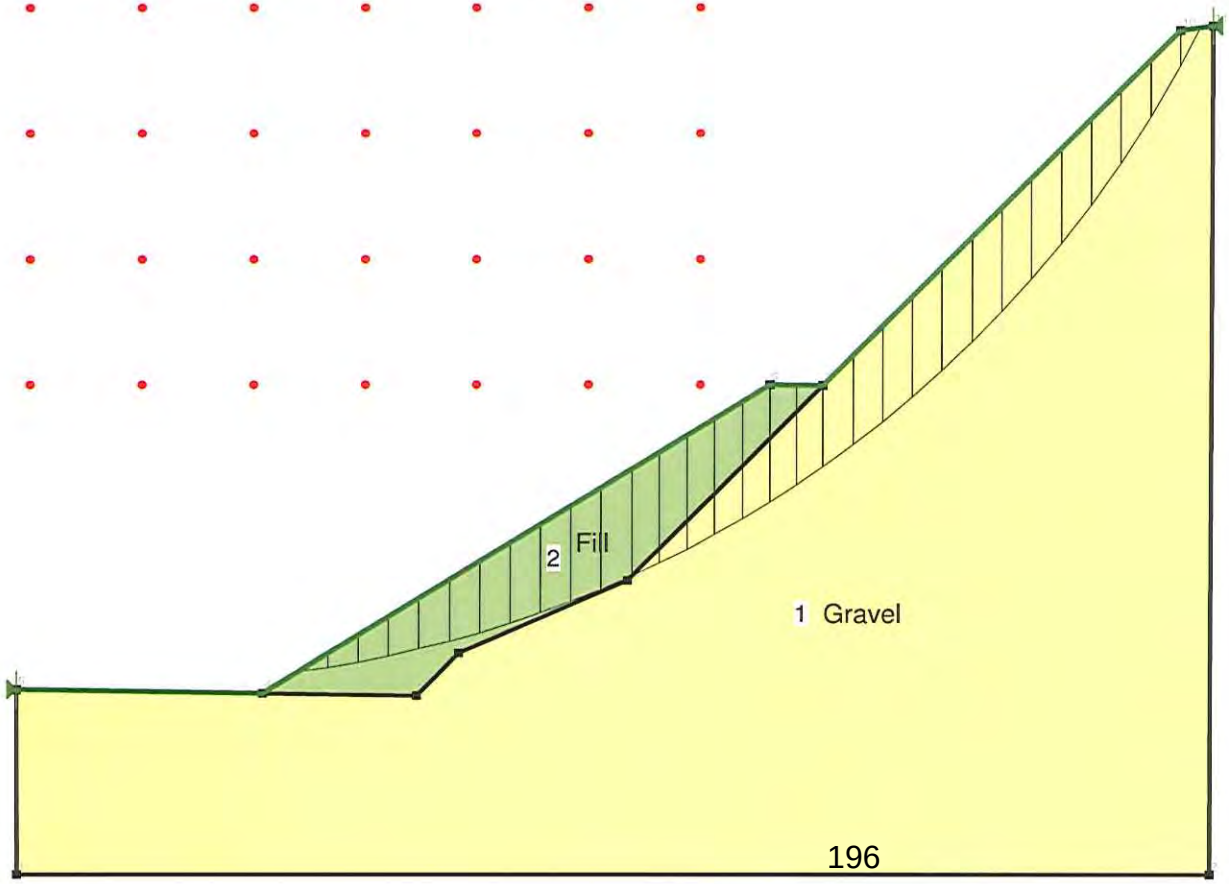
Tonkin & Taylor



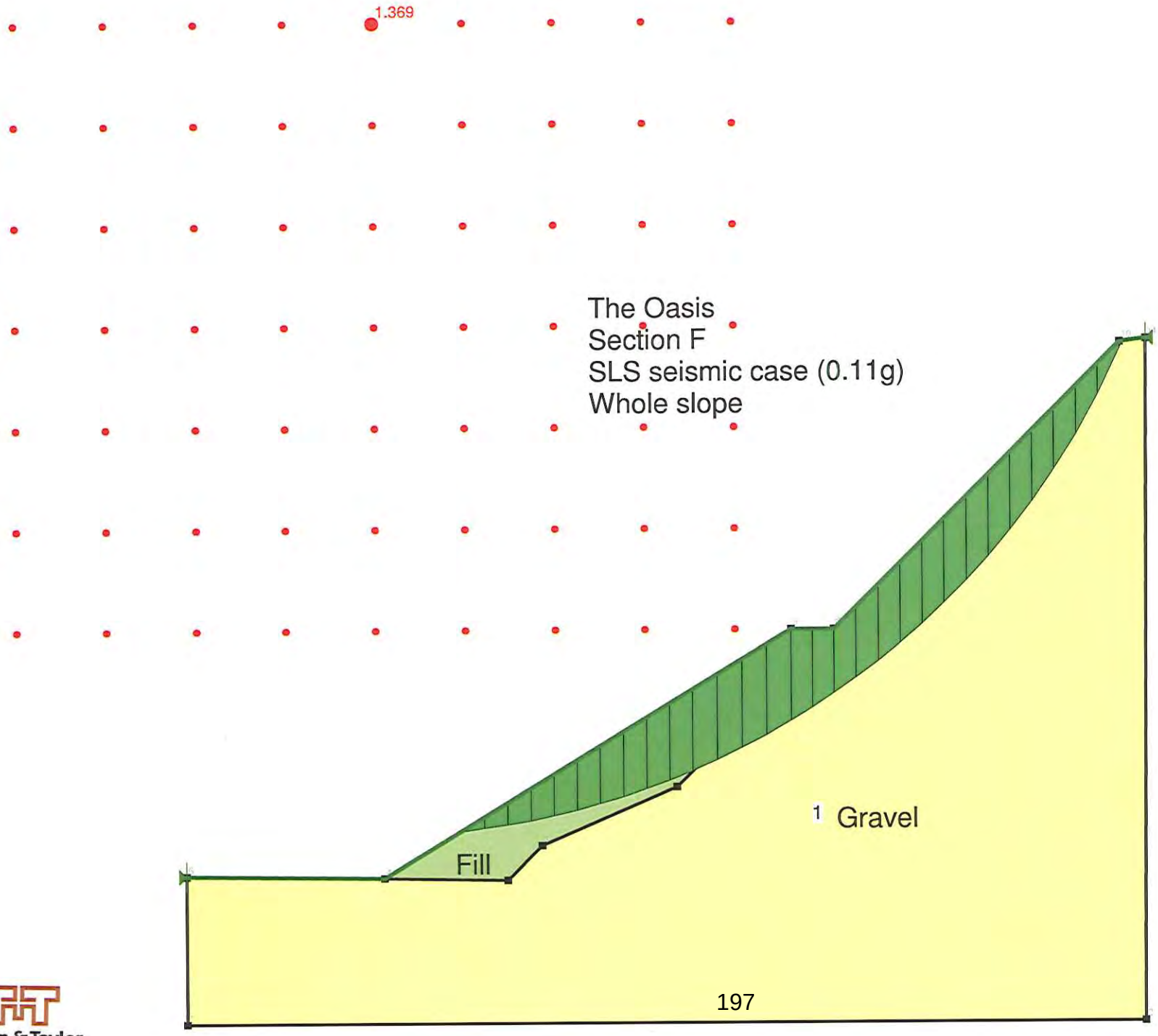
Tonkin & Taylor

1.540

The Oasis
Section F
Cut to Fill Slope



Tonkin & Taylor



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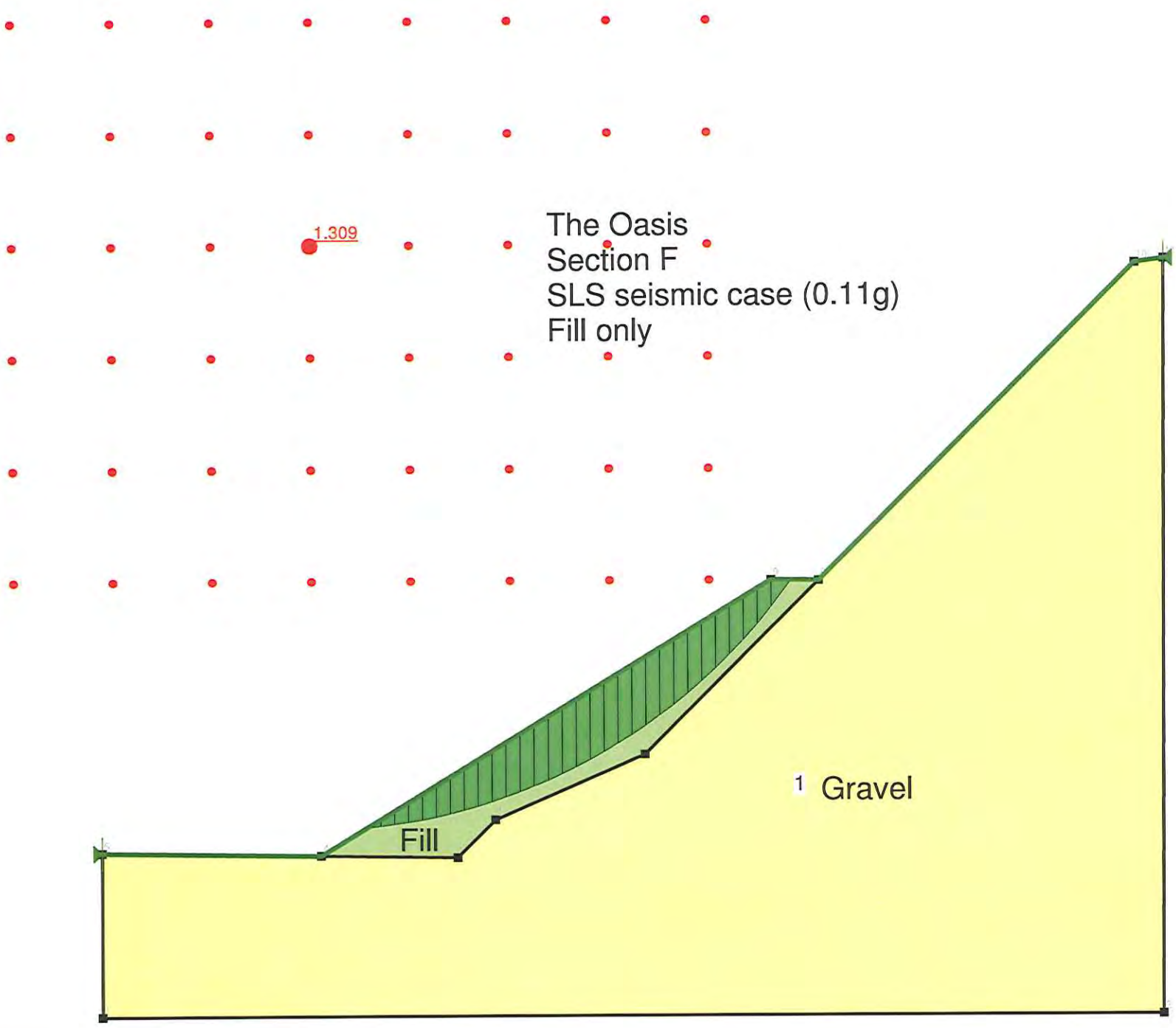
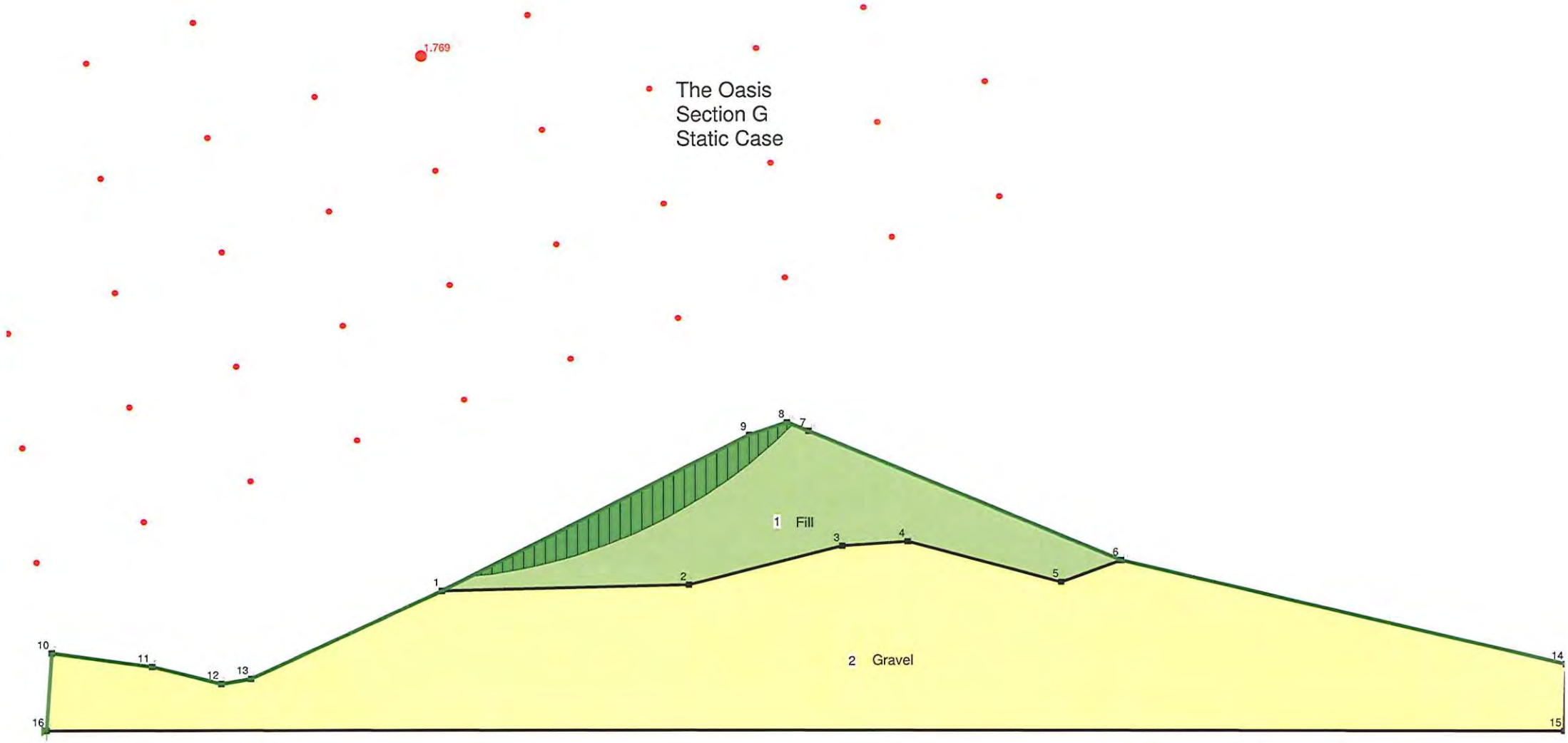
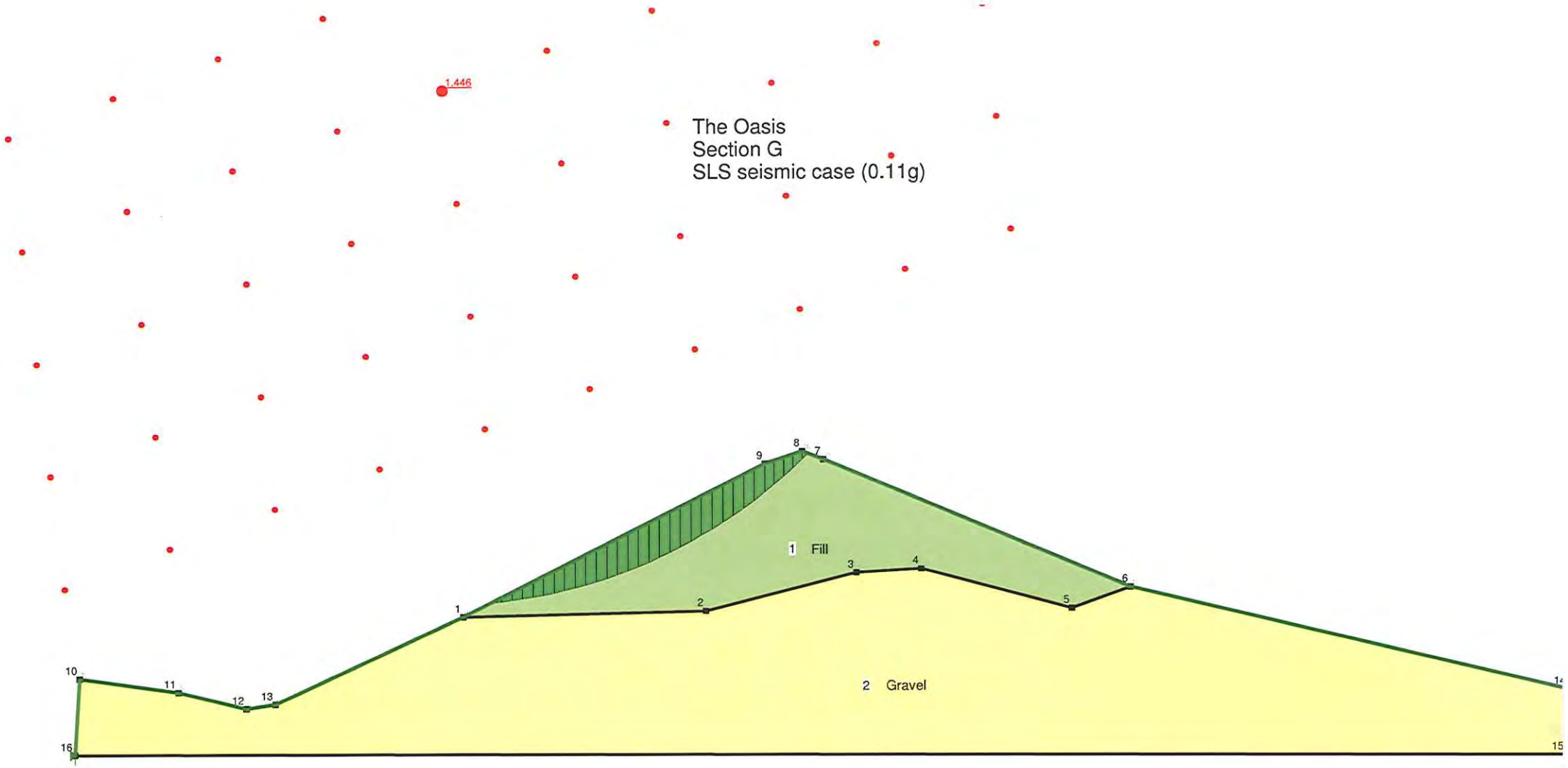


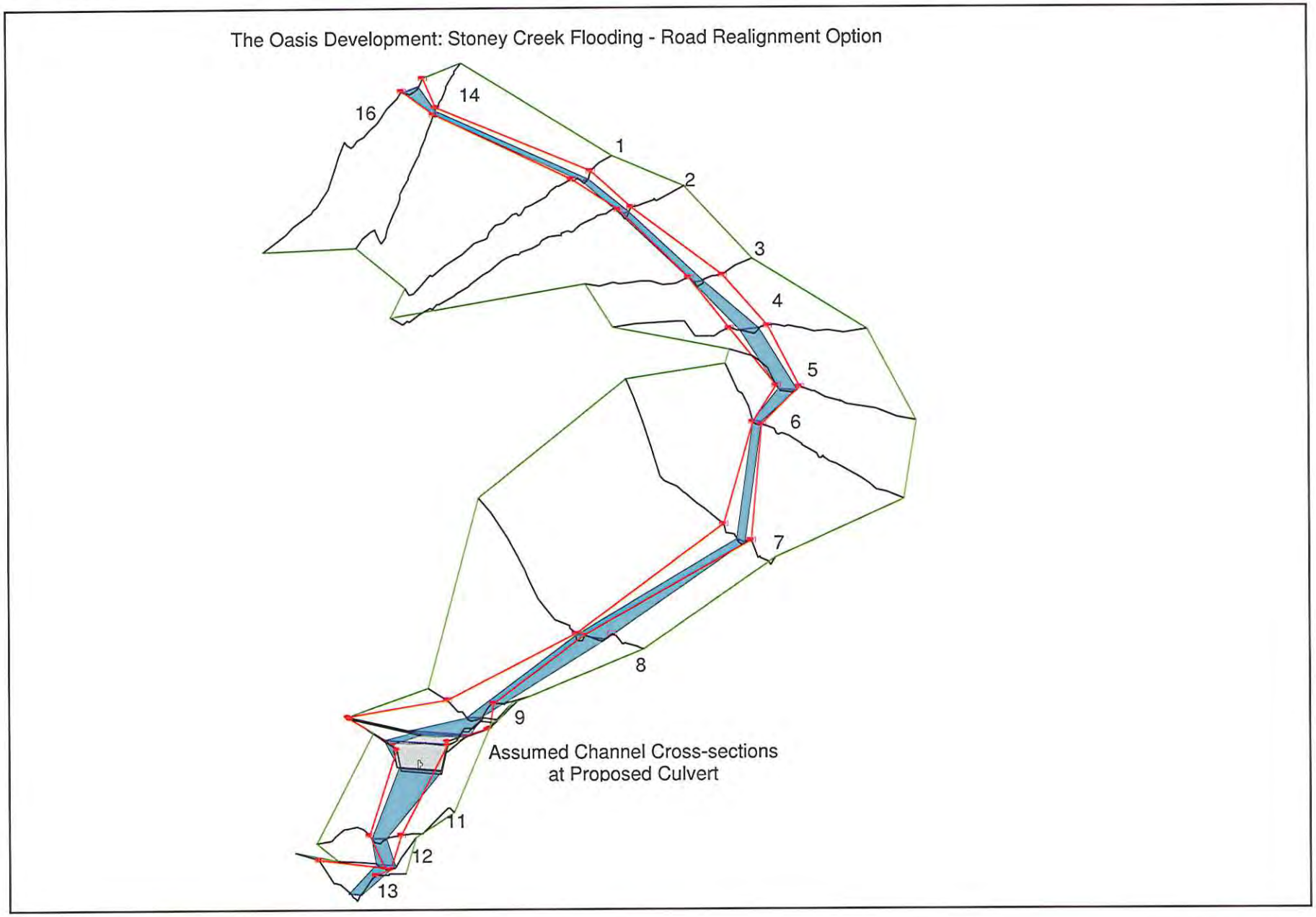
Tonkin & Taylor

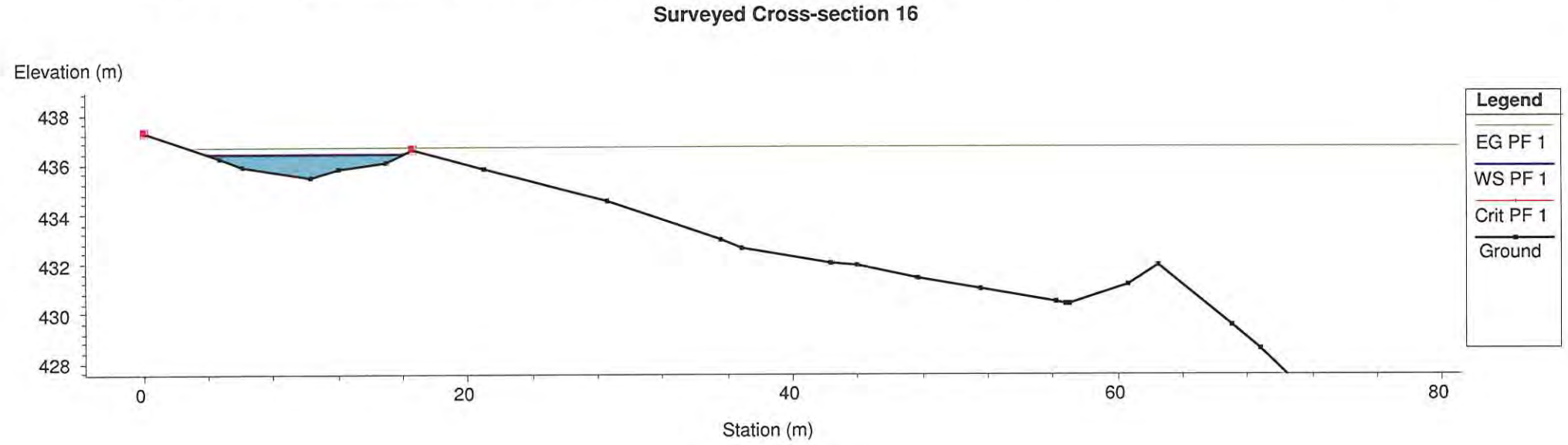

1.769
The Oasis
Section G
Static Case
1 Fill
2 Gravel
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16


1.446
The Oasis
Section G
SLS seismic case (0.11g)
1 Fill
2 Gravel
1
2
3
4
5
6
7
8
9
10
11
12
13
15
16

Appendix C: Flooding: Stoney Creek HEC-RAS model cross sections (12 pages)

Figure 1: 3 Dimensional schematic of HEC-RAS Model of Stoney Creek with 15 m^3/sec flood flow.




Surveyed Cross-section 16
Elevation (m)
438
436
434
432
430
428
0
20
40
60
80
Station (m)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground

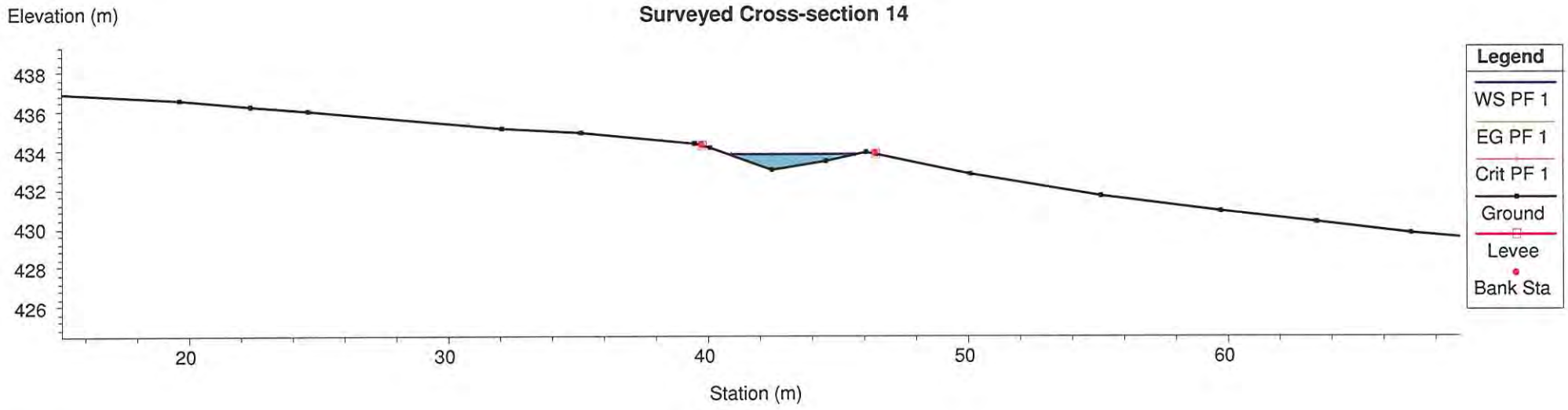

Surveyed Cross-section 14
Elevation (m)
438
436
434
432
430
428
426
20
30
40
50
60
Station (m)
Legend
WS PF 1
EG PF 1
Crit PF 1
Ground
Levee
Bank Sta

Figure 2: Stoney Creek Surveyed Cross-sections – Water Level during 15 m^3/sec flood event

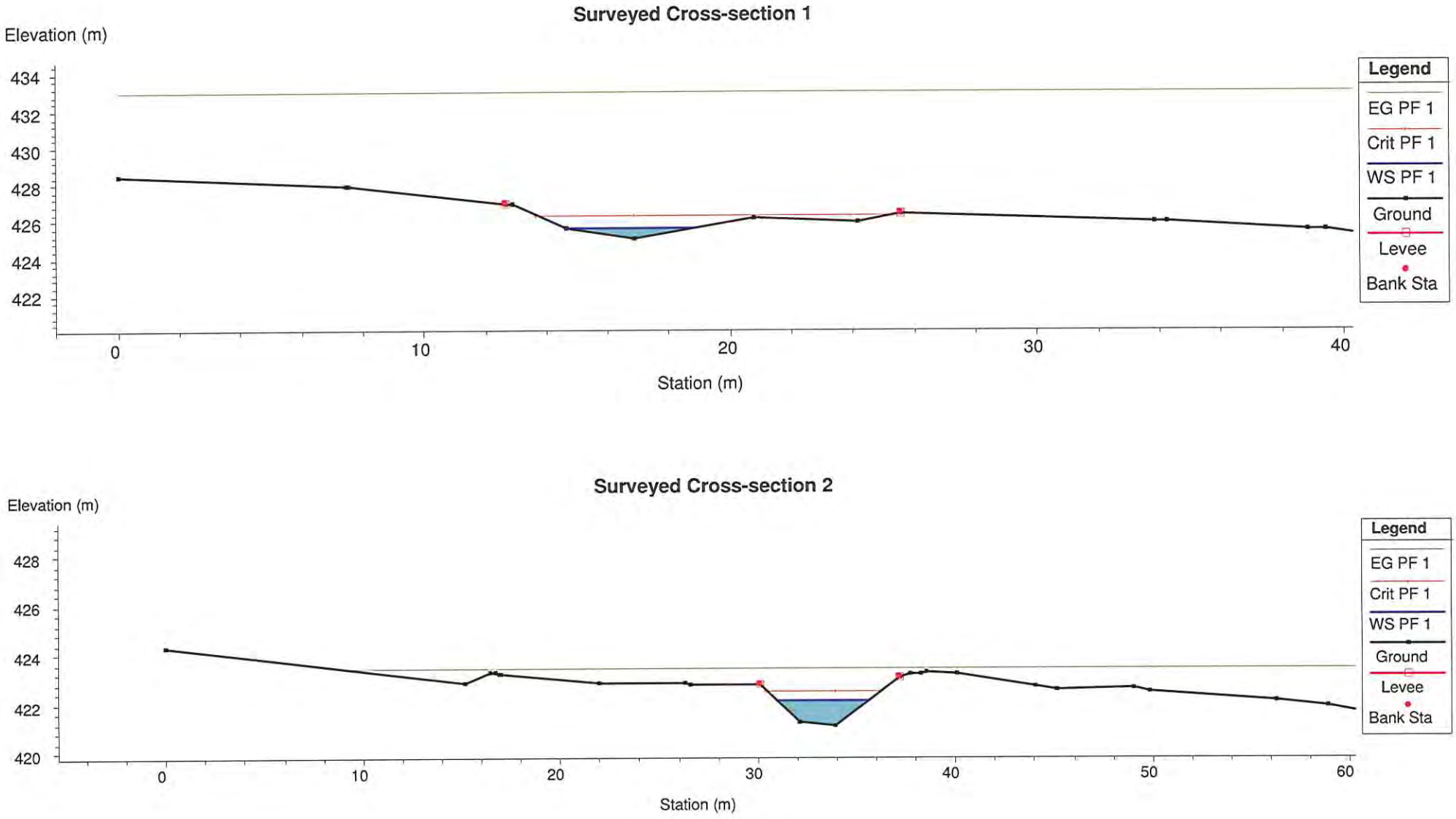
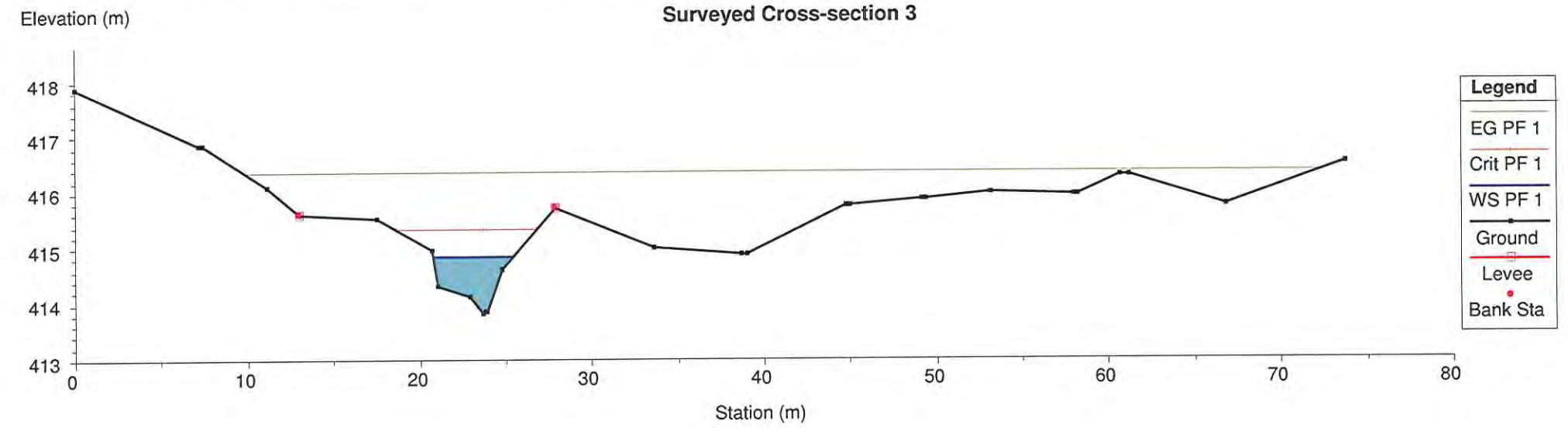


Figure 2: Stoney Creek Surveyed Cross-sections – Water Level during 15 m^3/sec flood event



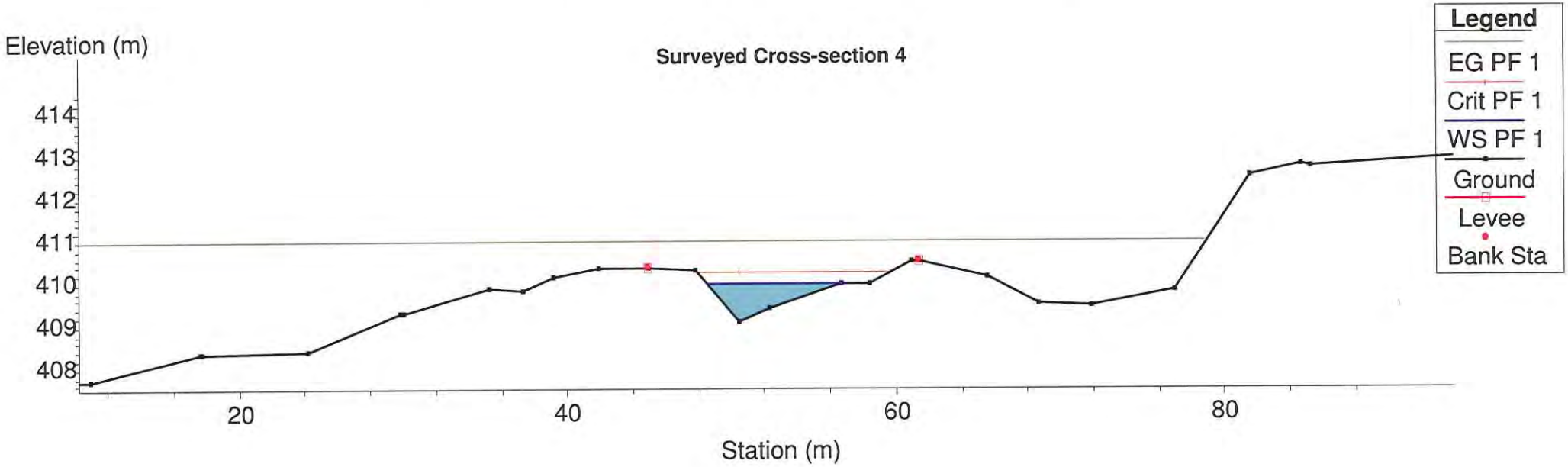
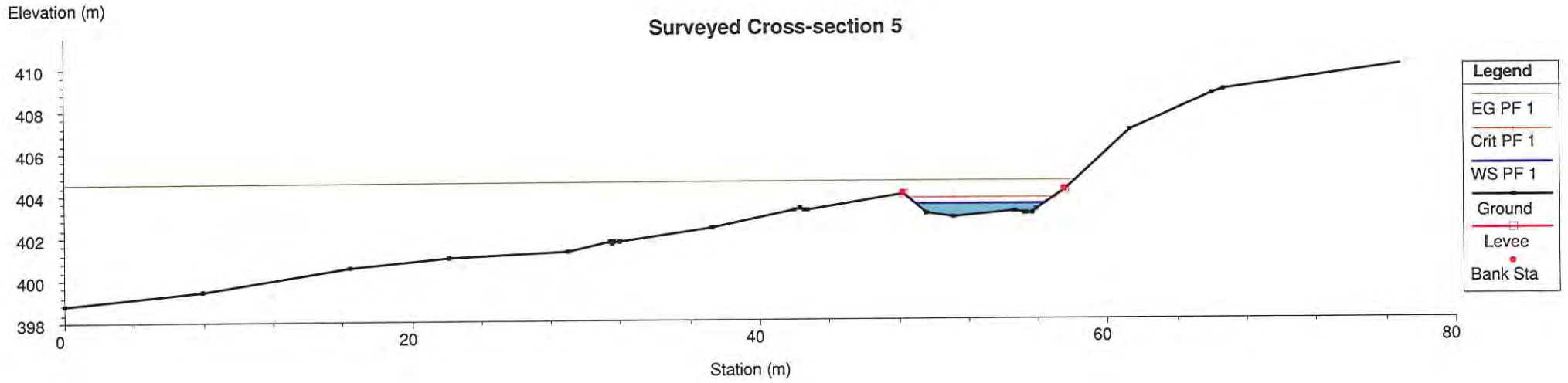


Figure 2: Stoney Creek Surveyed Cross-sections – Water Level during 15 m^3/sec flood event



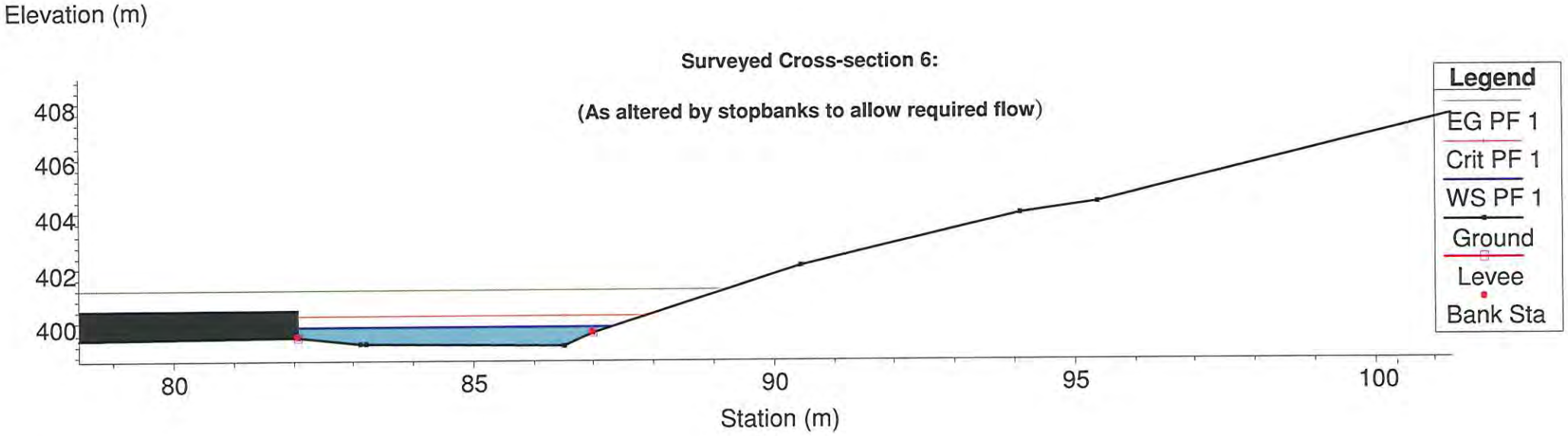


Figure 2: Stoney Creek Surveyed Cross-sections – Water Level during 15 m^3/sec flood event

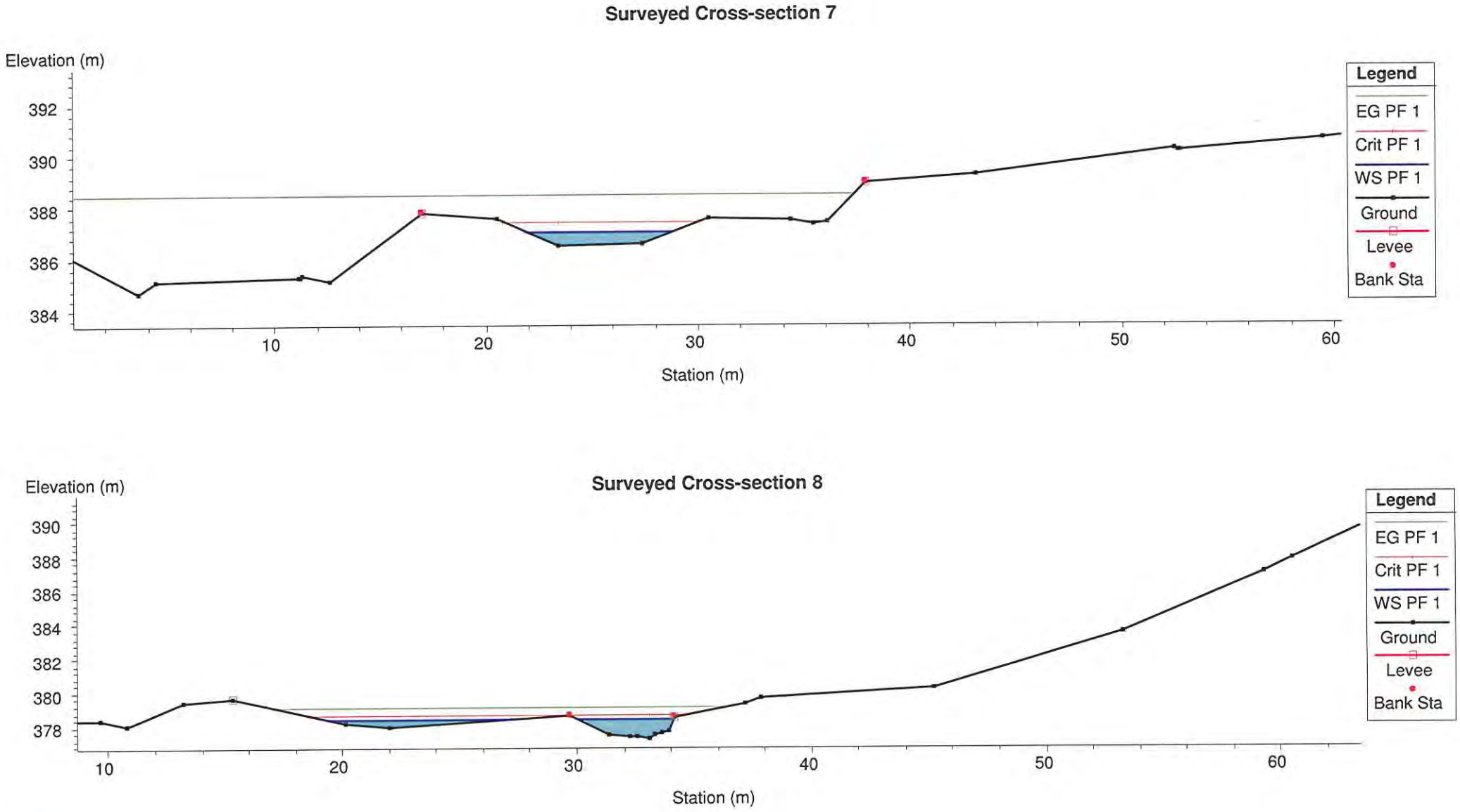
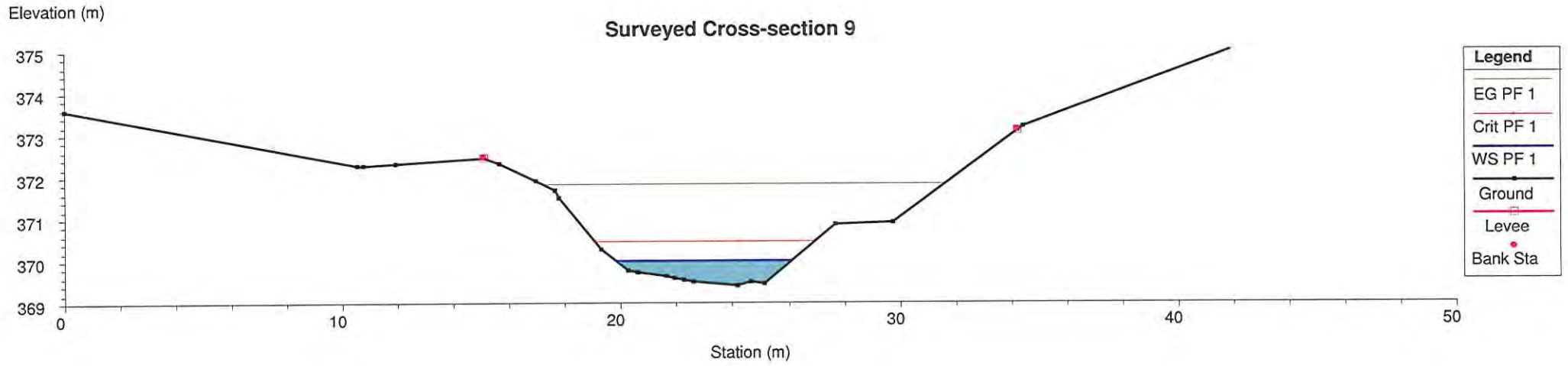


Figure 2: Stoney Creek Surveyed Cross-sections – Water Level during 15 m^3/sec flood event



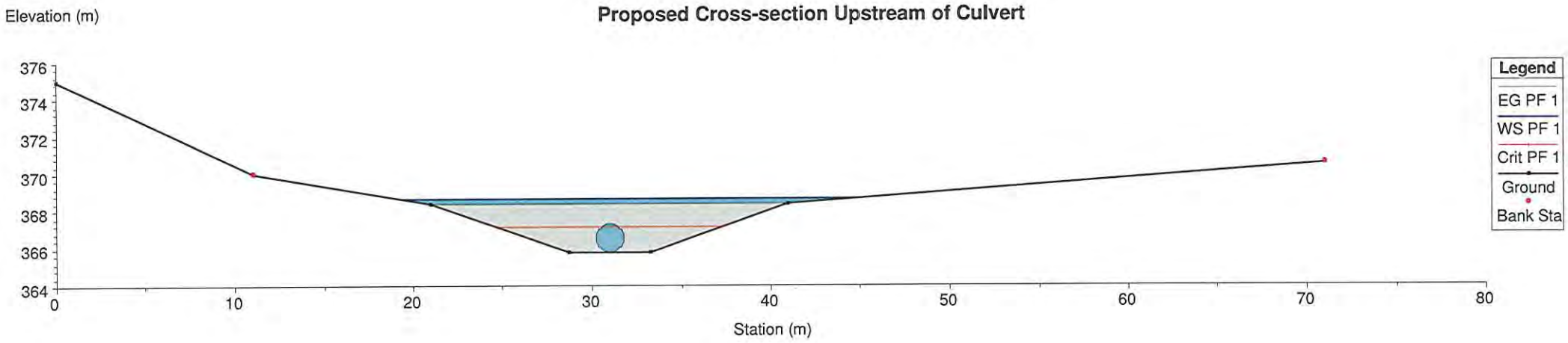


Figure 2: Stoney Creek Surveyed Cross-sections – Water Level during 15 m^3/sec flood event

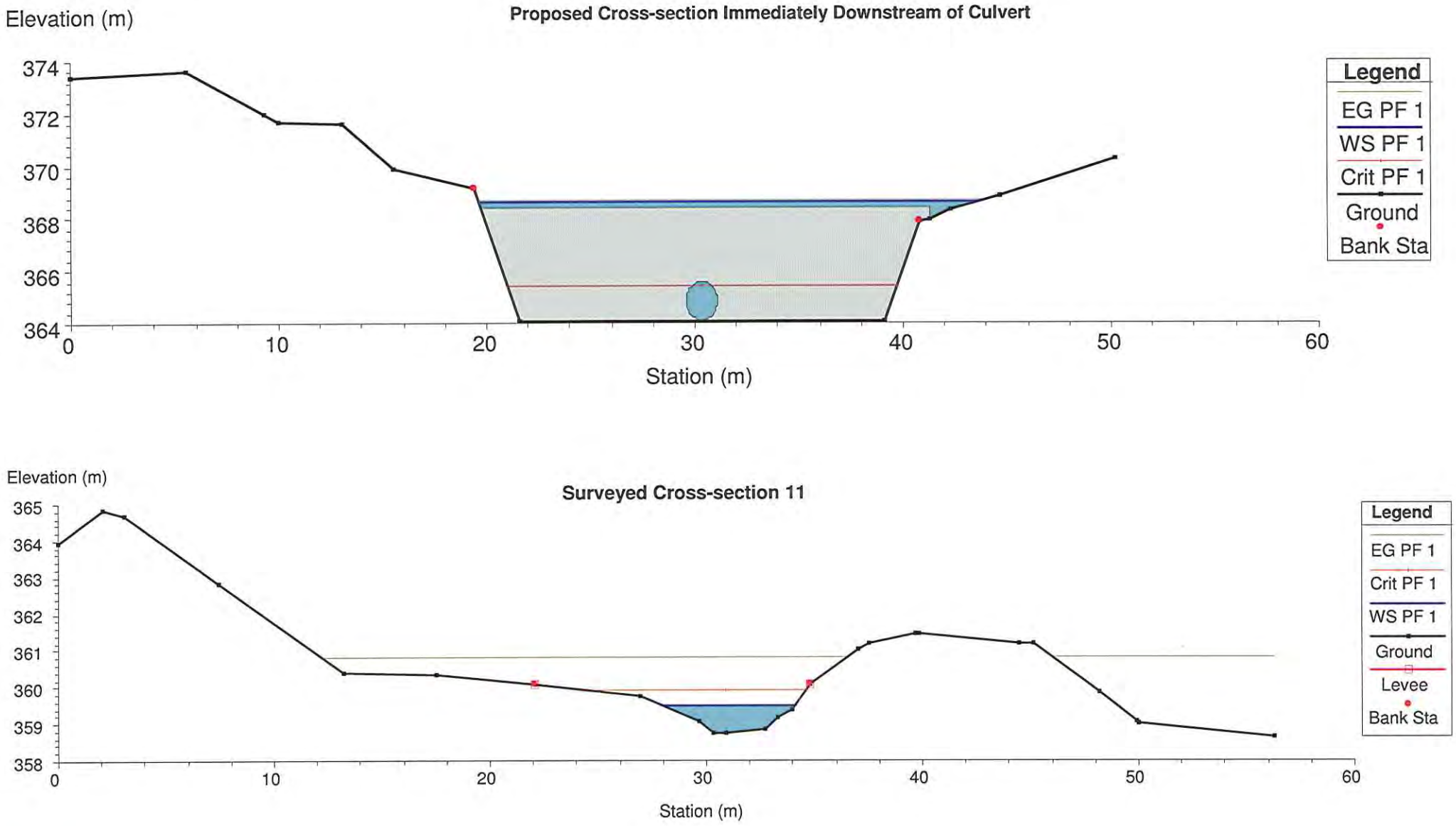


Figure 2: Stoney Creek Surveyed Cross-sections – Water Level during 15 m^3/sec flood event

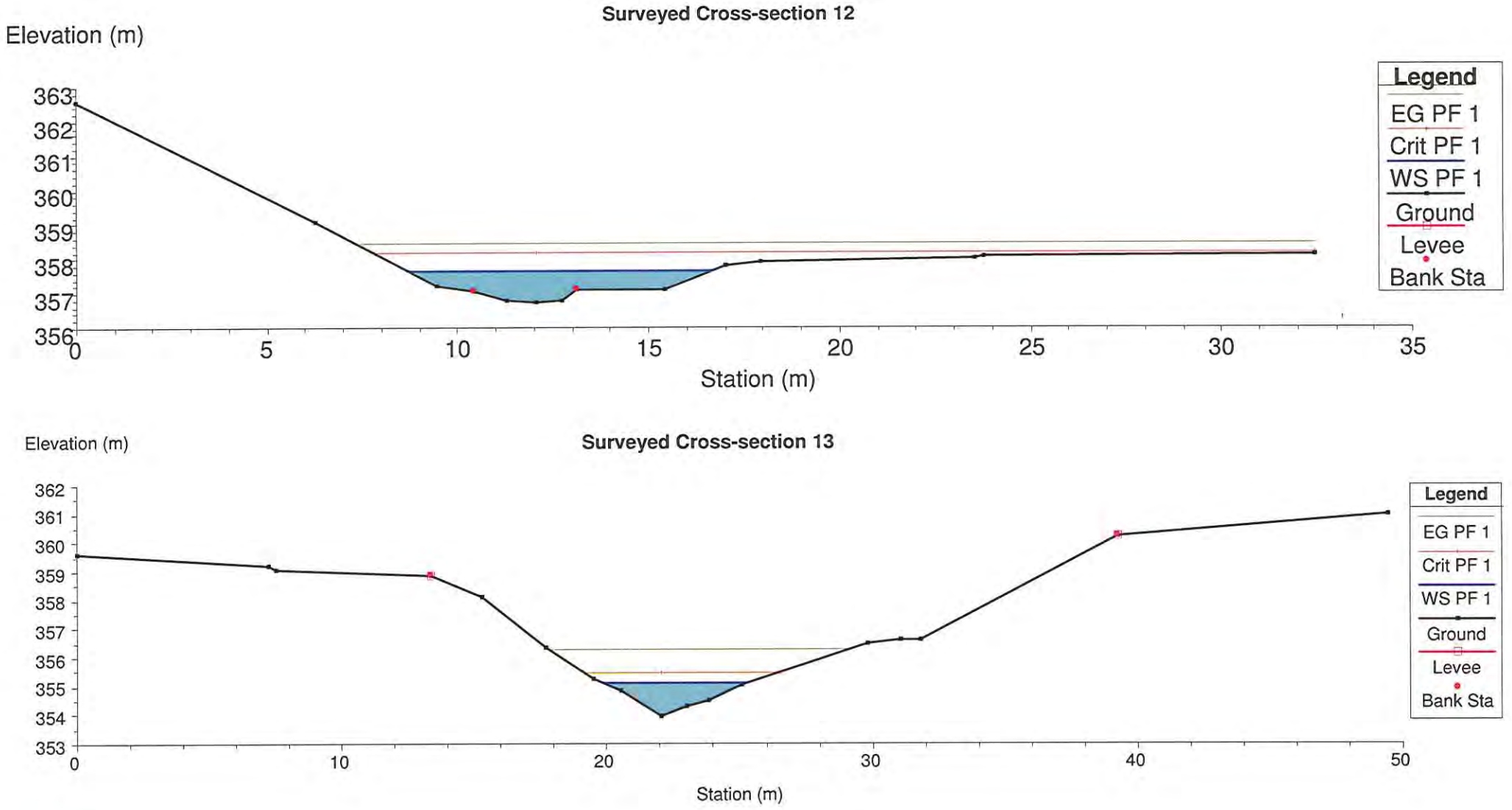
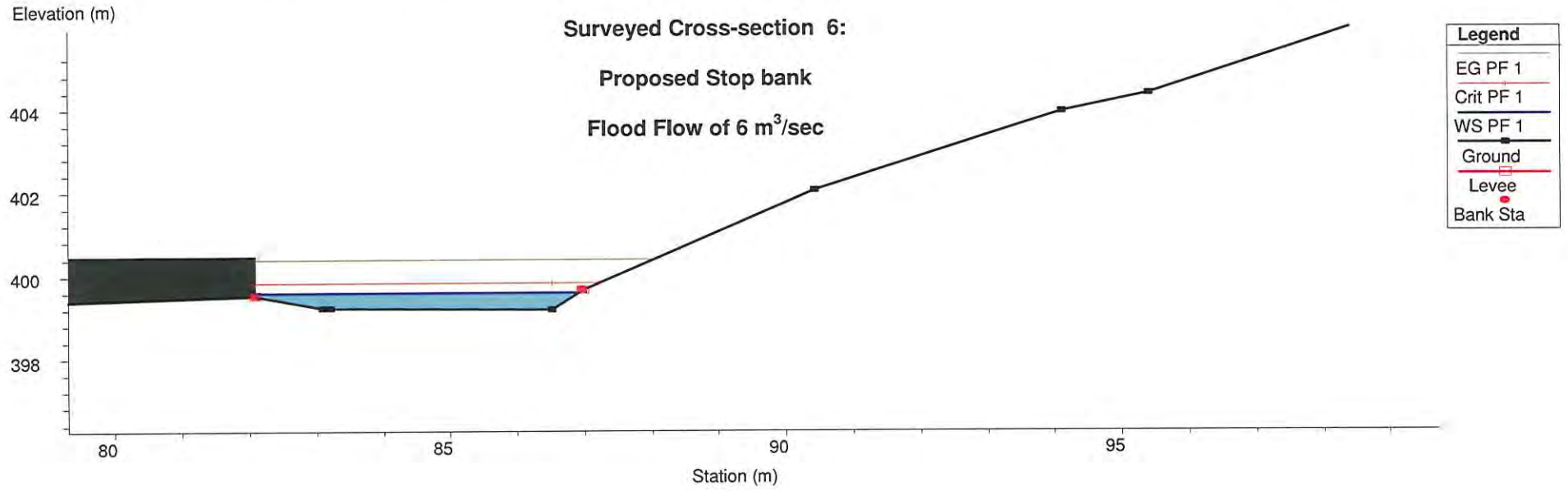


Figure 3: Water level at proposed Stopbanks – 6 m^3/sec and 19 m^3/sec flood events



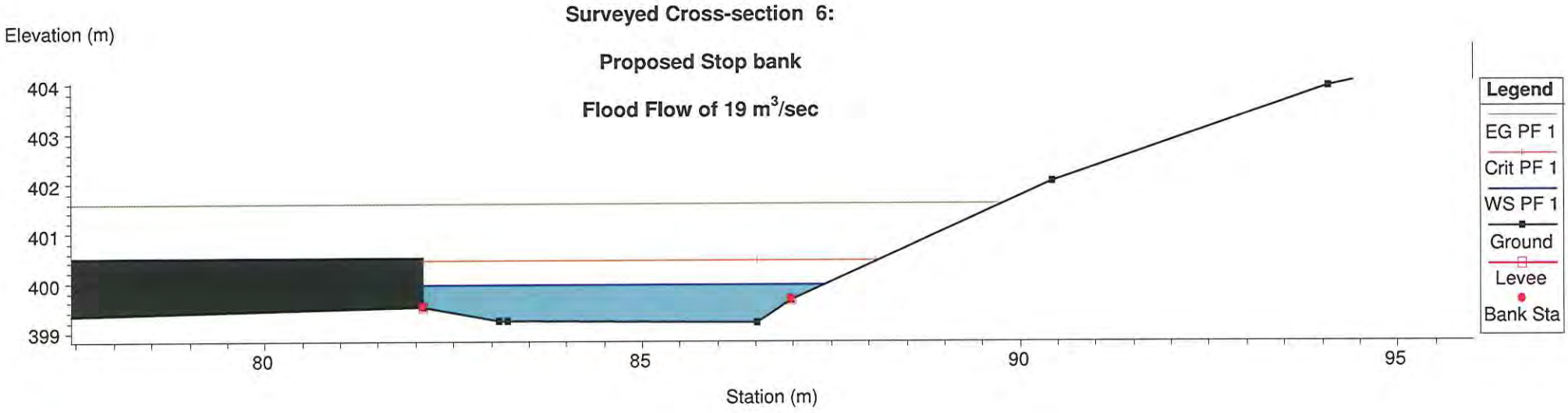
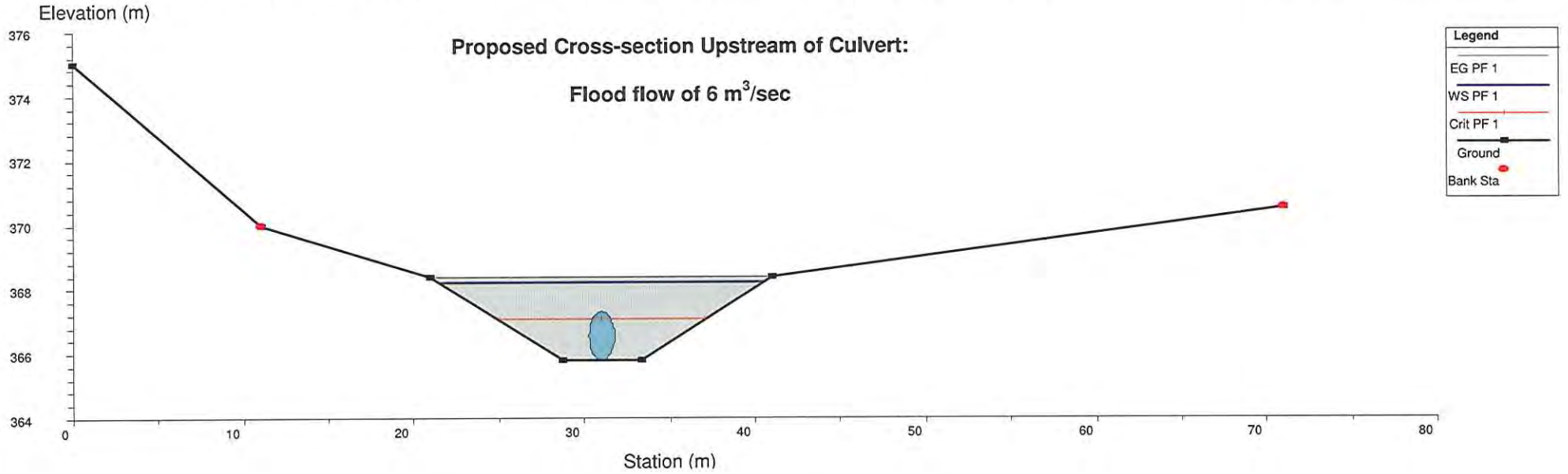


Figure 4: Water level at Proposed Road and Culvert – 6 m^3/sec and 19 m^3/sec flood events



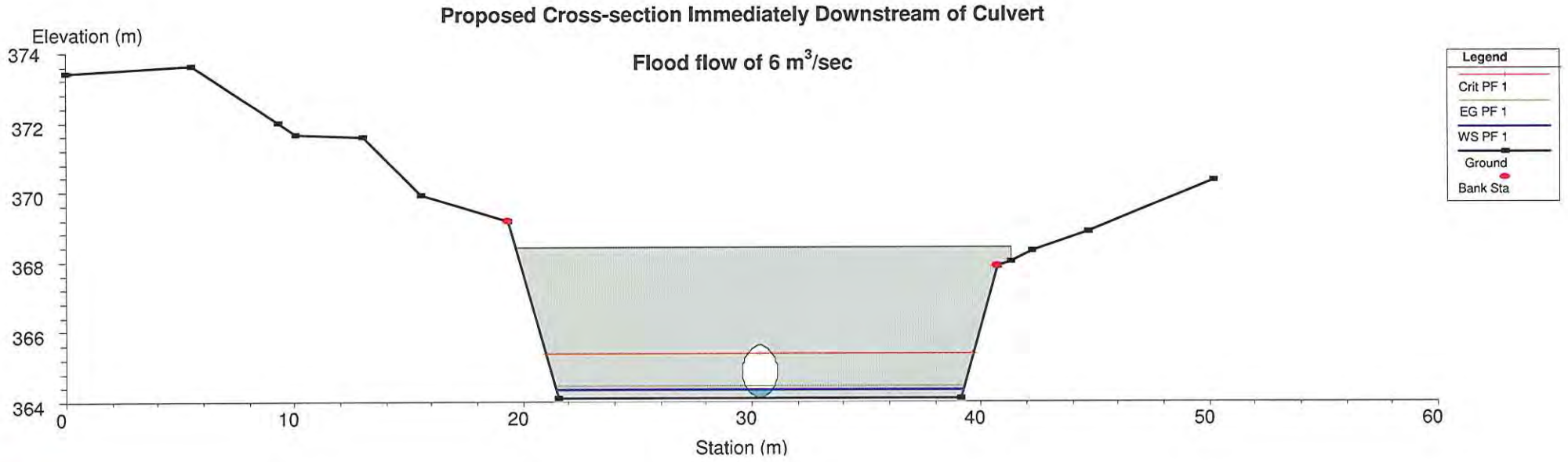
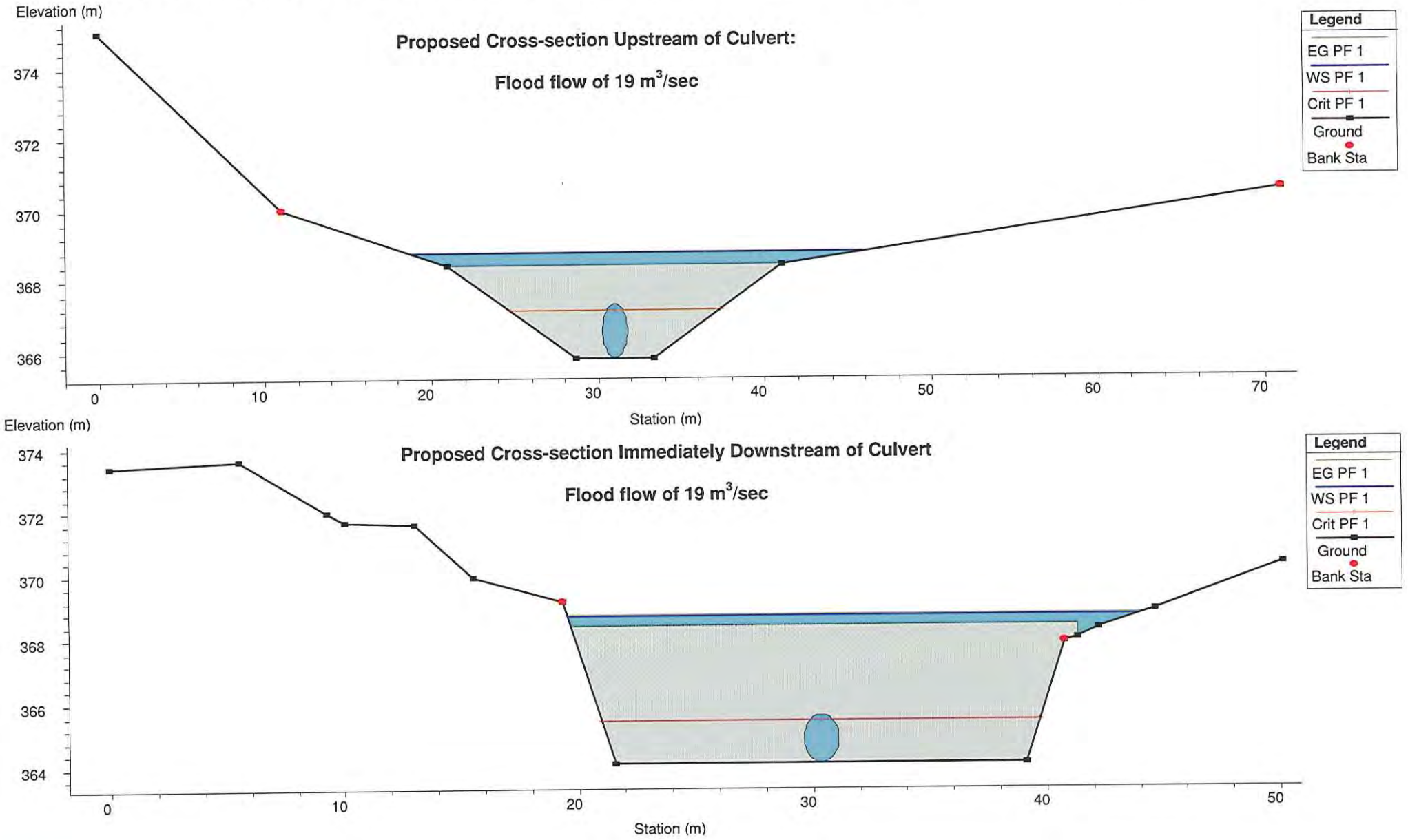
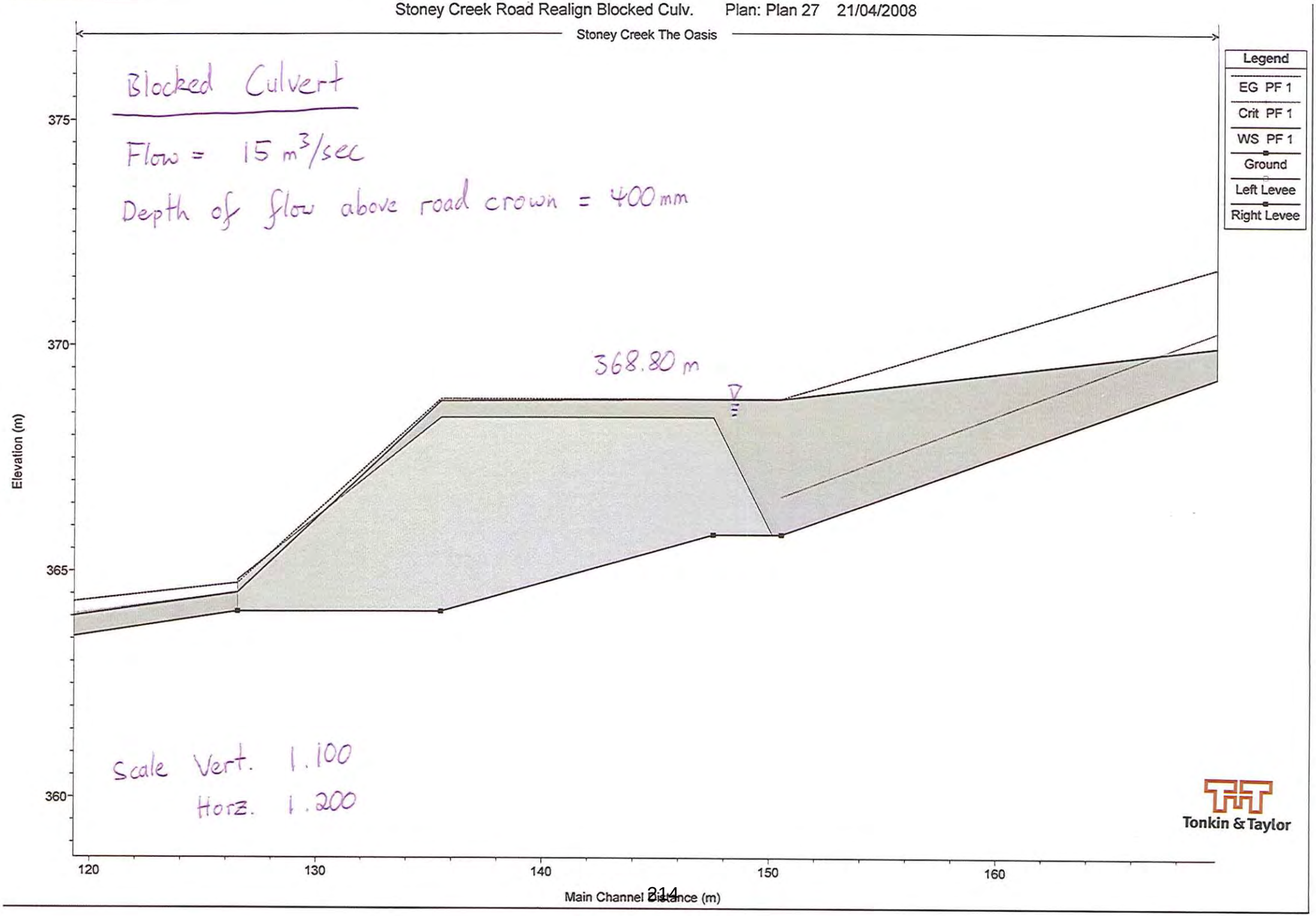


Figure 4: Water level at Proposed Road and Culvert – 6 m^3/sec and 19 m^3/sec flood events




Stoney Creek Road Realign Blocked Culv. Plan: Plan 27 21/04/2008
Stoney Creek The Oasis
Blocked Culvert
Flow = 15 m³/sec
Depth of flow above road crown = 400 mm
368.80 m
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Left Levee
Right Levee
375
370
365
360
Elevation (m)
Scale Vert. 1.100
Horz. 1.200
120
130
140
150
160
Main Channel Distance (m)
Tonkin & Taylor

Coneburn Industrial Zone Site Coverage Variation

Economic Assessment

6 August 2021 – draft

m.e consulting

Coneburn Industrial Zone Site Coverage Variation

Economic Assessment

Prepared for

Queenstown Lakes District Council

Document reference: QLDC027.21/Report/Coneburn Economic Assessment DRAFT.docs

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Report author: Natalie Hampson (Director)

www.me.co.nz

Contents

Figures

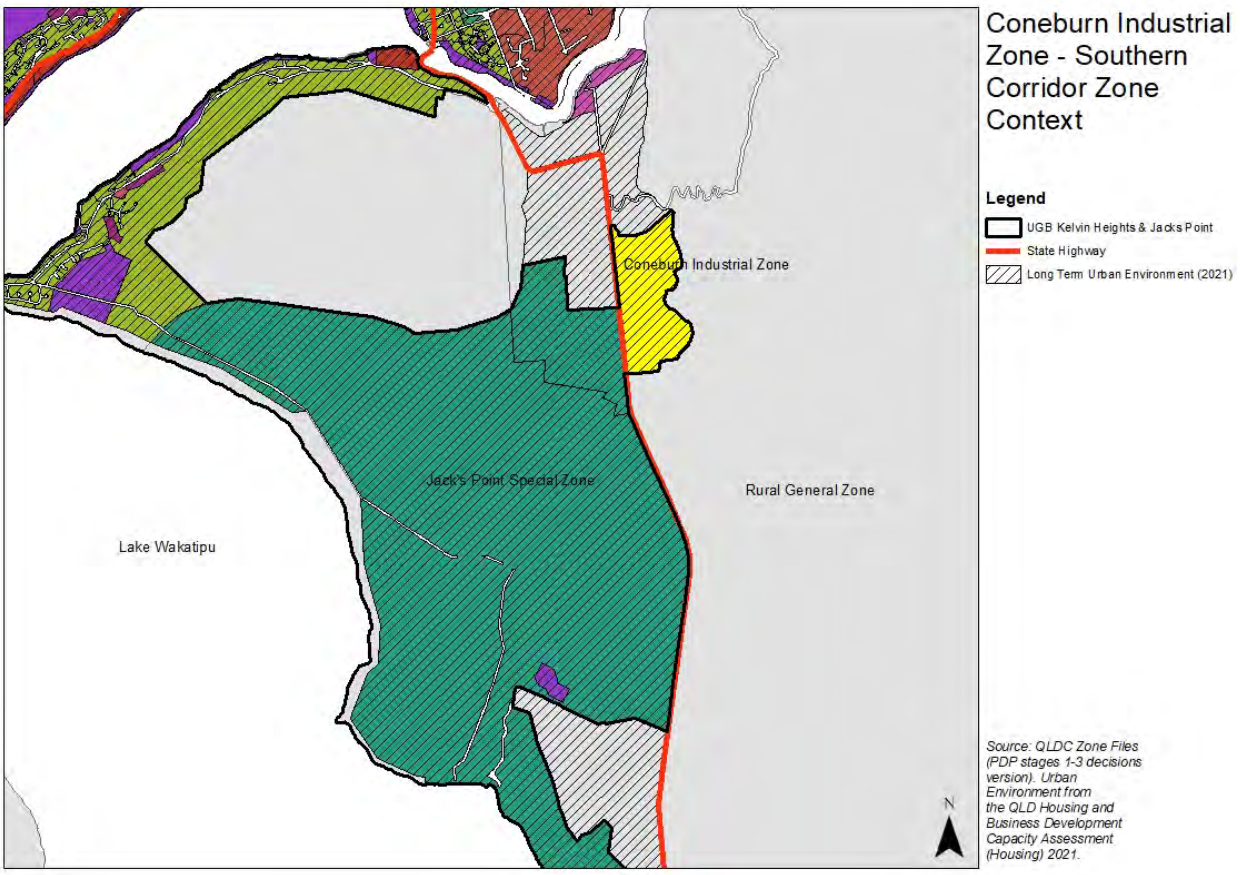
1 Introduction

Coneburn Industrial Zone was incorporated as Chapter 44 of the Queenstown Lakes District (QLD) Proposed District Plan (PDP) via stage 1 of the District Plan review. The zone has not yet been developed, although in its current form, it does already contain some industrial activities that may be expected to stay in future. The landowners have recently approached Council to amend the permitted site coverage for buildings within the zone. Market Economics (M.E) has been commissioned to provide an independent economic assessment of the proposed variation to the Plan to inform the section 32 evaluation.

1.1 Background

Coneburn Industrial Zone is a 70.99ha site located on State Highway 6 opposite the Jack's Point Special Zone in the southern corridor of Queenstown's urban environment (Figure 1.1). The purpose of the zone is to provide for the establishment and operation of industrial and service activities. Location wise, the site is close to a large current and future workforce, currently adjoins the Rural General Zone and is generally close to the Queenstown-Frankton 'market'.

Figure 1.1 – Coneburn Industrial Zone (Pink) – PDP Stage 1,2, and 3 Decisions Map



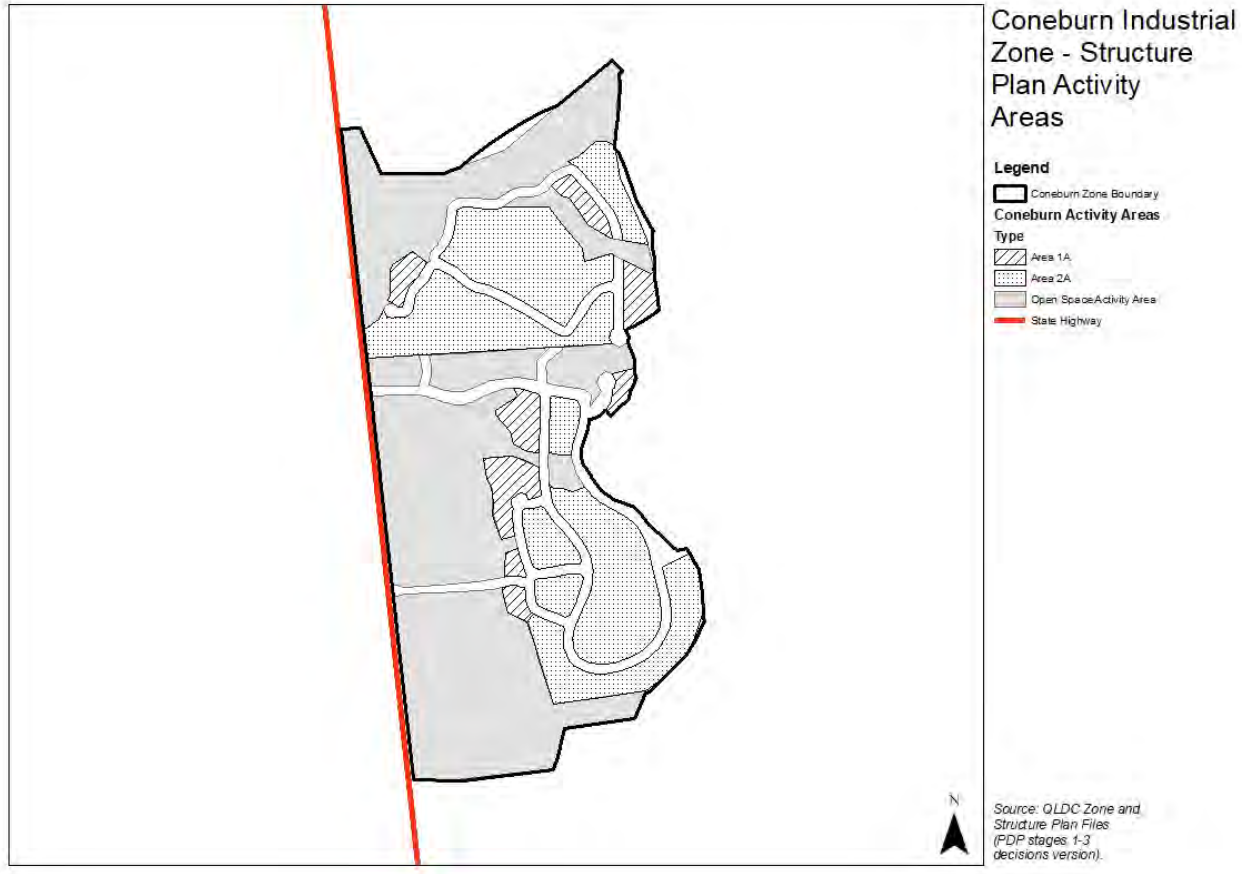
Compared with the decision version General Industrial and Service Zone (GISZ) incorporated in the PDP through stage 3 of the District Plan review (Chapter 18a), the Coneburn Zone enables trade suppliers and wholesaling (both permitted compared with discretionary and non-complying status respectively in the GISZ). Custodial units are discretionary in Coneburn but prohibited in the GISZ. Site coverage is more restrictive (discussed further below) and building height is managed through a measurement above sea level, rather than a specific height above ground level.

Permitted minimum lot size in Activity Area 2A (discussed below) of the Coneburn Zone is 1,000sqm (else discretionary), which is the same as in the GISZ (discretionary between 500-1,000sqm and non-complying less than 500sqm). Activity Area 1A of the Coneburn zone has a larger permitted 3,000sqm minimum lot size, so provides certainty that large lot activity will be provided for compared to the GISZ (where larger lot sizes are at the discretion of the landowner).

Otherwise, the two zones have a similar purpose and role – to provide capacity for the district's industrial and service economy. However, there is a key focus on screening buildings developed in the Coneburn Industrial Zone (using planting) so that they are not easily seen from State Highway 6. The GISZ has no such requirements and so uses the gross zoned land more efficiently.

1.1.1 Coneburn Structure Plan

Figure 1.2 – Coneburn Industrial Zone Structure Plan – Activity Areas



Development of the Coneburn Industrial Zone is managed via a structure plan set out in Chapter 44 of the PDP (Figure 1.2). Figure 1.3 summarises the composition of the structure plan. Only 37% of the gross zone area is able to be developed (net developable area) once open space and proposed roading is excluded. This equates to a maximum of 26.56ha of industrial land capacity, which is dominated (83%) by Activity Area 2A, which provides for the smaller of the two minimum lot sizes permitted (1,000sqm). Not all of this industrial land capacity is vacant. We discuss the estimated vacant capacity of the Zone further below.

Figure 1.3 – Coneburn Industrial Structure Plan Composition

	Hectares	Share of Gross Zone Area	Share of Development Area
Activity Area 1A	4.60	6%	17%
Activity Area 2A	21.96	31%	83%
Sub-Total Development Areas	*26.56*	*37%*	*100%*
Open Space plus Roads (Balance) *	44.43	63%	
Zone Total	70.99	100%	100%

Open Space boundaries and Roads can shift (within limits) and so these figures are indicative only)

1.1.2 Site Coverage for Buildings

Figure 1.4 sets out the operative site coverages for each Activity Area in the Zone and the proposed variation. The proposal does not seek to change any of the percentages (thresholds) previously established but seeks a change in activity status of the lower thresholds to make site coverage more enabling.

In Activity Area 1A, site coverage of between 30% and 40% is restricted discretionary in the current PDP, but the proposal would include that range within the permitted status (i.e. up to 40% would be permitted). In Activity Area 2A, site coverage between 35% and 65% is restricted discretionary, but the proposal would include that range within the permitted status (i.e. up to 65% would be permitted). The non-complying thresholds remain the same at 40% and 65% respectively.

As a comparator, Figure 1.4 includes the site coverage of the GISZ. This allows for a higher site coverage (with up to 75% permitted) than proposed in Activity Area 2A in Coneburn. It is also more enabling, with any coverage greater than 75% restricted discretionary only.

Figure 1.4 calculates the building footprint 'permitted' in each Activity Area in the Coneburn Zone if sites were subdivided at the minimum specified lots sizes. The indicative operative minimum building footprints permitted in the Coneburn Zone are around 360-900sqm GFA[1] depending on the Activity Area in which they occur. Under the proposed provisions, this increases to a permitted range of 660-1,200sqm GFA, again depending on the Activity Area. In the Activity Area 2A – where more intensive development is provided for – permitted buildings under the proposed provisions would be around 87% of the size of equivalent sized lots in the GISZ.[2] The implication is that Coneburn sites would continue to provide for relatively

[1] Gross Floor Area.

[2] Under the operative site coverage, permitted buildings in the Activity Area 2a would be 47% of the size permitted in the GISZ on equivalent sized lots (i.e., 1,000sqm minimum).

smaller permitted buildings but more on-site storage, yard area, parking, manoeuvring and potentially landscaping compared to the GISZ, even with the proposed changes.

Figure 1.4 – Current and Proposed Building Site Coverage Standards in Coneburn Industrial Zone

	Permitted	Restricted Discreationary	Non-complying	Minumum Permitted Lot Size	Indicative Minimum Permitted Building Footprint
Coneburn Operative Site Coverages:					
Activity Area 1A	Up to 30%	>= 30%	>=40%	3,000	900
Activity Area 2A	Up to 35%	>=35%	>=65%	1,000	360
Coneburn Proposed Site Coverages:					
Activity Area 1A	Up to 40%	N/A	>=40%	3,000	1,200
Activity Area 2A	Up to 65%	N/A	>=65%	1,000	660
Comparator					
GISZ	Up to 75%	>=75%	N/A	1,000	760

1.2 Scope of Assessment

A key objective of this assessment is to understand how the proposed increase in site coverages within the Zone (as set out in Figure 1.4) may impact industrial development capacity within the Wakatipu Ward in the short, medium, and long term in accordance with the NPS-UD. This includes any changes to the nature and scale of industrial development capacity in those time periods.

A second objective of this assessment is to then describe the economic related effects, costs and benefits likely to come about from the proposed building coverage variations, as required under s32 of the RMA.

To address the first objective, M.E has revisited the Interim Update of the QLD Business Development Capacity Assessment (BDCA) carried out in early 2020. We consider the assumptions applied for the Coneburn Zone in that analysis, how that may or may not differ using current information on the Structure Plan, and what effect the proposed variations might make in terms of industrial floorspace capacity in the Wakatipu Ward. This is discussed in Section 2.

Section 3 provides M.E's conclusions and recommendations on the proposed variation and a summary of wider economic costs and benefits of the variation (limited to the change in the building site coverage and not re-considering the economic effects of the zone itself).

2 Impacts on Industrial Capacity

This section sets out the approach and assumptions for assessing the effect of the proposed changes in site coverage on industrial capacity in the Wakatipu Ward. The assessment relies on modelling carried out for Council in the past under the NPS-UDC (2016) but considers the effect of new information.

2.1 Interim BDCA Update – Scope

The Interim BDCA Update[3] was carried out in March 2020, and updated BDCA modelling initially carried out for QLD Council's compliance with the NPS-UDC in 2017 (the 2017 BDCA). The update took account of:

- The change in Council growth (population and household) projections from 2016 to 2018 (faster growth), and the impact of this on associated employment growth projections.
- Associated with the above, a change in the base year for modelling business land and floorspace demand (from June 2016 to June 2018), and retaining a 3, 10 and 30 year future projection from that base year to cover the short, medium and long term outlook.
- The uptake (development and occupation) of vacant sites in business enabled zones between January 2018 and January 2020 (when surveyed).
- Changes in business enabled zoning that occurred between the notified stage 1 and 2 zones and the decisions version of those stages, which included among other changes, the inclusion of the Coneburn Industrial Zone.
- Notified zoning of stage 3 of the PDP, on top of the decision version of stage 1 and 2 and other updated zoning changes treated as operative. We note, the changes notified in the Wakatipu Ward under stage 3 made only a 0.1ha increase in vacant industrial land capacity compared to the decisions version on stages 1 and 2 and other changes in zoning incorporated in the update under the Maximum Capacity Scenario (79.5ha compared to 79.4ha). The changes notified increased the industrial land capacity under the Alternative Capacity Scenario by 0.5ha (an increase from 59.7ha to 60.2ha). These very minor changes arose because the notified GISZ[4] rezoned operative industrial zones in the Wakatipu Ward, with only very small additional sites/land areas included in the zoning.[5]

[3] https://www.qldc.govt.nz/media/ec5j0umf/qldc-t17-hampson-n-evidence-economic-18-03-2020.pdf (Appendix B)

[4] As notified, the zone was called the General Industrial Zone (GIZ).

[5] Changes in the Wanaka Ward were more substantial but are not reported here given the focus on Wakatipu Ward outcomes.

- Results with and without assumptions of Queenstown Airport Corporation (QAC) owned land in the Frankton Flats B Special Zone being made available for general market industrial development (i.e., whether or not it could be expected to be tied to the adjoining airport).[6]

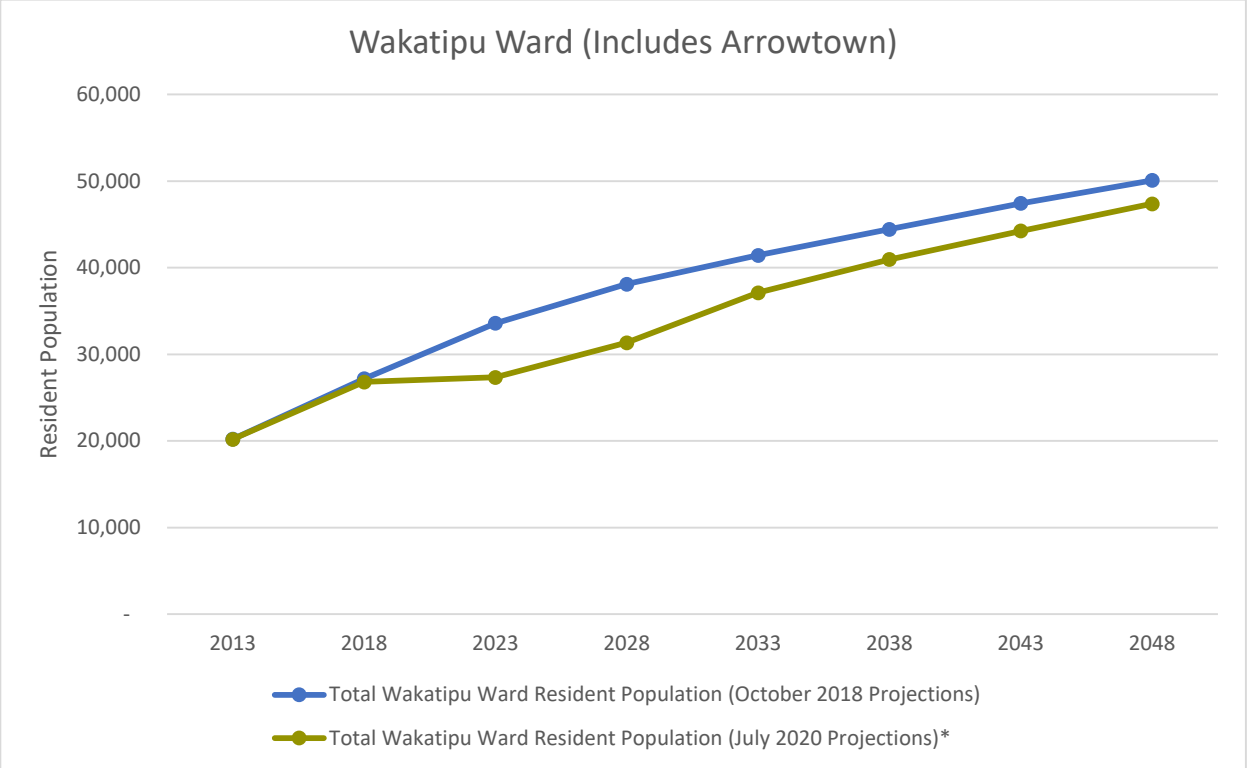
2.2 Reliability of the Interim BDCA Update Results Today

It is outside the scope of this assessment to generate another complete update of the BDCA model[7]. If we are to use the Interim BDCA update (with Stage 3 notified zoning scenario) as the basis for this Coneburn Assessment, it is therefore relevant to consider how reliable that base line is compared to the present. This assumes that we are still relying on a 2018-2048 perspective of future demand and a January 2020 perspective of vacant capacity. There are four key factors to consider:

2.2.1 Growth projections

In July 2020 Council released new growth projections to replace the 2018 projections. These projections have taken into account the anticipated impact of Covid-19. The preferred growth projection of the series produced in July 2020 is the high growth outlook.

Figure 2.1 – Comparison of Council Population Projections 2018 and 2020 (Wakatipu Ward)



[6] This scenario was on top of a preferred scenario of results which also excluded industrial capacity in the Airport Mixed Use Zone (including Lot 6 and Runway/Airside land) and associated Air Transport Services Sector demand on the basis that this capacity was not available to meet the demand of the general industrial market. We do discuss this scenario further in this assessment.

[7] Council is not obligated to update the BDCA (as part of the next HBA) until July 2024.

Figure 2.1 provides a comparison between the 2020 projection for resident population in Wakatipu Ward, compared with the 2018 projection that underpinned the employment projections in the Interim BDCA update. It shows that very little resident population growth is projected in the short term, but by the long term, the growth outcome is very similar (95% of the population projected in 2048 in the 2018 figures). The expectation is that the two lines on the graph would converge soon after 2048.

We would expect employment projections to have a similar profile if regenerated from the July 2020 population projections (i.e., limited growth in the short term and strong growth rates returning in the medium-long term, to achieve a similar outcome by 2048 as projected in 2018).

On the basis on this comparison, we consider that the demand modelling in the Interim BDCA Update is still relevant, particularly in the long term, and may be slightly conservative from a sufficiency perspective by testing slightly higher long term demand. Based on the current projections, the short-medium results of the Interim BDCA Update may overstate demand for industrial capacity and could be given less weight.

2.2.2 Decision's version of stage 3 compared to notified stage 3.

The Interim BDCA Update Stage 3 PDP scenario considered the notified zoning of the (then) General Industrial Zone (GIZ). There were no Stage 3 changes to the Business Mixed Use Zone, Coneburn Industrial Zone or any other business enabled zones that could support industrial land use (i.e., Frankton Flats B, Operative Business Zone, etc).

We have checked the spatial extent of the GIZ with the decision version of the GISZ[8] in the Wakatipu Ward and there are no changes in zone area based on the mapping files available and our understanding of the Stage 3 process and outcomes. While there were more material changes to zoning in the Wanaka Ward in the decisions version, the Wanaka catchment is outside of the scope of this assessment.[9]

In terms of the way that the decisions version of the GISZ enables industrial category land uses and building typologies, it would be treated the same as the notified GIZ in the BDCA Update (given the approach taken in the capacity modelling). There would also be no change in M.E's assumption under the Maximum Capacity Scenario and Alternative Capacity Scenario that the GISZ can be expected to totally provide for industrial development (i.e., 100% industrial category capacity).

On this basis, the zoning framework of the Interim BDCA Update Stage 3 scenario is still directly applicable with the most current zoning.

2.2.3 BDCA Assumptions around Coneburn Industrial Zone

The 2020 Interim BDCA Update clearly stated that "*Modelling structure plan areas was especially challenging in the BDCA 2017, and the same issue applies here as there are no Council GIS files available in those [Special] zones*". This caveat applied to all Special Zones and included Coneburn Industrial Zone.

[8] Decisions Version zoning is still subject to appeals.

[9] M.E maintain their previously expressed view that the two wards serve their own markets of demand with minor trade between them. From a sufficiency perspective, both should demonstrate sufficiency for industrial capacity in our view and they should not be treated in aggregate where a shortfall in one location can be offset by a surplus in the other location.

At the time of the BDCA 2017, Coneburn Industrial Zone did not exist. For the Topic 2 Appeals evidence (Natalie Hampson acting for Council),which post-dated the BDCA 2017 and pre-dated the Interim BDCA Update, M.E relied on assumptions of developable land capacity provided in Coneburn Industrial Zone economic evidence for the Bunning's Frankton hearing in order to incorporate the Coneburn Industrial Zone in capacity modelling at that time.[10] Coneburn was an area of focus in that hearing and so was the most recent evidence base on the zone available for consideration.

It is our understanding that GIS files for the proposed Coneburn Structure Plan were not available to witnesses in the Bunnings hearing, but that the sum of the two Activity Areas was confirmed by the landowners in Stage 1 PDP evidence, albeit there was still some minor differences between witnesses on this total area in the Bunnings Hearing, now able to be confirmed as 26.56ha based on GIS calculations.

At the time of the Bunnings hearing, M.E (Derek Foy, acting for Council) adopted a figure of 19.2ha of net vacant zoned area in the Coneburn Industrial Zone. This took into account the existing land use activities which fell within the Activity Areas 1A and 2A, that were expected to stay in-situ and therefore reduce the vacant capacity available for new growth in the Activity Areas. This assumption relied on (and was therefore very similar to) the evidence provided by the economic witness for the Coneburn Industrial Zone submission in the Stage 1 PDP hearing. See Appendix A for a summary of how M.E (Derek Foy) settled on the net vacant area of the Coneburn Industrial Zone in the Bunnings evidence. The approach is consistent with the way that vacant capacity was determined in the BDCA and subsequent update.

In the subsequent Interim BDCA Update, that figure of 19.2ha of net vacant capacity in Coneburn was rolled over in the capacity modelling, with Council given the opportunity to re-examine the assumptions at that time. No changes were made.

While M.E now have the benefit of the Structure Plan in GIS format (for this assessment), and we can see those existing activities visually (Figure 2.2), M.E does not have any better information on the likely land area that existing activities might choose to occupy in the future (when the Zone is developed).[11] On that basis, we have assumed that the amount of capacity deducted for existing activities remains the same as first estimated in evidence and we retain 19.2ha as the net vacant capacity of the zone today.

It is relevant to note that the evidence base relied on to inform the Coneburn vacant land capacity was relatively high level and did not consider floorspace capacity, hence did not need to split the 19.2ha of land capacity across the two Activity Areas.

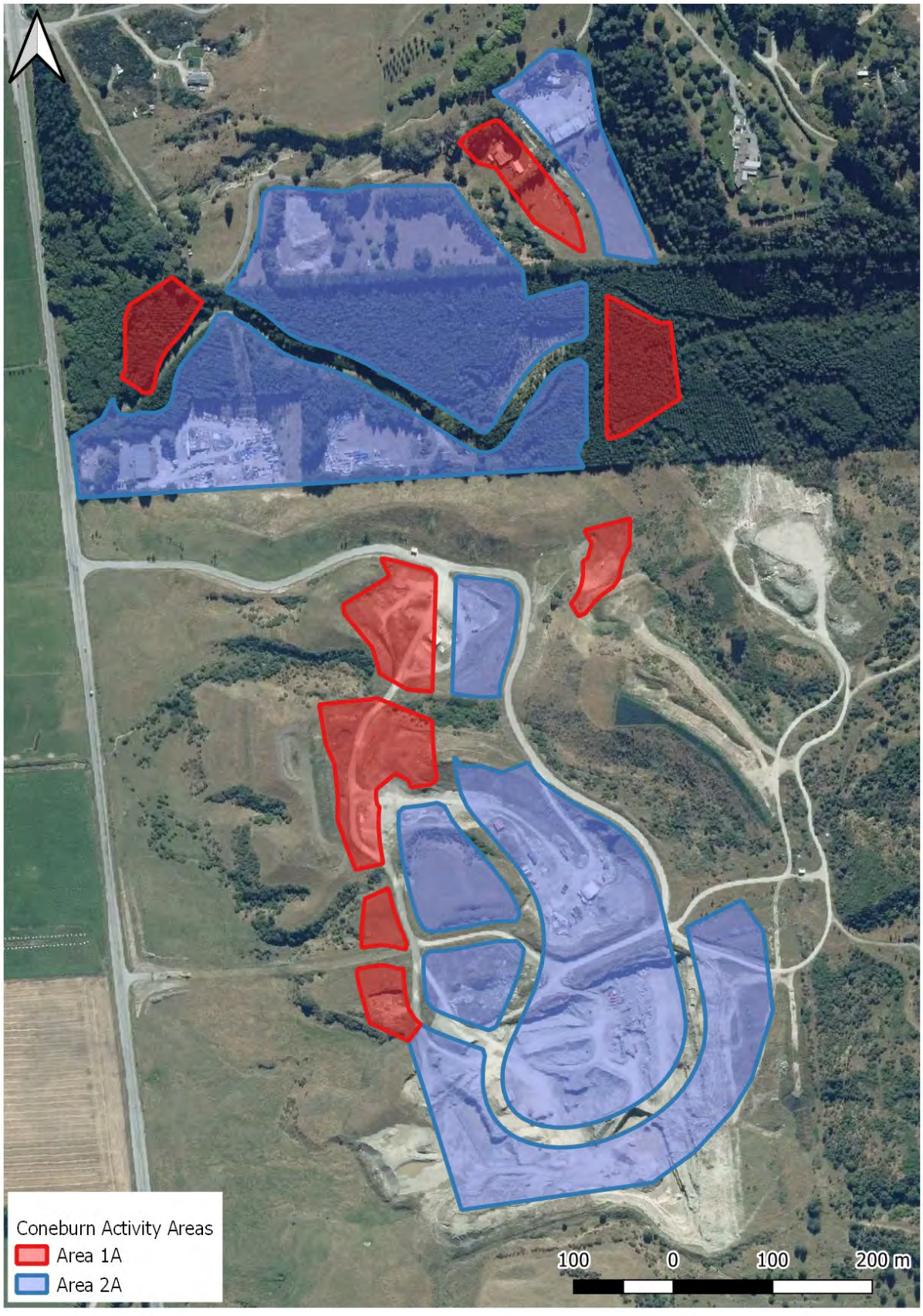
The next related consideration is the floorspace assumptions applied to that 19.2ha in the Interim BDCA Update. In total, the model showed an estimated 67,200sqm GFA[12] of industrial floorspace. This was calculated based on the following assumptions:

[10] ENV-2018-CHC-105, decision dated 5 April 2019.

[11] I.e., where site boundaries might be drawn to accommodate those businesses.

[12] Rounded to the nearest 100sqm GFA.

Figure 2.2 – Overlay of Coneburn Industrial Zone Activity Areas and Aerial Imagery Showing Existing Activities



- Permitted or controlled[13] (although only permitted is applicable in this Zone) site coverage of 35% applied to all of the developable land area.

- Single storey development, in keeping with the assumption that industrial buildings typically require ground floor space and higher internal roof heights, with little or no space on upper floors (including tenancies on upper floors available to other businesses).

In retrospect, this calculation was a simple one that did not reflect that there were two Activity Areas with different site coverages in the zone. It adopted the higher of the two coverages and applied it to the total developable vacant land area. For this to be valid, it would require all existing activities to occupy the Activity Area 1A, and a small amount of Activity Area 2A, leaving only the residual of Activity Area 2A for future growth.

As with all zones that have structure plans, a more comprehensive approach to calculating capacity in the BDCA Update was hampered by a lack of GIS files able to be supplied to M.E at the time. Figure 2.2 now shows that the existing areas that may be expected to remain in-situ are in the northern part of the zone, and occupy mainly the Activity Area 2A, with only one existing building occupying the Activity Area 1A. This shows that the approach used to calculate vacant floorspace capacity in the Interim BDCA Update was not valid. We conclude that the maximum GFA of 67,200sqm overstated the floorspace capacity of Coneburn Industrial Zone to a minor (3%) degree (all else being equal) as a portion of the 19.2ha of vacant land should have been multiplied by the lower permitted site coverage for Activity Area 1A.

Figure 2.3 contains a revised calculation using the BDCA Update approach of permitted floorspace coverage, now applying separate calculations of operative site coverage for each activity area. For the purpose of this assessment, M.E has assumed that existing activities occupy 6% of the gross Activity Area 1A and 32% of the gross Activity Area 2A. The result is an estimated 65,000sqm GFA of vacant industrial floorspace capacity instead of 67,200sqm previously estimated.

Figure 2.3 – Revised Industrial Floorspace Capacity of Coneburn Industrial Zone – Operative Permitted Site Coverage by Activity Area

Activity Area 1A (sqm)	Activity Area 2A (sqm)	Total Activity Areas (sqm)	Parameter
43,202	148,659	191,861	Developable sqm of Vacant Zoned Land
30.0%	35.0%	33.9%	Building coverage (showing weighted average for Total Activity Areas)
1	1	1	Storeys of development
13,000	52,000	65,000	Building GFA (Rounded)

[13] It is noted that while the NPS-UDC (which was applied at the time of the Interim BDCA Update) considered 'zoned capacity' to include zones where businesses were permitted, controlled or restricted discretionary, the decision was made with Council that the capacity modelling would apply just permitted or controlled building heights and site coverages. The permitted, controlled or restricted discretionary approach was applied in the BDCA modelling to identify business enabled zones and also to identify activities enabled in those zones.

This minor reduction in industrial floorspace capacity in the Wakatipu Ward has no impact on the sufficiency conclusions previously reported in the Interim BDCA Update Addendum (which are summarised in Appendix B).

2.2.4 Uptake of Vacant Capacity

Last, at the time of drafting (August 2021), there has been a further 17 months (since January 2020) of development and uptake of vacant capacity in business enabled zones, including those which provide capacity for industrial category land uses and building typologies. As at January 2020, the following vacant developable industrial land area was estimated in the Wakatipu Ward (Stage 3 scenario)[14]:

- 79.5ha (60.3ha excluding Coneburn's 19.2ha) – Maximum Capacity Scenario (which double counts capacity where commercial and retail activities are also enabled in the same zone).
- 60.2ha (41.0ha excluding Coneburns's 19.2ha) – Alternative Capacity Scenario (where double counting is removed based on a scenario of the mostly supply of capacity between competing industrial, commercial and retail land uses).
- 37.1ha (17.9ha excluding Coneburns's 19.2ha) – Alternative Capacity Scenario also excluding capacity attributed to the Airport Mixed Use Zone in Frankton (and associated Air Transport Services Demand in Wakatipu Ward) on the basis that much of this land was 'air-side' and not available to cater for general industrial sector growth.

Given the passage of time, albeit with Covid-19 having some impact starting to be felt in non-residential building consents since March 2021, M.E expects that less of this vacant capacity outside of the Coneburn Zone (which has not changed) is available today than when it was last surveyed. How much less, has not be quantified and is outside the scope of this assessment.

The implication is really one of context. In relying on the Interim BDCA update for this assessment, any actual reductions in capacity that have occurred since the modelling are already estimated within the demand side of that modelling. It just means that the Short Term sufficiency results (2018-2021) are more likely to be representative of the situation today (limitations of the modelling notwithstanding).

2.3 Interim BDCA Results

The results of the Interim BDCA Update for land and floorspace industrial demand and capacity in Wakatipu Ward 2018-2048 are contained in Appendix B. it should be noted that the demand projections in the sufficiency analysis include a competitiveness margin on top of demand (20% in the short-medium term and 15% in the long term) to help ensure that Council provides "at least" sufficient capacity.

As the proposed changes to site coverage do not affect the size of the land that is vacant in the Coneburn Industrial Zone, the proposed changes have no impact on sufficiency of industrial land. The industrial floorspace results showed the following in the long term (including the revision for Coneburn GFA):

[14] See Appendix B for floorspace capacity estimates.

- Maximum Capacity Scenario – a surplus of 227,900sqm GFA (or 225,700sqm GFA correcting Coneburn)
- Alternative Capacity Scenario – a surplus of 101,100sqm GFA (98,900sqm GFA correcting Coneburn)
- Alternative Capacity Scenario Excluding AMU Zone Capacity and Wakatipu Air Transport Services Sector Demand – a shortfall of -50,600sqm GFA (-52,800sqm GFA correcting for Coneburn).

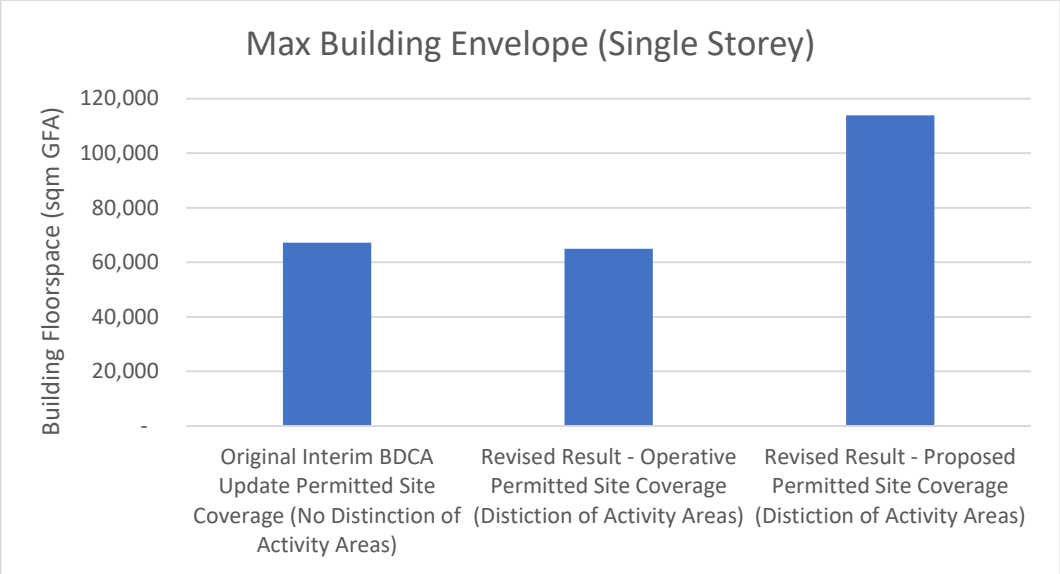
2.3.1 Effect of the Proposed Site Coverages on GFA Sufficiency

Figure 2.4 and 2.5 show the impact of the proposed change in permitted site coverage in the Coneburn Industrial Zone Activity Areas, using the BDCA approach of permitted or controlled development parameters. When compared with Figure 2.3 above, the effect of increasing permitted coverage from 30% to 40% in Activity Area 1A and 35% to 65% in Activity Area 2A is an increase in permitted floorspace of 48,900sqm (169%) in the Zone – increasing from 65,000sqm to 113,900sqm GFA.

Figure 2.4 – Revised Industrial Floorspace Capacity of Coneburn Industrial Zone – Proposed Permitted Site Coverage by Activity Area

Activity Area 1A	Activity Area 2A	Total Activity Areas	Parameter
43,202	148,659	191,861	developable sqm of zone
40.0%	65.0%	59.4%	Building coverage (showing weighted average for Total Activity Areas)
1	1		Storeys of development
17,300	96,600	113,900	Building GFA (Rounded)

Figure 2.5 – Comparison of Industrial Floorspace Capacity Estimates for Coneburn Industrial Zone – Original, Revised, and Proposed Site Coverage



With reference to the Interim BDCA Update results, the proposed site coverage changes would provide a further buffer of industrial floorspace capacity in Wakatipu Ward under the Maximum Capacity and Alternative Capacity Scenario as modelled. The increase in permitted floorspace also goes a long way to reduce the estimated shortfall in the Alternative Capacity Scenario Excluding Airport related demand and capacity (i.e., a 48,900sqm increase compared to a 52,800sqm shortfall), but a very minor shortfall would remain by 2048 (-3,900sqm GFA)[15].

If the BDCA modelling was instead running of the Council's latest (July 2020) projections, which are slightly lower in 2048 from those modelled in the BDCA Update, the estimated shortfall *may* be totally offset by the proposed changes in activity status for site coverage in Coneburn. However, in the absence of another full update of the BDCA modelling, that effect cannot be quantified with any certainty.

2.3.2 Limitations of the BDCA Modelling Approach

There are two relevant issues to be considered when interpreting these BDCA-based results:

First, land is a more robust indicator of sufficiency for industrial demand and capacity than floorspace given the high dependency on ground floor space, outdoor storage (yards) and the fact that many types of industrial activity are not suited to mixed use buildings. This has been discussed in the BDCA 2017 report and again in the Interim BDCA Update Addendum. In contrast, floorspace is considered the more robust indicator of sufficiency for retail and commercial development.

Industrial activity is relatively more land extensive than other forms of business activity, with some industrial businesses requiring land but little or no built space. Care is therefore needed in considering floorspace demand and capacity independently of land demand and capacity. While we are able to calculate industrial demand and capacity in floorspace terms (and have done so above), M.E continues to advocate that greater weight should be given to the land sufficiency outcomes – for which this proposed variation in Coneburn Industrial Zone has no impact.

Second, the increase in industrial floorspace GFA associated with the proposed variation to site coverages is not necessarily a net increase to the counterfactual (i.e. what floorspace could develop with no change to the operative site coverage provisions).

The proposed change is only a change in compliance levels – a shift towards more enabling development. The same level of floorspace (i.e. 113,900sqm GFA – Figure 2.4) may still be achievable under the current mix of permitted and restricted discretionary site coverage status (discussed further in Section 3). This highlights the limitations of the BDCA modelling, which is sensitive to assumptions such as permitted or controlled status only for building height and site coverage parameters.

M.E considers that while the BDCA is a necessary[16] and useful tool for council, it is only somewhat relevant to evaluating the economic costs and benefits of the proposed site coverage changes in the Coneburn Industrial Zone.

[15] Note, the industrial land shortfall in 2048 in that scenario is estimated at -5.5ha and is not influenced by any changes in site coverage proposed in the Coneburn Zone.

[16] The assessment was required under the NPS-UDC and continues to be a requirement under the NPS-UD.

3 Conclusions, Costs and Benefits

This section considers wider economic costs and benefits of the proposed variation in site coverages in Activity Areas 1A and 2A in the Coneburn Industrial Zone and provides an overall recommendation for Council from an economic perspective.

The scope of the proposed variation is very narrow – limited to site coverage provisions – and as such, the scope of potential economic costs and benefits is also limited. Care has been taken not to conflate potential costs and benefits with those associated with the provision of the Coneburn Industrial Zone generally, as this is captured in the status quo.

We consider that there are slight differences in costs and benefits depending on whether one considers them from the perspective of the initial developers of the sites in the Zone - where new owners/investors bear the cost of resource and building consents but customise the sites to their needs - compared with future/subsequent occupants - where buildings are already developed and prospective buyers/tenants make a decision to occupy based on the improvements already established on site (and how well they fit with the operational and functional needs of their business).

3.1 Economic Benefits

Removing the restricted discretionary site coverage (and making them permitted instead) *potentially* enables a broader range of industrial business types to locate in the Zone. That is, Coneburn may be considered a more attractive location for businesses seeking sites with 30-40% site coverage on sites greater than or equal to 3,000sqm and for businesses seeking sites with 35-65% site coverage on sites greater than or equal to 1,000sqm, compared with the status quo.

The consequent effect of this potential benefit is that the effectiveness[17] of the Zone to provide capacity for industrial and service activities increases as it could cater for a greater range of business (in terms of the scale and nature of business demand) under a permitted site coverage compared to the status quo. This is highlighted in Figure 1.3 where permitted buildings in the Activity Area 2A, for example, increase from a minimum of 360sqm GFA to 660sqm GFA under a permitted status.

This in turn will allow the Coneburn Zone to compete more strongly with the GISZ as an alternate location for industrial development or business operation. This reduces the risk for the land developer and therefore improves the commercial feasibility of bringing the Zone to market.

The larger buildings permitted under the proposed provisions may also improve the commercial feasibility of development for some purchasers/developers. This could generate more income and value associated with built space to help offset (recover) the costs of development. Larger buildings may also allow building owners to create additional tenancies within the building envelope on site (creating another stream of

[17] While on the face of it, higher site coverage can be considered a more efficient use of the land, care is needed with determining efficiency in industrial zones as the pure economic approach discounts the role of yard based/land extensive industries in the industrial and wider economy. M.E considers that providing zoned capacity for land extensive industrial activities contributes to the overall efficiency of the district and urban economy. As such, we do not claim any net additional efficiency benefits here.

income). An increased scale of buildings on each site may also sustain for construction activity (GDP and employment benefits for the district).

These benefits above apply for the initial development phase of the individual lots and/or their future/subsequent occupation (i.e., churn of businesses over time).

We caveat these direct and consequent benefits with the term '*potentially*' because these benefits apply only in so far as a restricted discretionary activity status for site coverages between 30-40% and 35-65% respectively would have put-off, deterred or constrained initial development of the sites by owners of more land intensive businesses (i.e., those seeking to build larger buildings than currently permitted) under the status quo.

Under the operative provisions for the Zone, buildings already require a controlled non-notified consent, but the restricted discretionary site coverage would elevate the consent application to a notified or partially notified consent (with additional assessment matters to be addressed in the application). There is a cost associated with this (discussed below).

It is outside our area of expertise to determine how onerous (or not) the matters of discretion would be to address/overcome. Our 'observation' of Zone Standard 44.5.5 is that the discretion is focussed on traffic/transport matters, primarily on-site, as they relate to the intended activity. It follows that the applicant would not seek the additional site coverage (and reduced yard area) unless it suited them on that particular sized lot. If they required both the larger building and larger yard area, they would seek a larger site where both could be achieved. We therefore estimate that demonstrating that on-site traffic/transport matters can be addressed/managed would not be an especially onerous task for consent applicants, nor result in trade-offs that would constrain or deter site development under a restricted discretionary consent to a more than minor degree.

If the current restricted discretionary activity status of site coverages in each Activity Area *is* unlikely to materially deter those wanting to develop the sites, then the above benefits may be negligible for the initial development period of the Zone (because the counterfactual would also enable a broad range of industrial and service businesses to establish at a broader range of sizes). This outcome does not however lessen the benefits above that apply to the long term occupation of (and churn within) the Zone.

Related to the above, a benefit of the proposed changes to the activity status of site coverages is the reduced compliance costs for those initial developers of sites in the zone (i.e. savings associated with those that could apply for a controlled non-notified consent instead of a notified or partially notified restricted discretionary consent). These reduced time and financial costs (unquantified in this assessment) will benefit both applicants and Council, although it is not known how many sites would have sought a restricted discretionary consent under the status quo. If every potential future lot in the zone was subdivided at the minimum lot size and all would have sought a restricted discretionary consent (unlikely), then this could have been approximately 160 consent applications by M.E estimates.[18] This is considered an absolute maximum as it is more likely that a portion of sites would be satisfied to develop under the existing permitted site coverages and bear the costs of a controlled consent only.

[18] I.e. 4.3ha in Activity Area 1A divided by 3,000sqm lots and 14.8ha in Activity Area 2A divided by 1,000sqm lots equates to approximately 160 lots. This does not taken into account the size and shape of areas able to be subdivided, and any constraints, that may reduce the number of lots can be created in practice.

3.2 Economic Costs

Changing the site coverages to become more enabling may result in a reduction of industrial capacity perceived[19] by the market to be available for more land extensive industrial and service businesses, particularly in Activity Area 2A where the change from restricted discretionary to permitted is more significant and the permitted minimum lot size is the same as permitted in the GISZ (narrowing the differences between the two zones).[20] This is a potential opportunity cost arising from the proposed changes.

Relatedly, by making sites more enabling of development (by providing for a greater range of permitted building sizes and therefore potential uses of the sites by industrial and service businesses), this may increase the value and therefore cost of the land (and developed sites) in the Coneburn Zone. Any change in value is however anticipated to by minor when considered in conjunction with the activities enabled in the zone. These provide mainly for industrial and service (and ancillary/accessory) activities (with 'ability to pay' limited to the range within this sector) and exclude those activities which would be more likely to drive up land prices (such as retail and commercial development which have a higher 'ability to pay' compared to many businesses in the industrial and service sector). That is, there will be competition for sites within the industrial and service sector, but not between sectors of the economy.

However, as discussed above, these costs/opportunity costs arise only in so far as a restricted discretionary status for building coverage would have put off, deterred, or constrained more land intensive businesses from taking up sites in Coneburn Industrial Zone under the status quo.

If the current restricted discretionary activity status of site coverages in each Activity Area *is* unlikely to materially deter those wanting to develop the sites, then the above costs/opportunity costs may be negligible because the counterfactual would also enable a broad range of industrial and service businesses to establish at a broader range of sizes.

3.3 Recommendation

Overall, M.E consider that the economic benefits and costs of the variation are likely to be no more than minor but that benefits from the proposed site coverage changes may still outweigh any potential costs.

We do not anticipate any more than minor adverse economic outcomes in terms of providing capacity for Wakatipu Ward's industrial and service economy growth. Given that Coneburn has yet to be developed, and that potentially there is only limited remaining zoned capacity for industrial (and service) land use growth elsewhere in the Wakatipu Ward (depending on what capacity scenario is considered), and less than previously surveyed in January 2020, Coneburn may be the only real 'pure' industrial growth option in the Ward by the time it comes to market.

If that is the case, it makes sense that the Zone offering is closer to what can be supplied in the GISZ given that the provisions of that new zone were developed with the future industrial economy in mind. With the

[19] Perceptions based on the intent of the different activity statuses of site coverage only.

[20] The 3,000sqm minimum lot size in the Activity Area 1A helps protect capacity for a small number of large scale yard-based businesses and the minor increase in permitted site coverage proposed would not materially reduce that opportunity.

proposed changes, the Activity Area 2A approaches the development potential of the GISZ while the Activity Area 1A continues to protect a small amount of capacity for larger-scale or very land-extensive businesses going forward.

M.E recommends that the proposed variation be approved from an economic costs and benefits perspective. There is uncertainty as to how a relatively more enabling site coverage framework will result in real changes in Zone development over time relative to the status quo. It is possible and perhaps likely that given limited options for vacant industrial sites throughout Wakatipu Ward that the existing mix of permitted and restricted discretionary activity status would deliver the same outcome. If this is the case, then the key net benefit of the variation is regulatory efficiency – including reducing compliance costs by reducing reliance on more complex resource consent processes, reducing the requirements for notification, simplifying develop controls in the District Plan and improving competition and commercial feasibility of industrial development. As the GISZ is still more enabling (i.e., site coverage of 75% is permitted), then we consider there would be very low risk of approving the proposed changes, if any.

Appendix A – Bunnings Hearing Evidence

The following is extracted from the evidence in chief of Mr Derek Foy, acting for Council in the Environment Court appeal on the Bunnings Limited consent application in Frankton (ENV-2018-CHC-15). At the time, the Coneburn Industrial Zone was subject to an appeal, but the various economic experts (and planning experts) had provided commentary on the scale of potential industrial land capacity in the Coneburn Industrial Zone. Mr Foy's estimate of 19.2ha of vacant capacity (after existing activities were excluded) was adopted for the Topic 2 Appeals evidence by Natalie Hampson for Council, which later rolled over into the Interim BDCA update.

7.25 I note that several different estimates of the land area proposed to be zoned Industrial at Coneburn were presented to the PDP hearings. The Coneburn Structure Plan shows 26.53ha of Industrial land[12], within a total land area sought to be rezoned of 62.5ha (the balance of 36ha is "Open Space No buildings or structures"). Evidence presented by Ms Alyson Hutton (the submitter's planner) identified 27.25ha of Industrial land within a total of 63.24ha.[13]

7.26 Evidence presented by Mr Copeland[14] (also on behalf of the submitter requesting rezoning at Coneburn) recorded a total of 19.5ha of additional industrial land that was proposed to be created[15], over and above the existing and consented industrial activities:

> .....within the proposed zone change site are a number of existing industrial activities including a quarry, a construction depot and a mechanical workshop. There are synergies from the co-location of industrial activities together. Also one of the owners of the land proposed for rezoning is a related company to the owner of the nearby Remarkable Ski Field and it is anticipated that part of the site would be utilised for the storage and maintenance of plant and equipment for the operation and maintenance of the skifield. There are economic efficiency benefits from having a yard for such activities in close proximity to the skifield.[16]

7.27 Mr Copeland has advised me that his recollection is that his estimate of 19.5ha was derived using the total industrial zoned area proposed, and subtracting land that is either already used for industrial activities or would be committed to providing for skifield use.

7.28 Mr Tansley has recognised that part of the area is already occupied, , and has estimated that these existing activities might account for 2.5-7.5ha, which should then be removed from the total proposed industrial land area.[17] Some or all of the existing industrial activities might leave Coneburn and free up land

12 4.59ha of Activity Area 1a, and 21.94ha of Activity Area 2a.
13 Paragraph 3.2.
14 Available at: http://submissions.qldc.govt.nz/Consult24Prod/Consult24Office//Docs//PID_5/5_404_EEP1O4_Annexure%20I%20Economic%20Analysis.pdf.
15 Paragraph 1.1.
16 Paragraph 4.12.
17 Paragraph 5.14.

there, but would then require land elsewhere, resulting in no net increase in supply.

7.29 As a conservative estimate then I suggest that if the Coneburn appeal is unsuccessful, the net additional industrial land supply the proposal might create would be in the order of 20ha, not the 27.5ha indicated by Mr Heath.[18] That 20ha may not be available to the market for some time, given the possible timing of the PDP appeals, and then time needed to service the land and otherwise ready it for bringing to market.

Appendix B – Interim BDCA Update Results

Copies of (Industrial Wakatipu only) Interim BDCA Update Results for the PDP Stage 3 Scenario, as reported. Results include the competitiveness margin on top of demand (20% in the short-medium term and 15% in the long term).

Scenarios include:

- Maximum Capacity Scenario (which double counts capacity where commercial and retail activities are also enabled in the same zone).
- Alternative Capacity Scenario (where double counting is removed based on a scenario of the mostly supply of capacity between competing industrial, commercial and retail land uses).
- Alternative Capacity Scenario also excluding capacity attributed to the Airport Mixed Use Zone in Frankton (and associated Air Transport Services Demand in Wakatipu Ward) on the basis that much of this land was 'air-side' and not available to cater for general industrial sector growth.

Industrial - Maximum Capacity Scenario – Land (ha)

Category by Ward	Cumulative Land Demand (Ha)			Total Vacant Business Zone Land 2020 (ha) *	Sufficiency		
	Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)		Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)
Industrial							
Wakatipu	7.0	20.5	47.0	79.5	Sufficient	Sufficient	Sufficient

Source: QLD EFM 2018, 2020 Update (QLDC Recommended Oct 2018 Population, High Tourism, High Other), M.E

*Projected demand and current capacity within core business enabled zones in defined urban environment only. Wakatipu Ward includes both Queenstown and Arrowtown Wards. * Maximum capacity assuming no uptake by other enabled land uses. Will overstate capacity where other land uses take precedent.*

Capacity Scenario: ***January 2020 Zone (Consolidated District Plan Plus Other Changes and Proposed Stage 3)***

Industrial - Maximum Capacity Scenario – Floorspace (sqm GFA)

Category by Ward	Cumulative GFA Demand (sqm)			Total Vacant Business Zone GFA 2020 (sqm) *	Sufficiency		
	Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)		Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)
Industrial							
Wakatipu	33,000	96,000	219,400	447,300	Sufficient	Sufficient	Sufficient

Source: QLD EFM 2018, 2020 Update (QLDC Recommended Oct 2018 Population, High Tourism, High Other), M.E. Figures rounded to nearest 100.

*Projected demand and current capacity within core business enabled zones in defined urban environment only. Wakatipu Ward includes both Queenstown and Arrowtown Wards. * Maximum capacity assuming no uptake by other enabled land uses. Will overstate capacity where other land uses take precedent.*

Capacity Scenario: ***January 2020 Zone (Consolidated District Plan Plus Other Changes and Proposed Stage 3)***

Industrial - Alternative Capacity Scenario – Land (ha)

Category by Ward	Cumulative Land Demand (Ha)			Total Vacant Business Zone Land 2020 (ha) *	Sufficiency		
	Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)		Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)
Industrial							
Wakatipu	7.0	20.5	47.0	60.2	Sufficient	Sufficient	Sufficient

Source: QLD EFM 2018, 2020 Update (QLDC Recommended Oct 2018 Population, High Tourism, High Other), M.E

*Projected demand and current capacity within core business enabled zones in defined urban environment only. Wakatipu Ward includes both Queenstown and Arrowtown Wards. * Overlap in capacity has been removed, refer to the scenario assumptions in appendices.*

Capacity Scenario: ***January 2020 Zone (Consolidated District Plan Plus Other Changes and Proposed Stage 3)***

Industrial - Alternative Capacity Scenario – Floorspace (sqm GFA)

Category by Ward	Cumulative GFA Demand (sqm)			Total Vacant Business Zone GFA 2020 (sqm) *	Sufficiency		
	Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)		Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)
Industrial							
Wakatipu	33,000	96,000	219,400	320,500	Sufficient	Sufficient	Sufficient

Source: QLD EFM 2018, 2020 Update (QLDC Recommended Oct 2018 Population, High Tourism, High Other), M.E. Figures rounded to nearest 100.

*Projected demand and current capacity within core business enabled zones in defined urban environment only. Wakatipu Ward includes both Queenstown and Arrowtown Wards. * Overlap in capacity has been removed, refer to the scenario assumptions in appendices.*

Capacity Scenario: ***January 2020 Zone (Consolidated District Plan Plus Other Changes and Proposed Stage 3)***

Industrial - Alternative Capacity Scenario and Excluding AMU Zone Capacity and Wakatipu Air Transport Services Sector Demand – Land (ha)

Category by Ward	Cumulative Land Demand (Ha)			Total Vacant Business Zone Land 2020 (ha) *	Sufficiency		
	Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)		Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)
Industrial							
Wakatipu	6.2	18.4	42.6	37.1	Sufficient	Sufficient	Insufficient

Source: QLD EFM 2018, 2020 Update (QLDC Recommended Oct 2018 Population, High Tourism, High Other), M.E

*Projected demand and current capacity within core business enabled zones in defined urban environment only. Wakatipu Ward includes both Queenstown and Arrowtown Wards. * Overlap in capacity has been removed, refer to the scenario assumptions in appendices. Queenstown Airport demand & capacity excluded.*

Capacity Scenario: ***January 2020 Zone (Consolidated District Plan Plus Other Changes and Proposed Stage 3)***

NOTE - EXCLUDES INDUSTRIAL AND COMMERCIAL DEMAND FOR AIR TRANSPORT SERVICES IN WAKATIPU WARD AND CAPACITY IN THE AIRPORT MIXED USE

Industrial - Alternative Capacity Scenario Excluding AMU Zone Capacity and Wakatipu Air Transport Services Sector Demand – Floorspace (sqm GFA)[21]

Category by Ward	Cumulative GFA Demand (sqm)			Total Vacant Business Zone GFA 2020 (sqm) *	Sufficiency		
	Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)		Short Term (2018-2021)	Medium Term (2018-2028)	Long Term (2018-2048)
Industrial							
Wakatipu	28,900	85,400	197,600	147,000	Sufficient	Sufficient	Insufficient

Source: QLD EFM 2018, 2020 Update (QLDC Recommended Oct 2018 Population, High Tourism, High Other), M.E

*Projected demand and current capacity within core business enabled zones in defined urban environment only. Wakatipu Ward includes both Queenstown and Arrowtown Wards. * Overlap in capacity has been removed, refer to the scenario assumptions in appendices. Queenstown Airport demand & capacity excluded.*

Capacity Scenario: ***January 2020 Zone (Consolidated District Plan Plus Other Changes and Proposed Stage 3)***

NOTE - EXCLUDES INDUSTRIAL AND COMMERCIAL DEMAND FOR AIR TRANSPORT SERVICES IN WAKATIPU WARD AND CAPACITY IN THE AIRPORT MIXED USE

[21] The table was not previously included in the Interim BDCA Update Addendum report but was in the underlying model.

Shotover Design Limited trading as
Clark Fortune McDonald & Associates
Licensed Cadastral Surveyors - Land Development - Planning Consultants

10th July 2020

MEMORANDUM

RE: Coneburn Industrial Zone, Chapter 44 – Potential Variation

I have prepared a memorandum to document some background to inform discussions on potential amendments to the Chapter 44 planning framework:

The original submission 361 to Stage 1 of the District Plan review was made by landowners Trojan Holdings Ltd and Scope Resources Ltd as well as three other individuals. Submission 361 sought a light industrial zone which was based upon access from SH6 at two points. An existing Priority T intersection and a four-leg roundabout at the intersection of Woolshed Road and SH6:

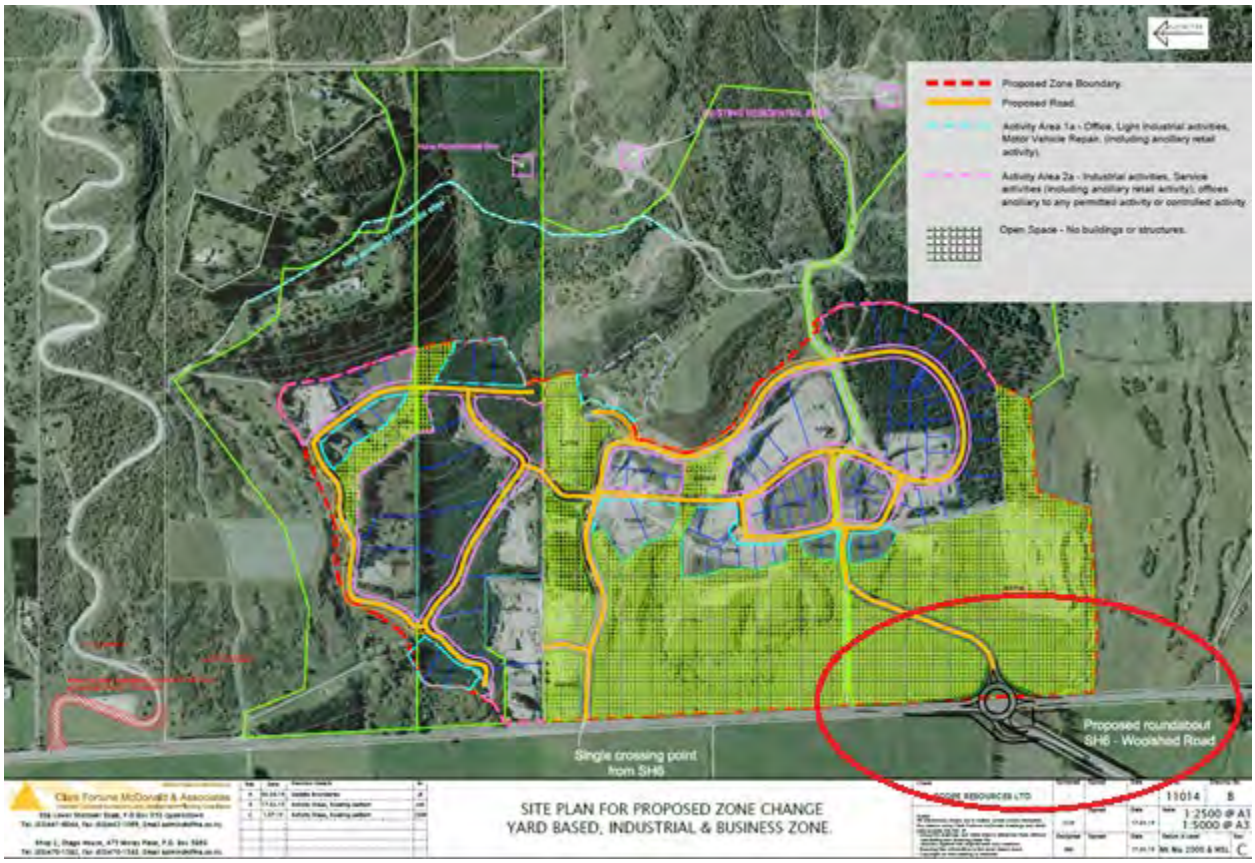


Figure 1: CIZ – Priority T and Roundabout access proposals.

Discussions were held between NZTA, RCL (Hanley Downs) and Jacks Point entities to agree as to a partnership to share funding and construction requirements in relation to the roundabout. Informal agreements were made following a number of meetings yet before any agreements could be formalised NZTA provided an APA for RCL Hanley Downs to construct a Priority T intersection to SH6 for Hanley Down's access now known as Jack Hanley Drive. Without a funding partner(s) the construction costs for a roundabout were cost prohibitive and unworkable.

Without the roundabout to service the CIZ, discussions were progressed with NZTA and landowner representatives including Traffic Engineer, Mr Jason Bartlett. The next and only practical option for intersection design to replace the roundabout was to service the zone with two Priority T intersections:

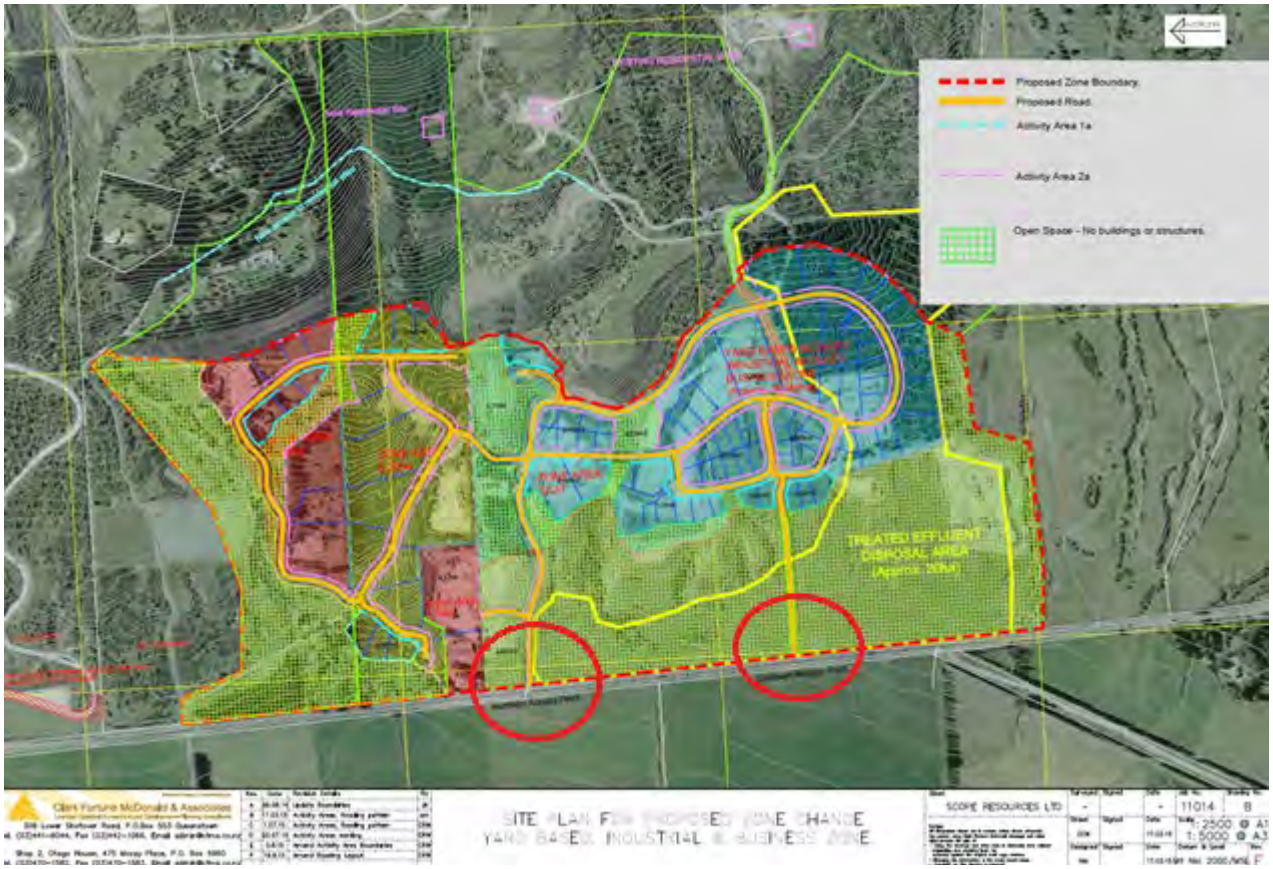


Figure 2: CIZ – Priority T access proposals.

In order for these two intersections to provide an appropriate level of service the traffic generation from CIZ as originally submitted needed to be lowered. The most effective way of lowering the traffic generation to a point where the intersections would be acceptable to NZTA was to lower the enabled building coverage.

The Zone proposed two Activity Areas (AA) where AA1a originally sought to provide up to 40% building coverage as a permitted activity and AA2a 60% where any coverage in excess of these thresholds was to be treated as a non-complying activity. This equated to enabling 1.83ha of building within AA1a and 13.16ha within AA2a.

To achieve an appropriate level of service AA1a (40%) was lowered to 30% a reduction of 4589m^2 while AA2a (60%) was lowered to 35% a reduction of 5.4ha in permitted building coverage. In addition to the lower building coverages and in recognition of the constraint the traffic generation presents to the Zone, a restricted discretionary assessment regime (44.5.5) was authored to enable assessment of traffic related matters for applications made to establish building coverages between 30%-40% AA1a and 35-65% AA2a.

The resulting traffic generation and intersection design was acceptable to NZTA and this was confirmed in consultation with the Agency's Mr Tony Sizemore, sufficiently so, that Traffic Engineer, Mr Jason Bartlett confirmed to commissioners NZTA was amenable to the revised submission 361 planning framework in this regard.

Commissioners heard submission 361 in Stage 1 hearings and recommended conferencing between the author of the s.32 analysis Ms Alyson Hutton and QLDC consultant planner Mr Robert Buxton. This conferencing was unrelated to traffic. Following conferencing a slightly adjusted CIZ planning framework was accepted by Commissioners. This recommendation was subsequently adopted by QLDC and appears as Chapter 44.

Chapter 44 was subject to one appeal from Jacks Point (ENV-2018-CHC-137) and Jacks Point have withdrawn the appeal point which relates to Chapter 44 as detailed in the amended notice of appeal filed with the Court 04th March 2019.

The existing Priority T (Northern Access Fig 2) was inspected by Opus early 2019 as being constructed in accordance with Austroads Priority T.

In June 2019 we made an application for works in SH6 to NZTA's consultants Opus to upgrade the existing Diagram E crossing (Southern Access Fig 2) to Austroads Priority T in association with an bulk titles subdivision design, internal roading layout and open space area ecological work within the southern part of CIZ. This was lodged as a pre-application but subsequently it has not been lodged formally as a consent application.

Following some delay, NZTA arranged a meeting October 2019 and advised that the reason we had not been given permission to construct the Austroads Priority T at the southern access point was that following the release of the *Government Policy Statement on Land Transport 2018* it was no longer acceptable to construct these type of intersections to service this type of development, a roundabout is required, and there are no other alternatives. NZTA advised this requirement was authenticated and could be enforced under NZTA's use of the *Governments Roading Powers Act 1989*.

Aside of the NZTA meeting, we had been working with QLDC Property and Infrastructure on a water supply for the CIZ which would support the wider Coneburn Valley reticulation network. September 2019 CIZ landowners lodged a resource consent application for the construction of water reservoirs above CIZ and are currently awaiting a decision.

In October 2019 we were made aware of a proposed residential development which had been accepted (SH190488) for processing under Housing Accords and Special Housing Areas Act 2013 (HASHA) requiring access for some 600 residential allotments onto SH6 directly opposite the southern access point. NZTA had advised the proponents of this development Queenstown Housing Ltd they would be required to construct a roundabout to serve this development.

Based upon the meeting with NZTA and knowledge of the SHA proposal, we met with QLDC's Mr Craig Barr at a preliminary and informal meeting in November 2019 to gather an understanding of the likelihood of seeking by Variation (or otherwise) amendments to the CIZ planning framework to revert building coverages within the Zone to those originally sought when a roundabout was proposed at the intersection of SH6 and Woolshed Road (Fig 1 above).

January 2020 Queenstown Housing Ltd representative Mr Dan Wells approached us to ascertain the likelihood of CIZ landowners entering into an agreement as a funding partner for the construction of a four-leg roundabout:

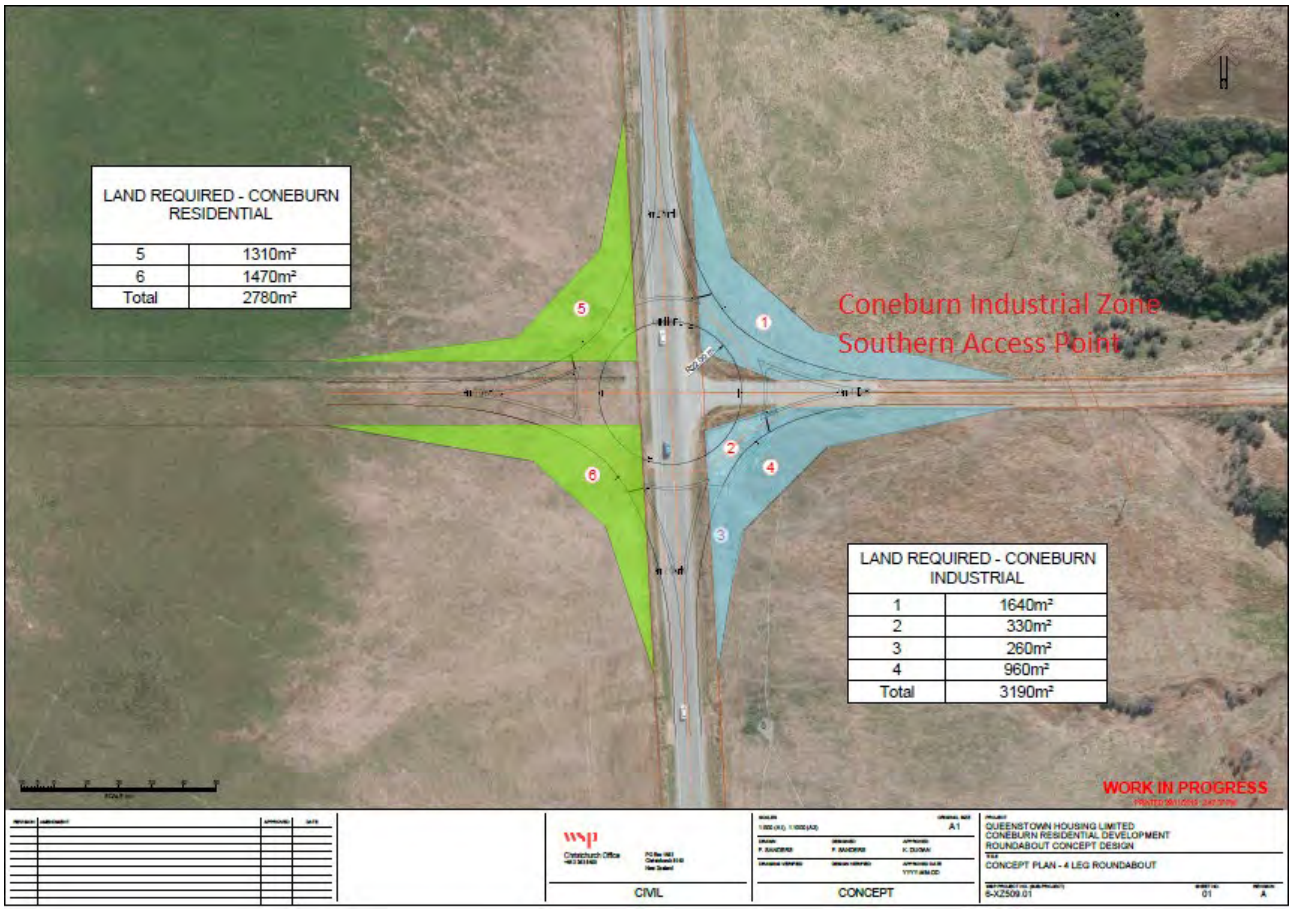


Figure 3: Proposed Four Leg Roundabout.

A cost share agreement as to the contribution from CIZ landowners towards the construction of the roundabout has been reached between CIZ landowners and Queenstown Housing Ltd.

Nick Geddes
CLARK FORTUNE MCDONALD & ASSOCIATES