

Form 5

Submission on Proposed Queenstown Lakes District Plan - Stage 3B

Clause 6 of Schedule 1, Resource Management Act 1991

To: Queenstown Lakes District Council

Submitter: Lake McKay Limited Partnership

Address for Service: Lake McKay Limited Partnership
C/- IP Solutions Ltd
Unit 2, Ground Floor, 15 Cliff Wilson Street
Wanaka 9305

Attn: Dan Curley
dan@ipsolutions.nz
027 601 5074

Background & Submission:

Lake McKay Limited Partnership own the land identified as Lot 1, DP 534249, held within Certificate of Title 880021 (the site).

The site previously formed part of a greater land parcel run as part of Lake McKay Station that was owned by Lake McKay Station Ltd.

Lake McKay Station Ltd were in ownership of the land during Stage 1 of Council's District Plan Review, which in decisions zoned a portion of the subject site (12.3ha) Rural Residential, and which included a Building Restriction Area (BRA).

Subsequent to the release of Stage 1 decisions, Lake McKay Station has been subdivided, seeing the creation of the subject site, which includes the Rural Residential zone as identified on Proposed District Plan Map 11.

In reaching a decision during Stage 1 of the Council's District Plan Review, among other matters, that portion of the site decided to be zoned Rural Residential raised matters and questions of:

- What zoning the land should accommodate to ensure that future growth was enabled in a logical manner? *(to avoid issues such as those now experienced in townships such as Hawea);*
- What zoning would best implement the PDP's strategic policy framework?
- Should the land be zoned to more properly form part of Luggate Township?
- Would there be issues as a consequence of not creating a clear urban form boundary on the northern edge of Luggate?

In discussing these matters, the Commissioners Recommendations Report as adopted by Council stated:

"Finally, we have considered whether both the submitter's land [the site] and the adjacent area of Rural Residential zoned land should more properly form part of Luggate Township, potentially within a UGB. We foresee similar issues in enabling growth to occur in a logical manner at Luggate as is now apparent at Hawea, as discussed in Report 16.2. At Hawea, the form of development already established within the Rural Residential zone on the periphery of Hawea township has constrained what would have been more efficient use of land had it been zoned Low Density Residential ... at the outset. The Panel has concluded in Report 16.2 that despite the apparent inconsistencies of an urban zoning being applied to land on the outer edge

of existing Rural Residential development, this will still, by some margin, better implement the PDP's strategic policy framework than the Rural Residential zone within certain areas of Hawea.

As Mr Barr notes, while the Lower Density Suburban Residential Zone would be a more efficient use of land, infrastructure constraints currently preclude its adoption even if it were within our jurisdiction to recommend (which it is not). The concerns Mr Barr expressed about the lack of a clear boundary to the effective expansion of Luggate to the north suggest to us that there would be a case, both for imposition of a UGB and rezoning of Rural Residential land to a fully urban residential zoning on the periphery of the Township within the UGB, when the Council's plans for infrastructure enhancement at Luggate are clearer".

Accordingly, despite the subject site's location and topography being capable of accommodating a zone that would provide a more efficient use of land, infrastructure constraints at that time would preclude its adoption (*if at that time the Commission had scope to recommend such*).

Upgrades made and/or underway (2019)

Since the time of Council's Section 32 analysis undertaken for the purpose of considering zoning upon the site as part of Stage 1 of the District Plan Review, significant upgrades in infrastructure have either been made (foul sewer disposal by nature of Project Pure reticulation being extended to Luggate), and/or is currently in motion (new Luggate bore-water supply scheme as directed by Council's 2018/19 Three Waters Asset Management Plan) as currently being overseen by QLDC Three Waters staff.

In addition to Council's own current endeavors to upgrade Luggate's key infrastructure (foul sewer and water), as part of purchasing the site, the Submitter (Lake McKay Limited Partnership) has engaged with the Otago Regional Council (ORC) to obtain resource consent for domestic water at a volume adequate to cater for circa twice the

number of households that would be possible by the zoning sought by this submission (approx. 8 litres per second/or 691,200 litres per day). A favorable decision by ORC is expected to be issued in December 2019/January 2020.

In this regard, while it is likely that Council will itself make significant advances toward providing an increase in potable water available to Luggate (as per discussions between the Submitter and QLDC staff thus-far), the abovementioned consent will provide any new subdivision (of the site) with a high level of water supply contingency (*its requirement at all entirely dependent on Council's timeline to deliver improvements in water supply now currently underway*).

In respect of foul sewer, as Luggate has now been connected to Project Pure no evidence is presented by this submission. Please refer to Council's as-built of foul sewer as illustrated on Council's GIS. (*the Submitter has engaged with Council's engineering staff and has been assured that ample redundancy has been built into this reticulation to enable a development upon the site consistent with the densities sought by this submission*).

In respect of water, internal communication with QLDC engineering staff will confirm current bore drilling operations to ascertain new water supply for Luggate and surrounds (Wanaka Airport Land). In respect of high level direction for works, please see the 2018/2109 Three Waters Asset Management Plan here:

<https://www.qldc.govt.nz/assets/Uploads/Council-Documents/Asset-Management-Plans//2.3.18-3Water-DRAFT-AMP.pdf>

Building Restriction Area

The Submitter has engaged engineering professionals (Ground Consulting Ltd) to assess levels of hazard within the Building Restriction Area as identified within the 12.3ha of Rural Residential Zone identified.

As a result of engineering investigation, this submission seeks to change the activity-status applied to building within the Building Restriction Area as currently contained within the Rural Residential Zone (Chapter 22 of the Proposed District Plan) from Non-Complying to Restricted-Discretionary (to be contained within Chapter 20 – Settlement Zone of the Proposed District Plan), with matters of discretion being solely related to the management of natural hazard.

Alternatively, the Submitter seeks that the Building Restriction Area be removed from Map 11 of the Proposed District Plan in its entirety.

Please find an engineering report prepared by Ground Consulting Limited which discusses Natural Hazards relative to the site, and to what extent hazard is likely to affect the site - attached as **Attachment 1** to this submission.

On the basis of the findings of this reporting it is submitted that any future subdivision design can be adequately assessed in terms of proposed allotment exposure, design and defense against adverse hazard effect at the time of subdivision consent, and/or these matters are able to be appropriately addressed at the time of land use establishment as a Restricted-Discretionary activity.

Proposed Zoning

As Luggate's key reticulated infrastructure (primarily foul sewer disposal and water supply) has been (Project Pure) and currently is (Water) being addressed as part of the 2018/2019 Three Waters Asset Management Plan, it is submitted that infrastructural constraints should no longer dictate the most appropriate zoning for the subject site.

The Submitter seeks that the area of land identified at **Attachment 2** of this submission be zoned Settlement Zone including all consequential changes to proposed Chapters 20 and 27 of the Proposed District Plan, and including Map 11 of the Proposed District Plan.

Further to this, as per the points raised by this submission, the submitter seeks to change the activity-status applied to building within the Building Restriction Area as currently contained within the Rural Residential Zone (Chapter 22 of the Proposed District Plan) from Non-Complying to Restricted-Discretionary (to be contained within Chapter 20 – Settlement Zone of the Proposed District Plan), with matters of discretion being solely related to the management of natural hazard.

Exact Area of Land to be allocated to Settlement Zone

The plan provided at **Attachment 2** of this submission provides accurate ground surveyed areas based on both updated LINZ information relative to Luggate Creek and its margins, and accurately surveyed contour at 306 masl.

In this regard, it should be acknowledged that the previously decided Rural Residential Zone boundary adjacent Luggate Creek was based on outdated LINZ XML boundary data which can be out of position by several tens of meters depending on its accuracy in the LINZ database.

The actual property boundary for this parcel of land adjacent Luggate Creek is based on a 20m esplanade strip set-back from the top of stream bank (Luggate Creek). The Submitter has accurately surveyed the actual bank along the proposed zone and correctly set the boundary back 20m.

In addition to the zoning sought, and change of status applied to building within the Building Restriction Area, it is proposed that the exact area of 14.4ha should be zoned (to be identified on Map 11 of the Proposed District Plan) as per that exact area identified by the plan at **Attachment 2**.

Addressing landscape considerations applicable to the extent and type of zoning sought, please see landscape evidence by Mr Espie of Vivian+Espie attached as **Attachment 3** to this submission.

Overall, it is submitted that the land identified by **Attachment 3** is able to provide for residential living activities within a high amenity location that is a logical extension of the existing Luggate Township.

Settlement Zoning of the site will provide for a more efficient use of the land than Rural Residential, and at the same time will provide a hard urban form edge to the northern boundary of the proposed Urban Growth Boundary of Luggate.

It is submitted that the site will be capable of being serviced with key infrastructure (foul sewer and water supply), and its development to densities proposed by the Settlement Zone will have no more than minor adverse effects on the environment, all of which (including hazards) will fall adequately within the scope of matters addressed by the subdivision activity status afforded to a future application by Chapter 27 of the Proposed District Plan.

It is submitted that the proposed re-zoning will be strongly aligned to the relevant parts of the National Policy Statement that seek to provide residential land and housing supply, will give effect to the higher orders of the Proposed District Plan, and will achieve purpose of the Resource Management Act – being the sustainable management of the natural and physical resources.

Lake McKay Limited Partnership seeks the following decision from the Queenstown Lakes District Council:

1. Rezoning of the land identified at **Attachment 2** of this submission from Rural Residential to Settlement Zone, including all consequential changes to proposed Chapters 20 and 27 of the Proposed District Plan;

- 2. Identification of this area on **Map 11** of the Proposed District Plan;

- 3. Apply a Restricted-Discretionary status to building within the Building Restriction Area (to be contained within Chapter 20 – Settlement Zone of the Proposed District Plan), with matters of discretion being solely related to the management of natural hazard, or removal of the BRA entirely from Map 11; or remove the Building Restriction Area in its entirety from Map 11 of the Plan.

- 4. All and any necessary changes as a consequence of the changes sought.

The submitter could not gain an advantage in trade competition through this submission.

The submitter wishes to be heard in support of their submission.

If others make a similar submission the submitter would consider presenting a joint case at a hearing.



.....
Dan Curley (on behalf of Lake McKay Limited Partnership)
18 November 2019

Attachment 1 - Hazard

LAKE MCKAY STATION

WANAKA-LUGGAGE HIGHWAY,
LUGGATE



NATURAL HAZARDS ASSESSMENT FOR POTENTIAL RURAL RESIDENTIAL SUBDIVISION

REF: R4591-1A
DATE: 29 NOVEMBER 2018

REPORT QUALITY CONTROL

REPORT PREPARED BY: **GROUND CONSULTING LIMITED (GCL)**



QUEENSTOWN OFFICE

157 GLENDA DRIVE, FRANKTON
 POST: PO BOX 2963, QUEENSTOWN 9349
 EMAIL: queenstown@gcltech.co.nz
 TEL: 03 442 5700


DOCUMENT CONTROL				
REPORT TITLE		NATURAL HAZARDS ASSESSMENT FOR POTENTIAL RURAL RESIDENTIAL SUBDIVISION		
REPORT REFERENCE		R4591-1A	PROJECT NUMBER	4591
CLIENT		LAKE MCKAY STATION		
REV	DATE	REVISION STATUS	AUTHOR	REVIEWER
A	29 NOVEMBER 2018	ISSUED TO CLIENT	FRASER WALSH	PETER FORREST
APPROVAL				
AUTHOR SIGNATURE			REVIEWER SIGNATURE	
NAME		FRASER WALSH	NAME	
TITLE		DIRECTOR	TITLE	
			PETER FORREST	
			PRINCIPAL ENGINEERING GEOLOGIST	

TABLE OF CONTENTS

1	INTRODUCTION	5
1.1	PROJECT BACKGROUND	5
1.2	PREVIOUS INVESTIGATIONS	5
1.3	CURRENT GEOTECHNICAL INVESTIGATIONS	5
1.4	PROPOSED SITE DEVELOPMENT	5
2	SITE CONDITIONS	6
2.1	SITE LOCATION	6
2.2	SITE TOPOGRAPHY	6
2.3	SITE SURFACE WATER FEATURES	6
2.4	SLOPE INSTABILITY FEATURES	7
2.5	AERIAL PHOTOGRAPHS	7
2.6	NATURAL HAZARDS	7
2.6.1	Tonkin & Taylor (T&T) Liquefaction Hazard Assessment for QLDC	7
2.6.2	ORC Liquefaction Hazard Zoning	7
2.6.3	GIS Hazard Mapping	7
3	GROUND CONDITIONS	8
3.1	PUBLISHED GEOLOGY	8
3.2	SUB-SURFACE CONDITIONS	8
4	GROUNDWATER CONDITIONS	8
5	NATURAL HAZARDS RISK ASSESSMENT	8
5.1	GENERAL	8
5.2	LIQUEFACTION	9
5.2.1	Zone 1: Land not Susceptible to the Development of Liquefaction	9
5.2.1	Zone 2: Land Susceptible to the Development of Liquefaction	9
5.3	ACTIVE ALLUVIAL FAN DEPOSITS	9
5.4	GULLY FLOW PATH FLOODING	10
5.4.1	Flood Modelling	10
5.4.2	Flood Level Modelling	10
5.4.3	Proposed Site Development Effects	11
5.5	LUGGATE CREEK FLOODING	11
5.5.1	Flood Modelling	11
5.5.2	Flood Level Modelling	11
5.5.3	Proposed Site Development Effects	12
5.6	OTHER NATURAL HAZARDS	12
5.7	NATURAL HAZARDS RISK ANALYSIS	12
6	ADDITIONAL INVESTIGATIONS	14
7	LIMITATIONS	14
7.1	GENERAL	14
7.2	FURTHER INVESTIGATIONS REQUIRED	15

LIST OF DRAWINGS

DRAWING 001: SITE LOCATION PLAN
DRAWING 002: SITE INVESTIGATION PLAN
DRAWING 003: CATCHMENT LOCATION PLAN

LIST OF TABLES

TABLE 1: FLOOD ASSESSMENT PARAMETERS & CALCULATIONS	10
TABLE 2: FLOOD LEVEL CALCULATIONS	10
TABLE 3: FLOOD ASSESSMENT PARAMETERS & CALCULATIONS	11
TABLE 4: FLOOD LEVEL CALCULATIONS	12
TABLE 5: RISK MATRIX	13
TABLE 6: SUMMARY OF RISK CLASSIFICATION	13
TABLE 7: RISK REGISTER	14

APPENDICES

APPENDIX A: FLOOD CALCULATIONS

1 INTRODUCTION

1.1 PROJECT BACKGROUND

A natural hazards assessment has been undertaken by GCL for potential rural residential subdivision within the south-eastern portion of Lake McKay Station (Part Section 6 SO 300466), Wanaka-Luggate Highway, Luggate. The site location is presented in Drawing 001.

This assessment has been prepared for the purpose of providing a natural hazards assessment in accordance Section 106 of the Resource Management Act to aid with potential subdivision development. This assessment is considered to be high level only and further investigations and assessment will be required for subdivision consent with QLDC.

This report includes a summary of the investigations undertaken and provides an assessment of:

- Ground conditions.
- Groundwater conditions.
- Surface water conditions.
- Natural hazards.
- Other pertinent constraints and issues identified with the site.

1.2 PREVIOUS INVESTIGATIONS

GCL has reviewed the QLDC eDocs facility which provided limited site investigation documentation for the immediate area. GCL has undertaken recent site investigations within Luggate and surrounding area are therefore familiar with the ground conditions of the district.

1.3 CURRENT GEOTECHNICAL INVESTIGATIONS

The investigations undertaken as part of this assessment have consisted of:

- Desktop study of the site including:
 - Published Geology.
 - Historic Aerial Photographs.
 - Google Earth Imagery.
 - Queenstown Lakes District Council and Otago Regional Council GIS Viewer and eDocs.
- Site mapping and reconnaissance by a Principal Engineering Geologist.

The site mapping undertaken is shown on Drawing 002.

1.4 PROPOSED SITE DEVELOPMENT

The proposed subdivision development and layout is not known at this stage. The northern portion of the site is zoned as "Rural Residential without Building Restrictions" and provides an area of 8.6Ha. The southern portion is zoned as "Rural Residential with Building Restrictions" and provides an area of 3.7Ha. The "Building Restrictions" referred to in the

zoning plan appear to be associated with an active alluvial fan and liquefaction prone area mapped by QLDC and ORC within this zone.

The subdivision appears to be accessed via a road off Wanaka-Luggate Highway which is located to the immediate north-east of the site, although other access points are feasible.

The potential rural residential lots will require on-site stormwater disposal and effluent disposal.

2 SITE CONDITIONS

2.1 SITE LOCATION

The site is located on the western edge of Luggate and to the immediate north of Luggate Creek which hugs the southern site boundary. The subdivision comprises a mix of undeveloped slopes, pastureland, farm buildings and surface water features. McKay Station, forming an area of ~400Ha, surrounds the northern and western portions of the site.

2.2 SITE TOPOGRAPHY

The subdivision is approximately rectangular in shape and is predominately located on two landforms: terraces located within the northern and southern portions of the site, and terrace side slopes located predominately along the western edge of the site.

The terraces, which form the majority of the site, are largely gently sloping and undulating and extend down to Luggate Creek which is located on the southern site boundary. A smaller portion of the terraces extends down to a water race which extends through the site in two locations as shown on Drawing 002. The terraces include a lower-lying terrace which is located within the southern portion of the site and is truncated by Luggate Creek.

The terrace side slopes are typically gently to moderately steep and extend down to the aforementioned terraces. The side slopes extend down from an elevated terrace and broad ridge crests located to the west and north-west of the site. The terrace side slopes are truncated by a confined gully which extends in a north-west to south-east orientation to the immediate west of the site. The gully terminates close to the western site boundary.

The site slopes are largely grassed. The site contains a number of farm buildings and farm tracks which provide access to the various buildings and farm paddocks.

2.3 SITE SURFACE WATER FEATURES

The site in general extends down to Luggate Creek which is located on the southern site boundary. The stream is contained within a channel between 7 – 10m wide by at least 3m deep. The stream flows along a stony base with the stream banks covered in grassed and mature willows.

A water race extends off Luggate Creek to the south-west of the site via a controlled pipe outflow from the stream. The race extends through the site in two locations as shown on Drawing 002. The race appears to be utilised for irrigation water.

An overland flow path extends along the aforementioned gully to the immediate west of the site. The overland flow path forms a grassed channel which enters the race close to the western site boundary. The overland flow path appears to be an ephemeral feature and is dry for extended periods.

Surface water from the remainder of the subdivision is considered to be via. sheet flow into the aforementioned surface water features.

2.4 SLOPE INSTABILITY FEATURES

The subdivision is predominantly gently sloping and contains no observed slope instability features including the steeper terrace side slopes.

2.5 AERIAL PHOTOGRAPHS

Aerial photographs available from the Google Earth Imagery dating from 2006 to 2016 were studied to observe the property over time and assess the geomorphological setting. The review of historic aerial photography indicates that the land has not undergone significant change in the last 10 years. The progressive development of subdivisions to the immediate east of Luggate has occurred over this time period.

2.6 NATURAL HAZARDS

2.6.1 Tonkin & Taylor (T&T) Liquefaction Hazard Assessment for QLDC

In 2012, T&T published their Queenstown Lakes District Liquefaction Hazard Assessment Report, a summary of which is usually attached to the LIM for any property. The report indicates the southern portion of the site lies in an area zoned as having a "susceptible" risk for the development of liquefaction. The central and northern portions of the site are mapped as having a nil to low risk for the development of liquefaction.

2.6.2 ORC Liquefaction Hazard Zoning

The ORC hazard mapping relies on the Opus report provided to the Council titled Seismic Risk in the Otago Region (2005). This study identifies the area as 'possibly susceptible', subject to actual determination of the ground conditions and geology at a particular location. The western edge of the site is mapped as having a "low susceptibility" for the development of liquefaction.

2.6.3 GIS Hazard Mapping

With reference to the ORC and QLDC GIS and hazard mapping, the site area has the following characteristics:

- The site is not in a flood hazard zone.
- A recently active alluvial fan is mapped across the southern portion of the site and along the aforementioned gully located to the immediate west of the site. The extent of the mapped alluvial fan is shown on Drawing 002. An active alluvial fan is described as having contained flows within the last 300 years.
- A "gully erosion catchment" is mapped in the vicinity of the aforementioned gully located to the immediate west of the site. This mapped area does not directly affect the site.
- A "terrace riser" is mapped in the vicinity of the aforementioned terrace side slopes. The terrace riser also follows the water race within the site and marks the transition from the upper to lower site terraces.

- The aforementioned water race, gully overland flow path and Luggate Creek are mapped and coincide with mapping undertaken by GCL.
- The site is not in an area associated with active fault zones.
- The site is not in an area of known active landslides.
- The seismic soil classification for the majority of the subdivision is Class D. A 1:2500-year seismic event will cause significant shaking and damage to inappropriately designed structures.

3 GROUND CONDITIONS

3.1 PUBLISHED GEOLOGY

The Geological Map of New Zealand, Sheet 18 (Wakatipu), at a scale of 1:250,000 maps the southern portion of the subdivision as being underlain by Holocene River Deposits comprising unconsolidated gravel, sand, silt, clay minor peat associated with modern to post glacial flood plains. The remainder of the site is mapped as Late Pleistocene outwash river deposits comprising unweathered to slightly weathered sandy gravel forming large outwash terraces.

3.2 SUB-SURFACE CONDITIONS

No sub-surface investigations have been undertaken in the vicinity of the subdivision. From site mapping of outcrops, it appears the subdivision is underlain by terrace river deposits comprising largely sand and gravel deposits. Given the nature of the depositional environment, silt, clay and peat lenses are also feasible.

4 GROUNDWATER CONDITIONS

No sub-surface investigations have been undertaken in the vicinity of the subdivision, however, from site mapping undertaken, relatively shallow groundwater levels are expected within the southern portion of the site with depressed groundwater levels across the remainder of the site. This is largely based on the level of Luggate Creek which is expected to control groundwater levels within the site.

5 NATURAL HAZARDS RISK ASSESSMENT

5.1 GENERAL

Potential natural hazards have been identified in the process of the site investigations undertaken or as mapped by QLDC and ORC in the vicinity of the potential rural residential subdivision. The natural hazards include an active alluvial fan and liquefaction. Given these natural hazards may have a significant influence on the development of the subdivision, we wish to address these as follows:

5.2 LIQUEFACTION

Liquefaction describes the process of dilating soil in response to significant ground shaking leading to surface ejecta of liquefied soil and ground settlement. The subdivision contains ground conditions which are conducive to the development of liquefaction, however, the potential effects of liquefaction are controlled primarily by the depth to the groundwater table. In this regard, we have divided the subdivision into two zones as follows:

5.2.1 Zone 1: Land not Susceptible to the Development of Liquefaction

The extent of Zone 1 is shown on Drawing 002 and includes the central and northern portions of the site. The zone follows the "Rural Residential without Building Restrictions" zone.

This zone is likely associated with depressed groundwater conditions which is considered to significantly inhibit the development of liquefaction or at least the surface expression of liquefaction. As such, restrictions on building development within Zone 1 are not expected.

5.2.1 Zone 2: Land Susceptible to the Development of Liquefaction

The extent of Zone 2 is shown on Drawing 002 and includes the southern portion of the site. The zone follows the "Rural Residential with Building Restrictions" zone.

This zone is likely associated with relatively shallow groundwater conditions and as such, it is possible with sufficient ground shaking, liquefaction may affect standard building foundations potentially leading to failure.

Development within Zone 2 for rural residential purposes is considered to be feasible, however, given the range of remedial works and foundation options which are available for potentially liquefiable sites. These include the formation of reinforced rafts, raft foundations, deep foundation piles, earthworks filling, and/or groundwater drains.

5.3 ACTIVE ALLUVIAL FAN DEPOSITS

The southern portion of the site and a gully to the west are mapped as containing active alluvial landforms by ORC and QLDC as shown on Drawing 002. An active alluvial fan is described as having contained flows within the last 300 years.

Given the potential flooding risk posed by these features, we have undertaken a flood assessment in order to assess the potential risk these features may provide on subdivision development. The assessment is considered to be preliminary only given the detailed nature of the surface water catchments feeding the site surface water features and interpretation of results should be cognisant of this. Sections 5.4 and 5.5 of this report provide a flood assessment for these features.

We have not assessed the water race as a potential flooding feature as the flows are controlled by outfall pipes from Luggate Creek. In the event of a flood within Luggate Creek, the water race will overflow with the excess water returning to the stream.

5.4 GULLY FLOW PATH FLOODING

5.4.1 Flood Modelling

A flood assessment has been undertaken for the overland flow path which extends along a gully located to the immediate west of the site. The assessment has been undertaken in order to calculate maximum flood flows for a 1% AEP storm event. The flood assessment has been modelled using HEC-HMS and topographic contours from LINZ. Drawing 003 shows the mapped extent of the surface water catchment.

The modelling has been undertaken based on the following parameters and calculations which are provided in summary on Table 1.

TABLE 1: Flood Assessment Parameters & Calculations

PARAMETER	VALUE	CALCULATION METHOD/VALIDATION
Surface water catchment	3.36km ²	Analysis of topographic contours from LINZ
Catchment length	3.04km	Analysis of topographic contours from LINZ
Catchment gradient	3.3%	Analysis of topographic contours from LINZ
Weighted curve number	0.30	Building Code E1-VM1
Impervious area	0%	Analysis of aerial photograph
1% AEP storm event	8.5 – 105mm	10 minutes to 24 hours duration from HIRDS data with peak intensity at 50% duration
Initial rainfall abstraction	5mm	Estimated on landform
Catchment baseflow	0m ³ /sec	Based on site inspection
Time of concentration	2.1hrs	HEC-HMS transform
Peak flow	5.2m ³ /sec	HEC-HMS

Table 1 indicates that a peak flow of 5.2m³/sec is expected within the overland flow path for a 1% AEP storm event.

Appendix A includes a graph of overland flow path flow versus time from HEC-HMS.

5.4.2 Flood Level Modelling

An assessment of flood levels has been undertaken based on the calculated peak flow. The flood assessment has been modelled using a standard trapezoidal shaped overland flow path. The modelling has been undertaken based on the following parameters and calculations which are provided in summary on Table 2.

TABLE 2: Flood Level Calculations

PARAMETER	VALUE	CALCULATION METHOD/VALIDATION
Peak flow	5.2m ³ /sec	HEC-HMS
Catchment roughness	0.03	Grassed flood plain
Peak flood depth	0.8m	Trapezoidal shaped cross-section (1.0m at base, 3.0m wide at top)

Table 2 indicates that a maximum flood depth of 0.8m is achieved within a formed trapezoidal shaped channel which is at least 1.0m wide at the base and 3.0m wide at the top. Appendix A includes the flood level calculations.

5.4.3 Proposed Site Development Effects

The calculated flood flows from the gully overland flow path can be accommodated within a relatively modest channel. As such, we consider that the gully feature does not provide a significant constraint to subdivision development.

5.5 LUGGATE CREEK FLOODING

5.5.1 Flood Modelling

A flood assessment has been undertaken for Luggate Creek which extends along the southern site boundary. The assessment has been undertaken in order to calculate maximum flood flows for a 1% AEP storm event. The flood assessment has been modelled using HEC-HMS and topographic contours from LINZ. Drawing 003 shows the mapped extent of the surface water catchment.

The modelling has been undertaken based on the following parameters and calculations which are provided in summary on Table 3.

TABLE 3: Flood Assessment Parameters & Calculations

PARAMETER	VALUE	CALCULATION METHOD/VALIDATION
Surface water catchment	124km ²	Analysis of topographic contours from LINZ
Catchment length	17.2km	Analysis of topographic contours from LINZ
Catchment gradient	8.7%	Analysis of topographic contours from LINZ
Weighted curve number	0.30	Building Code E1-VM1
Impervious area	0%	Analysis of aerial photograph
1% AEP storm event	8.5 – 105mm	10 minutes to 24 hours duration from HIRDS data with peak intensity at 50% duration
Initial rainfall abstraction	5mm	Estimated on landform
Catchment baseflow	1m ³ /sec	Based on site inspection
Time of concentration	5.0hrs	HEC-HMS transform
Peak flow	95.5m ³ /sec	HEC-HMS

Table 3 indicates that a peak flow of 95.5m³/sec is expected within the overland flow path for a 1% AEP storm event.

Appendix A includes a graph of overland flow path flow versus time from HEC-HMS.

5.5.2 Flood Level Modelling

An assessment of flood levels has been undertaken based on the calculated peak flow. The flood assessment has been modelled using a standard trapezoidal shaped stream channel as measured on-site. The modelling has been undertaken based on the following parameters and calculations which are provided in summary on Table 4.

TABLE 4: Flood Level Calculations

PARAMETER	VALUE	CALCULATION METHOD/VALIDATION
Peak flow	95.5m ³ /sec	HEC-HMS
Catchment roughness	0.03	Grassed flood plain
Peak flood depth	2.5m	Trapezoidal shaped cross-section (7.0m at base, 10.0m wide at top)

Table 4 indicates that a maximum flood depth of 2.5m is achieved within a formed trapezoidal shaped channel which is at least 7.0m wide at the base and 10.0m wide at the top (as per on-site measurements). Appendix A includes the flood level calculations.

5.5.3 Proposed Site Development Effects

The calculated flood flows can be accommodated within the existing stream channel. As such, we consider that the stream does not provide a significant constraint to subdivision development.

5.6 OTHER NATURAL HAZARDS

As part of the natural hazards risk assessment we have briefly assessed other potential hazards as follows:

- Ground settlement: the ground conditions underlying the site likely consist of competent alluvial fan deposits which are not considered to be at risk from ground settlement.
- Slope stability: the subdivision is characterised by gently sloping topography which is not considered to be at risk from the development of slope instability features. As such, slope stability is not considered to provide a constraint on subdivision development.
- Seismicity: the subdivision is located within a region containing active faults, the most significant being the Grandview fault located ~8km to the east. The NW Cardrona Fault is situated 15km to the west of the site. Although, no active faults are mapped in the immediate vicinity of the subdivision, subdivision development and structural design should be cognisant of the effects of significant ground shaking.
- The inactive, concealed Lochar fault is shown to run north to south some 1500m to the west of the site. During site walkovers, no evidence was identified in the glacial terraces.
- Volcanism: The Queenstown region is not subject volcanism and as such is not considered to provide a risk to subdivision development.

5.7 NATURAL HAZARDS RISK ANALYSIS

In accordance with Section 106 of the Resource Management Act and previous discussions in this report, we have undertaken a qualitative natural hazards risk assessment for the subdivision. The natural hazard consequence and likelihood of occurrence has been assessed by means of the overall risk matrix as shown in Table 5, with the risk classifications defined in Table 6.

TABLE 5: Risk Matrix

POTENTIAL CONSEQUENCES	LIKELIHOOD				
	VERY UNLIKELY (0 – 5%)	UNLIKELY (5 – 45%)	POSSIBLE (45 – 55%)	LIKELY (55 – 95%)	ALMOST CERTAIN (95 – 100%)
SEVERE	Low	Low	Moderate	High	Very high
MODERATE	Negligible	Low	Moderate	Moderate	High
MINOR	Negligible	Low	Low	Moderate	Moderate
NEGLIGIBLE	Negligible	Negligible	Negligible	Low	Low

TABLE 6: Summary of Risk Classification

RATING SCALE	SECTION 106 COMPLIANCE	DISCUSSION
VERY HIGH	Non-compliant	There is a high probability that severe damage to the site could arise from an identified source without appropriate remedial action
HIGH	Non-compliant	The proposed house site is likely to experience significant damage from an identified source without remedial action
MODERATE	Non-compliant	It is possible that damage could arise to the site, but it is unlikely that such damage would be significant
LOW	Compliant	It is possible that damage could arise to the site from an identified source though this is likely to be mild or unlikely
NEGLIGIBLE	Compliant	The presence of the identified source does not give rise to the potential to cause significant damage to the site

Table 7 shows a risk register for the site and appropriate mitigation measures if applicable based on Tables 5 & 6.

TABLE 7: Risk Register

RISK	POTENTIAL CONSEQUENCES	LIKELIHOOD	RISK CLASSIFICATION	MITIGATION MEASURES IF REQUIRED
SLOPE INSTABILITY	Severe	Unlikely	Low	n/a
ROCK FALL	Moderate	Very unlikely	Negligible	n/a
GROUND SUBSIDENCE	Severe	Very unlikely	Negligible	n/a
SOIL SHRINK/SWELL	Moderate	Very unlikely	Negligible	n/a
EARTHQUAKE	Severe	Unlikely	Low	n/a
LIQUEFACTION	Severe	Possible	Moderate	Appropriately designed foundations and building platforms
FLOODING	Moderate	Unlikely	Low	Appropriately sized channels
TSUNAMI	Moderate	Very unlikely	Negligible	n/a
VOLCANIC ERUPTION/ASH FALL	Moderate	Very unlikely	Negligible	n/a

Table 7 indicates the risk classification for the identified natural hazards is low to negligible for all risks apart from "liquefaction" where appropriate mitigation measures can be reasonably provided pending further design work.

6 ADDITIONAL INVESTIGATIONS

This assessment has been undertaken to principally assess and define natural hazards which may have an effect on subdivision development. This has been undertaken with the view of providing sufficient geotechnical information to formulate a subdivision scheme plan. Specific geotechnical investigations will be required for subdivision consent once the subdivision layout is known. In addition, a specific assessment of the nominated house sites will be required including preliminary design of on-site effluent disposal and stormwater disposal systems.

7 LIMITATIONS

7.1 GENERAL

Ground Consulting Ltd has undertaken this assessment in accordance with the brief as provided, based on the site and location as shown on Drawing 002. This report has been provided for the benefit of our client, and for the authoritative council to rely on for the purpose of processing the consent for the specific project described herein. No liability is accepted by

this firm or any of its directors, servants or agents, in respect of its use by any other person, and any other person who relies upon information contained herein does so entirely at their own risk.

No part of this document may be reproduced without the prior written approval of Ground Consulting Ltd.

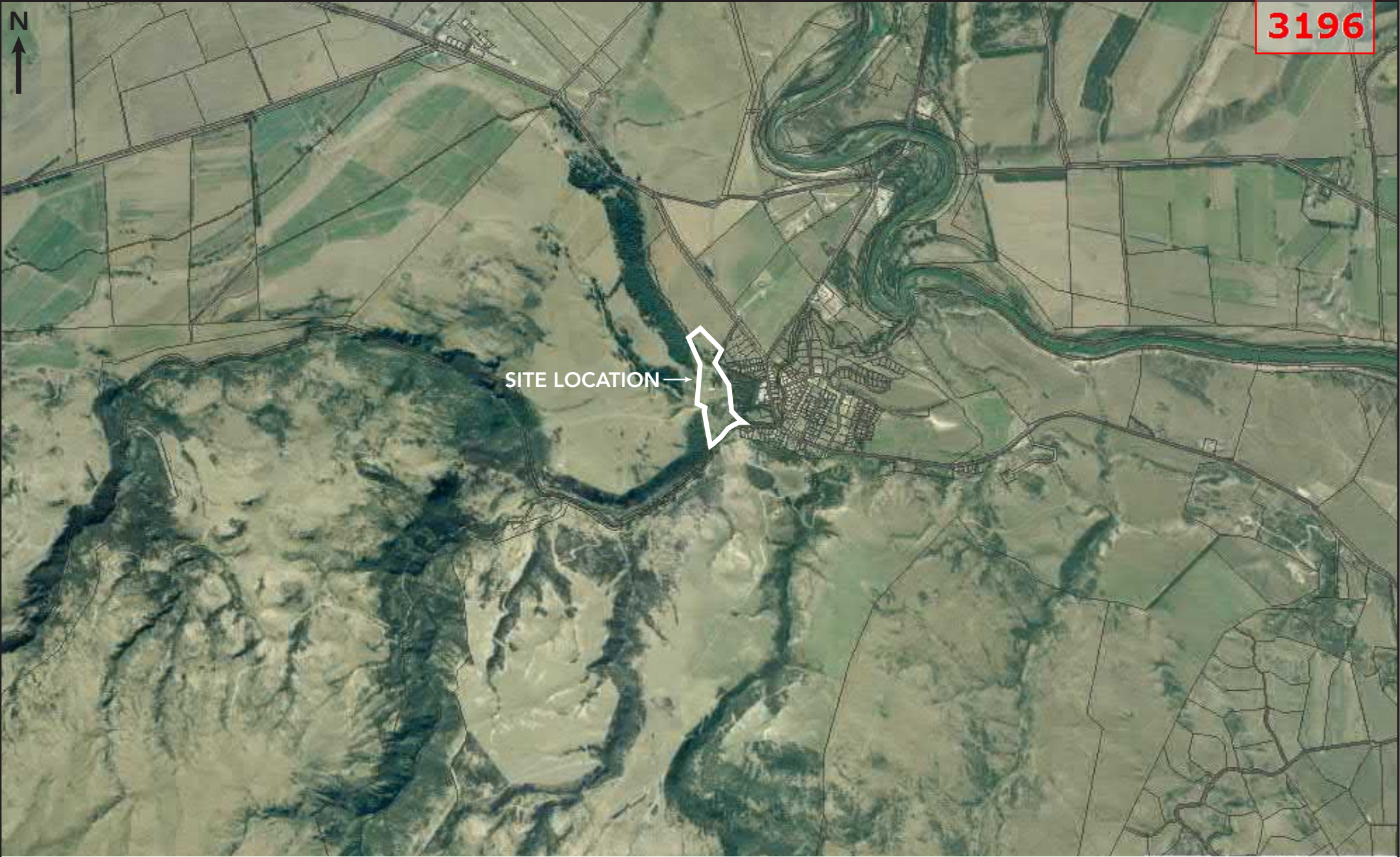
The sub-surface conditions have been extrapolated between the investigations undertaken. Whilst care has been taken to provide sufficient sub-surface information following best practice, no guarantee can be given on the validity of the inference made and it must be appreciated that actual conditions could vary from the assumed model.

7.2 FURTHER INVESTIGATIONS REQUIRED

This assessment has been undertaken for the proposed site development to date. Any structural changes, alterations and additions made to the proposed development should be checked by a suitably qualified person and may require further investigations and analysis.

Geotechnical inspections will be required during construction to assess site slopes, foundation excavations, retaining walls and other geotechnical aspects of the development. This is to ensure ground conditions encountered are in accordance with the findings of this assessment. If ground conditions differ from those presented in this report, advice on design and construction modifications should be sought from a suitably qualified person.

DRAWINGS



LAKE MCKAY STATION
WANAKA-LUGGATE HIGHWAY, LUGGATE
SITE LOCATION PLAN

Rev	Date	Status	Drafted	Reviewer
A	29/11/2018	Issued	K.H	FW

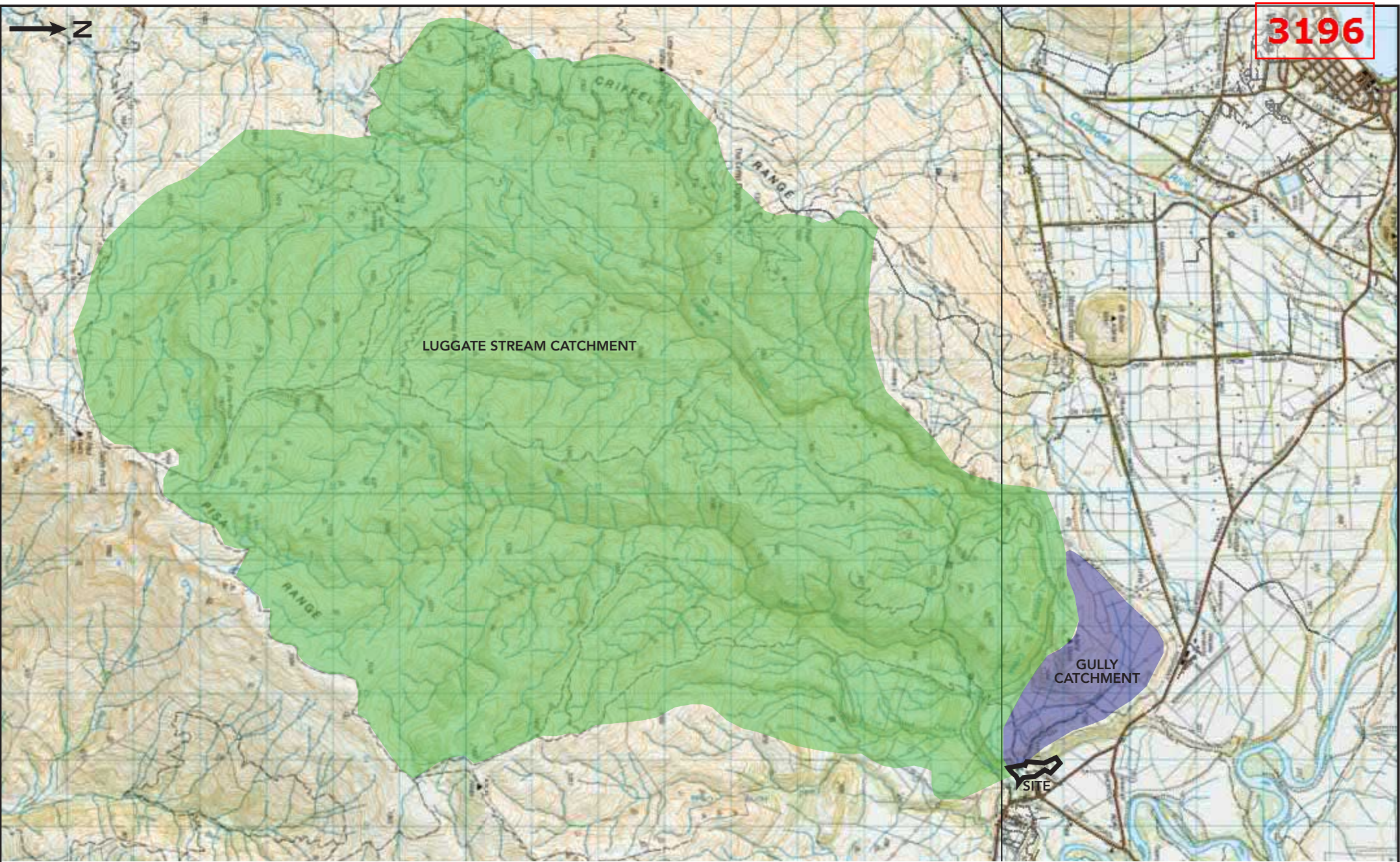
File Ref. MAC://Projects_4500/4591/R4591-1A/R4591-1A-DRW001.ai
Scale (A4) 1:30000
0 0.6 1.2km
Project No. 4591
Report Ref. R4591-1A
Drawing No. 001



LAKE MCKAY STATION
WANAKA-LUGGATE HIGHWAY, LUGGATE
INVESTIGATION LOCATION PLAN

Rev	Date	Status	Drafted	Reviewer
A	29/11/2018	Issued	K.H	FW

File Ref. MAC://Projects_4500/4591/R4591-1A/R4591-1A-DRW002.ai
Scale (A4) 1:5000
0 40 100 200m
Project No. 4591
Report Ref. R4591-1A
Drawing No. 002



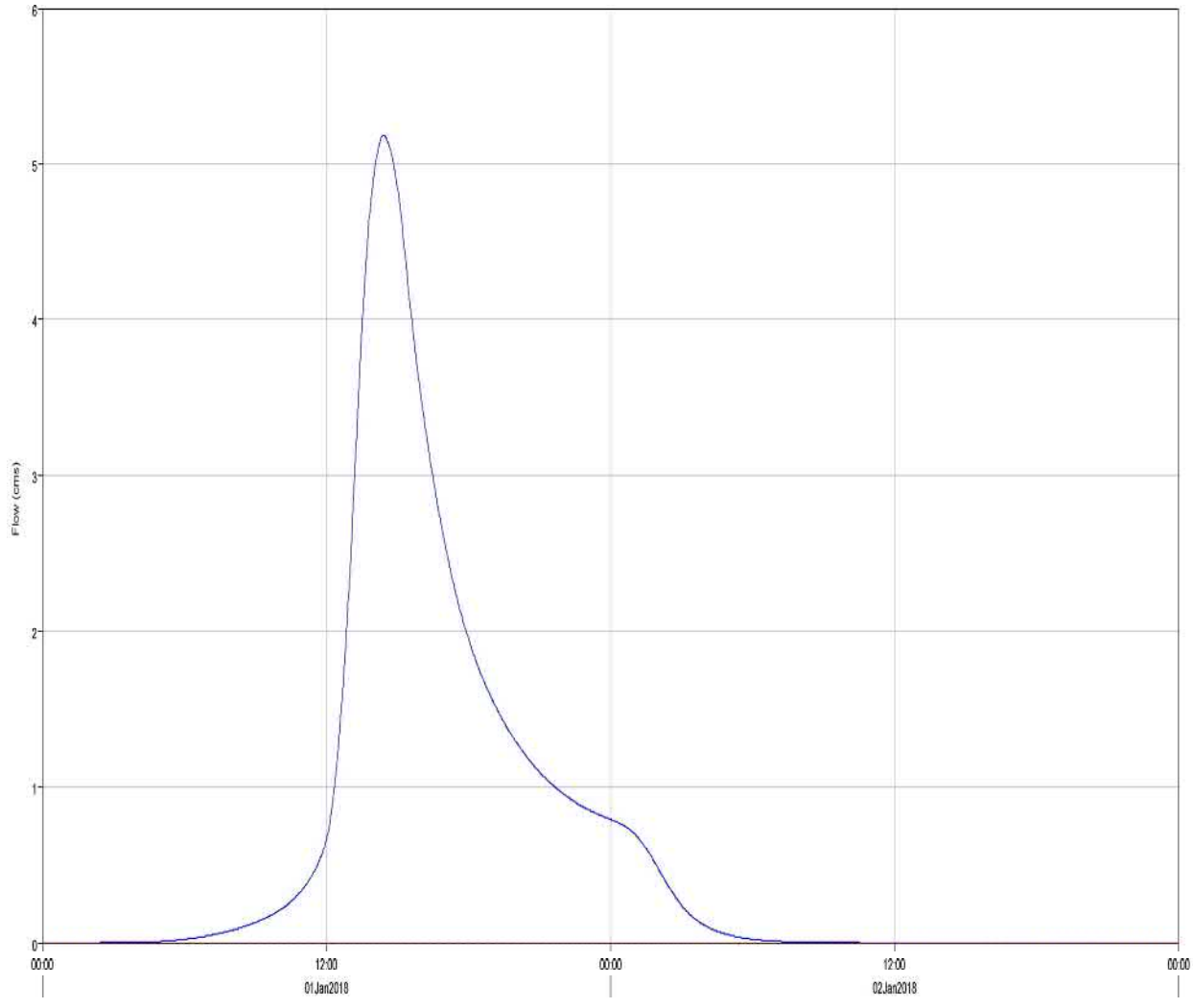
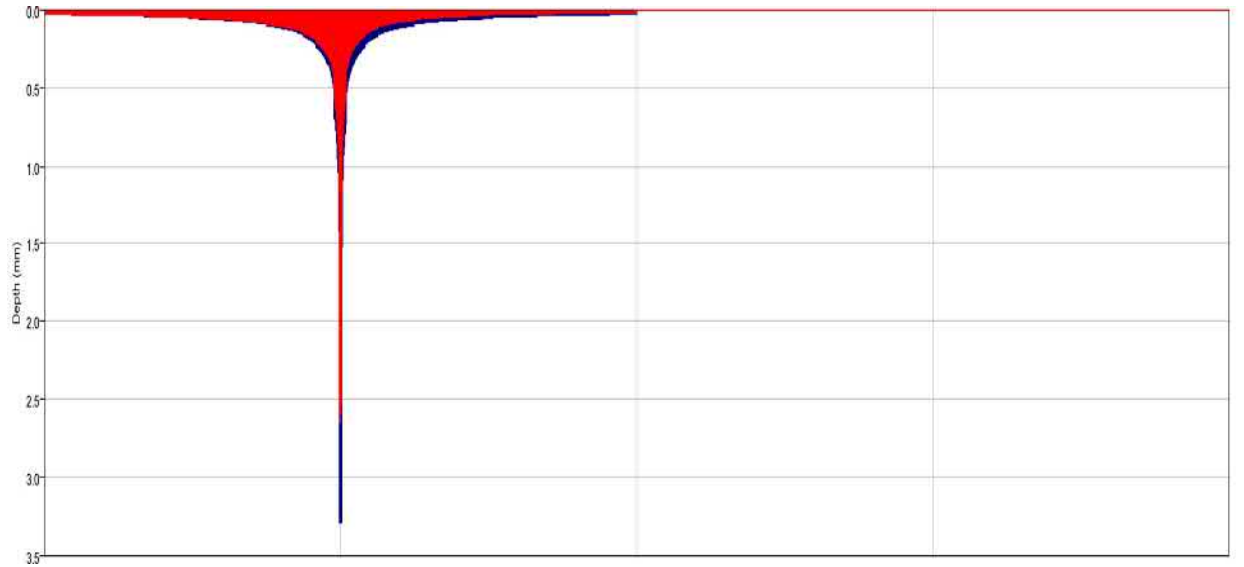
LAKE McKAY STATION
WANAKA-LUGGATE HIGHWAY, LUGGATE
CATCHMENT LOCATION PLAN

Rev	Date	Status	Drafted	Reviewer
A	29/11/2018	Issued	K.H	FW

File Ref. MAC://Projects_4500/4591/R4591-1A/R4591-1A-DRW002.ai
Scale (A4) 1:75,000
0 0.5km 3km
Project No. 4591
Report Ref. R4591-1A
Drawing No. 003

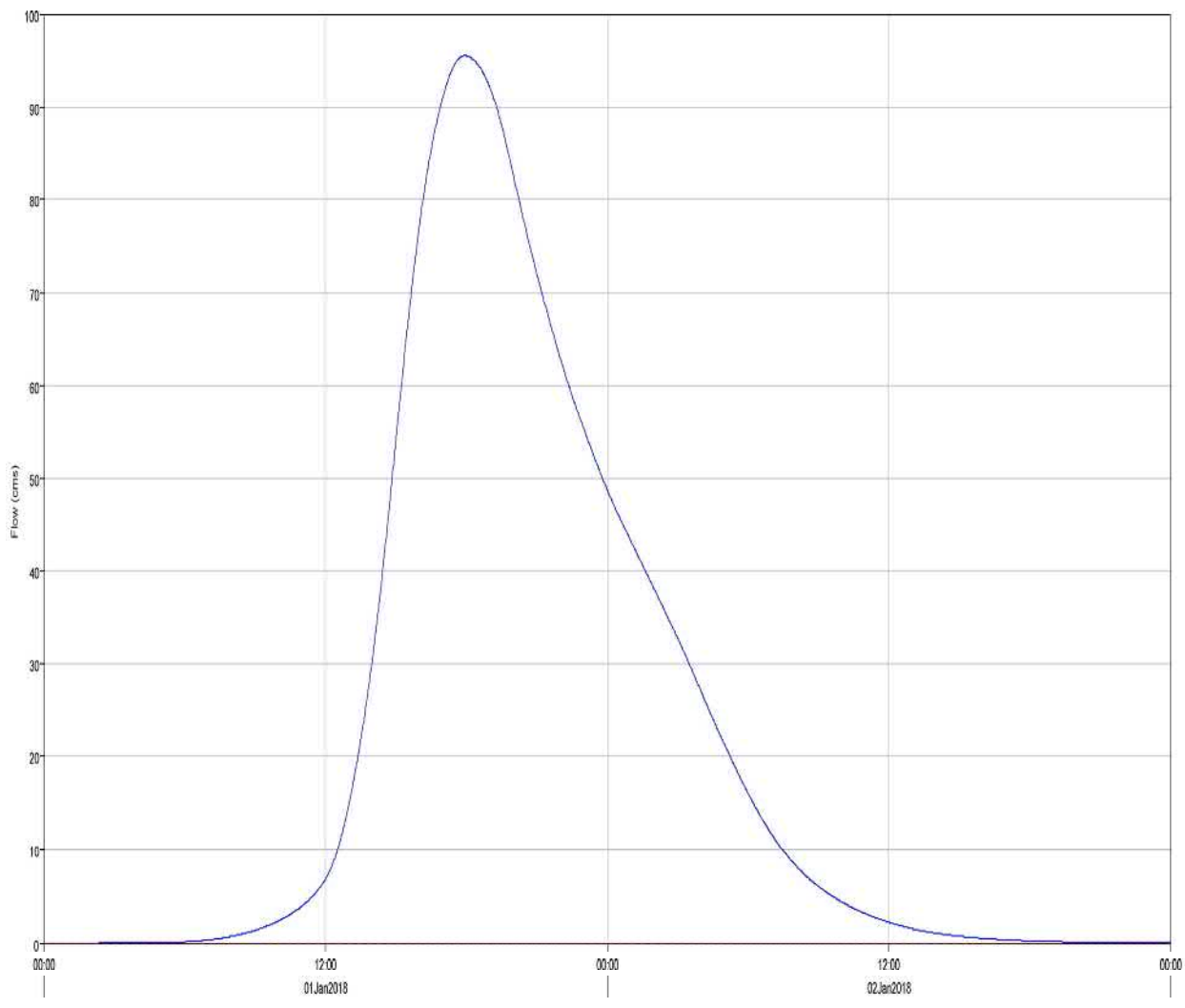
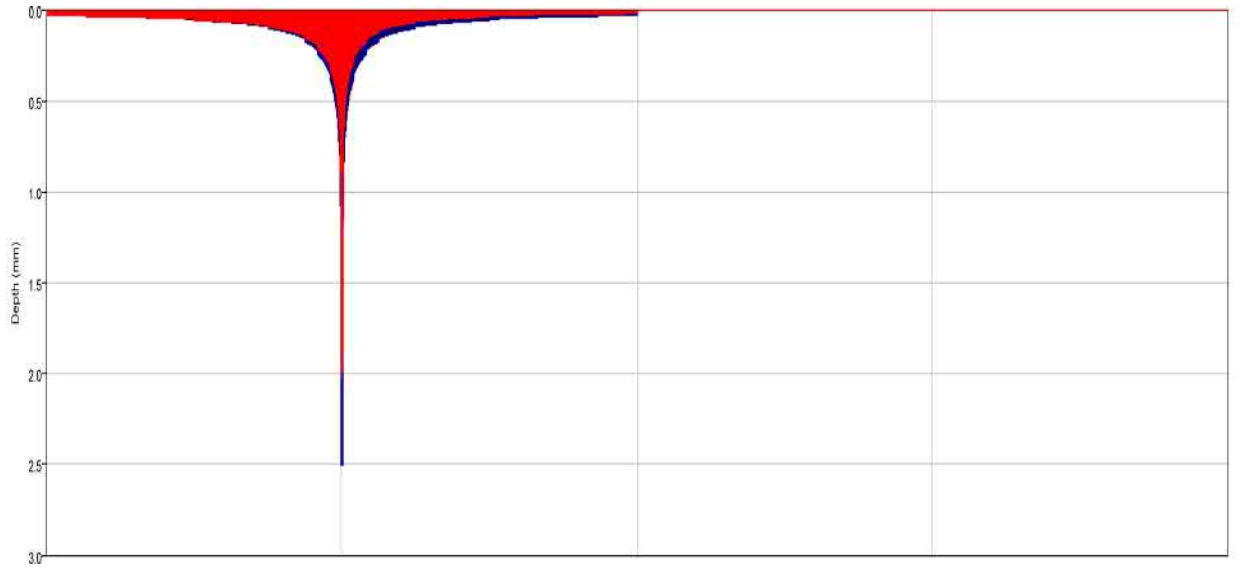
APPENDIX A: FLOOD CALCULATIONS

Subbasin 'Overland Flow' Results for Run 'Run 1'



Run/Run 1 Element Overland Flow Result: Precipitation Run/Run 1 Element Overland Flow Result: Precipitation Loss Run/Run 1 Element Overland Flow Result: Outflow Run/Run 1 Element Overland Flow Result: Baseflow

Subbasin 'Overland Flow' Results for Run 'Run 1'



Run/Run 1 Element Overland Flow Result: Precipitation Run/Run 1 Element Overland Flow Result: Precipitation Loss Run/Run 1 Element Overland Flow Result: Outflow Run/Run 1 Element Overland Flow Result: Baseflow

GULLY CHANNEL CALCULATIONS



PROJECT DETAILS

Property: Lake McKay Station
Date: 30/11/2018
Calc's by: F.W

LEGEND

	iterative inputted parameters
	inputted parameters
	calculated parameters

CALCULATE DESIGN RUN-OFF FLOW RATE

$$Q_{(1\%AEP)} = CIA$$

where

C = run-off coefficient
 I = rainfall intensity (mm/hr)
 A = catchment area (m²)

where

I =		mm/hr (1% AEP 10 minute event)
C _{imervious} =		
A _{imervious} =		m ²
C _{grass} =		
A _{grass} =		m ²

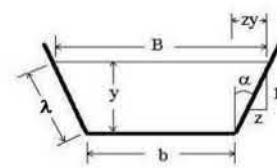
therefore

$$Q_{(1\%AEP)} = 5.20 \text{ m}^3/\text{s}$$

DETERMINE CHANNEL FLOW DEPTH

where

Flow height, y	0.80	
Top width of water, B	3.00	
Channel bottom width, b	1.00	
Side slope, z	1.25	(B-b)/2/y
Flow area, A	1.60	by + zy ²
Wetted perimeter, P	3.56	b+2y(1+z ²) ^{1/2}
Hydraulic radius, R	0.45	(by + zy ²)/[b+2y(1+z ²) ^{1/2}]



Trapezoidal Cross Section

where

Unit conversion factor, k	1.00	
Mannings Roughness, n	0.03	for grassed floodplain
Longitudinal slope, S	33.00	1/Sc
Velocity, V	3.40	m/sec k/n[R ^{2/3} S ^{1/2}]
Peak Flow, Q	5.45	m ³ /sec VA

LUGGAGE STREAM CHANNEL CALCULATIONS



PROJECT DETAILS

Property: Lake McKay Station
Date: 30/11/2018
Calc's by: F.W

LEGEND

	iterative inputted parameters
	inputted parameters
	calculated parameters

CALCULATE DESIGN RUN-OFF FLOW RATE

$$Q_{(1\%AEP)} = CIA$$

where

C = run-off coefficient
 I = rainfall intensity (mm/hr)
 A = catchment area (m²)

where

I =		mm/hr (1% AEP 10 minute event)
C _{imervious} =		
A _{imervious} =		m ²
C _{grass} =		
A _{grass} =		m ²

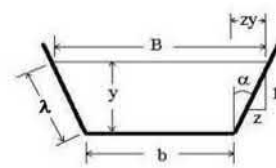
therefore

$$Q_{(1\%AEP)} = 95.50 \text{ m}^3/\text{s}$$

DETERMINE CHANNEL FLOW DEPTH

where

Flow height, y	2.50	
Top width of water, B	10.00	
Channel bottom width, b	7.00	
Side slope, z	0.60	(B-b)/2/y
Flow area, A	21.25	by + zy ²
Wetted perimeter, P	12.83	b+2y(1+z ²) ^{1/2}
Hydraulic radius, R	1.66	(by + zy ²)/[b+2y(1+z ²) ^{1/2}]



Trapezoidal Cross Section

where

Unit conversion factor, k	1.00	
Mannings Roughness, n	0.03	for grassed floodplain
Longitudinal slope, S	100.00	1/Sc
Velocity, V	4.67	m/sec k/n[R ^{2/3} S ^{1/2}]
Peak Flow, Q	99.15	m ³ /sec VA

PUKEKOHE OFFICE

UNIT 2, 4 MANUKAU ROAD, PUKEKOHE
POST: PO BOX 1019, PUKEKOHE, 2120
EMAIL: pukekohe@gcltech.co.nz
TEL: 09 239 2229

QUEENSTOWN OFFICE

157 GLENDA DRIVE, FRANKTON
POST: PO BOX 2963, QUEENSTOWN 9349
EMAIL: queenstown@gcltech.co.nz
TEL: 03 442 5700

AUCKLAND CENTRAL OFFICE

LEVEL 1, KAURI TIMBER BUILDING
104 FANSHAWE STREET, AUCKLAND, 1010
EMAIL: auckland@gcltech.co.nz
TEL: 09 379 0777

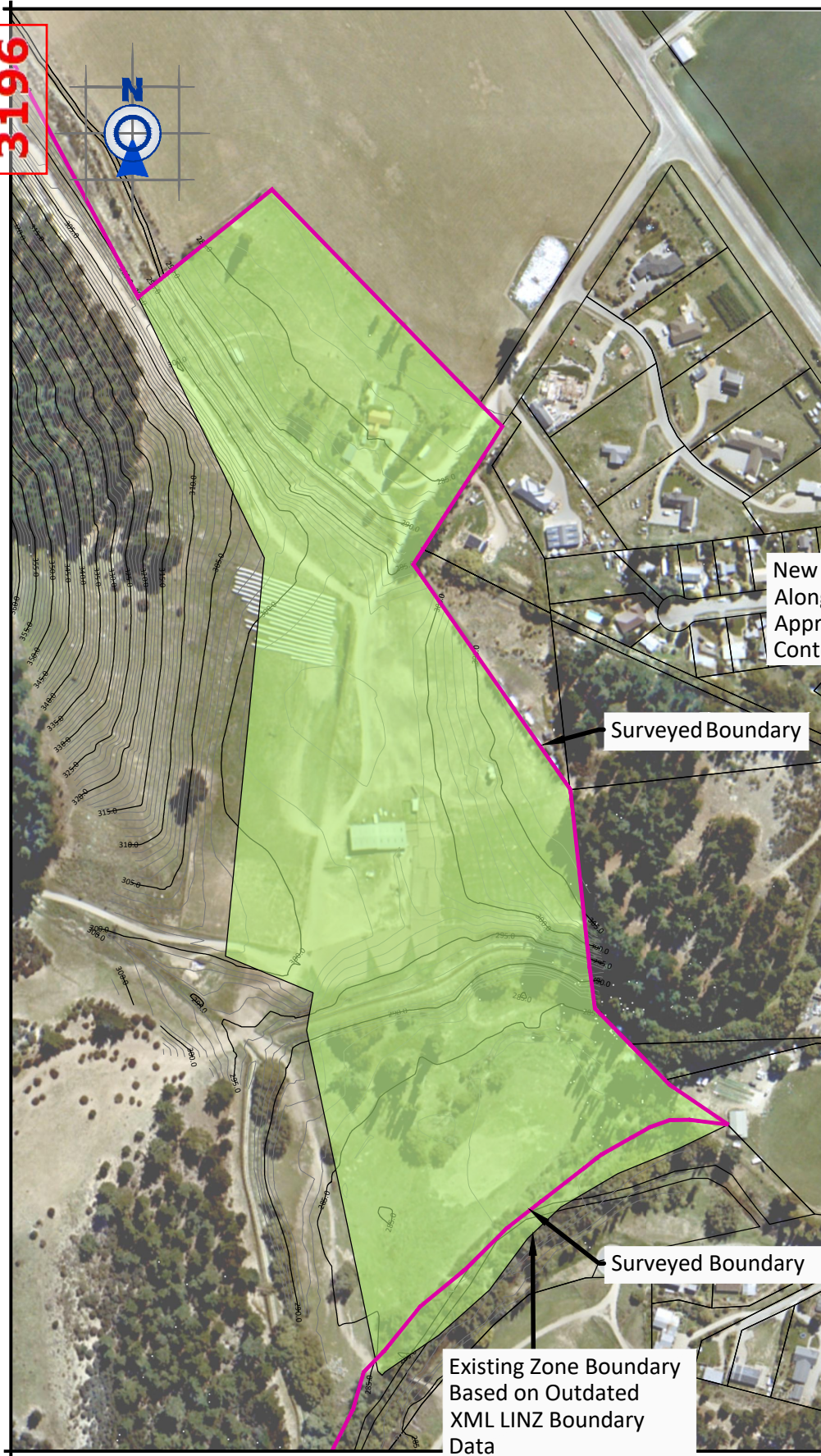
GREAT BARRIER IS. OFFICE

6 MOANA VIEW ROAD, OKUPU
POST: PO BOX 1019, PUKEKOHE, 2120
EMAIL: office@gcltech.co.nz
TEL: 09 239 2229



Attachment 2 - Plans

3196

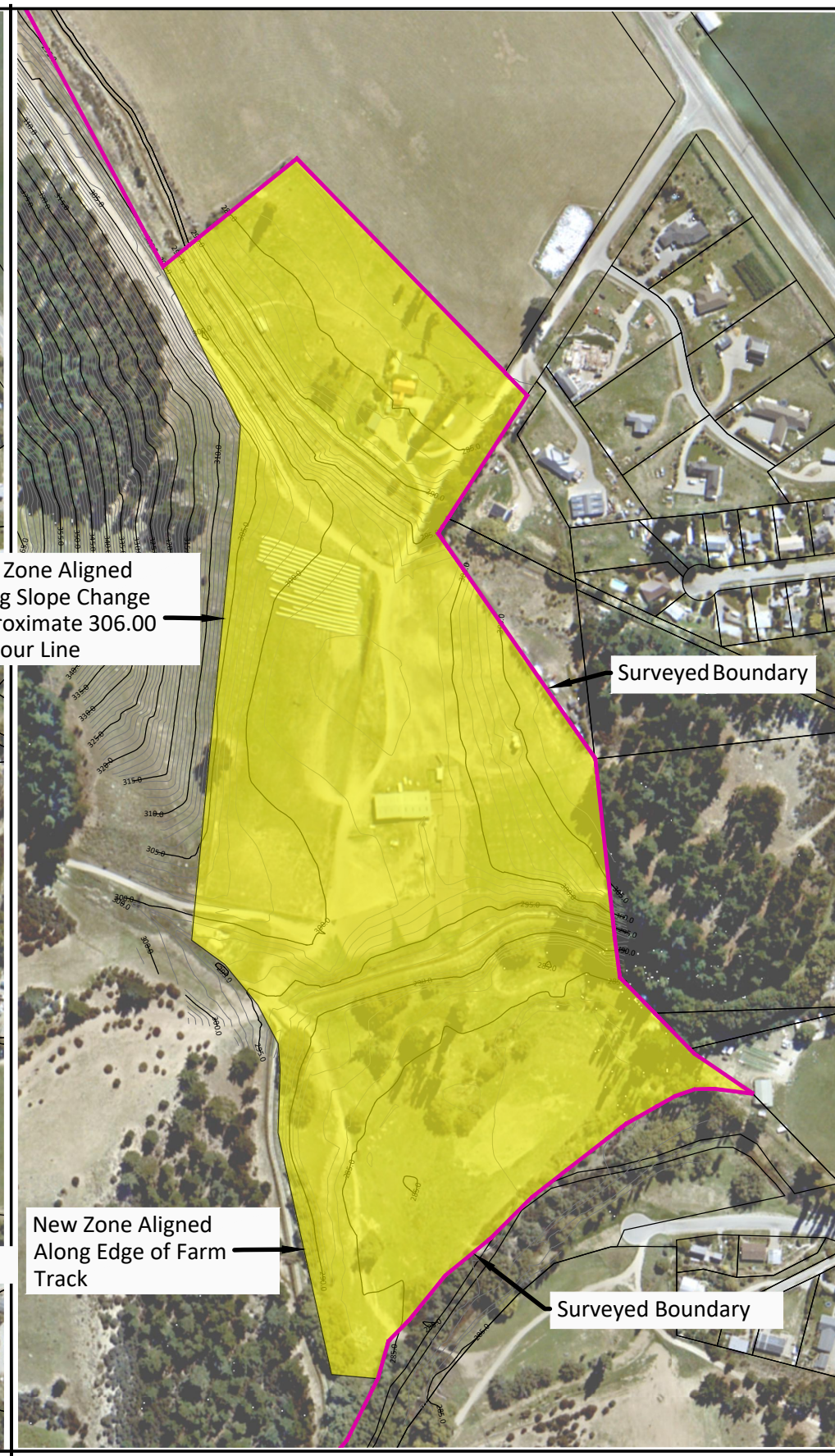


New Zone Aligned Along Slope Change
Approximate 306.00
Contour Line

Surveyed Boundary

Surveyed Boundary

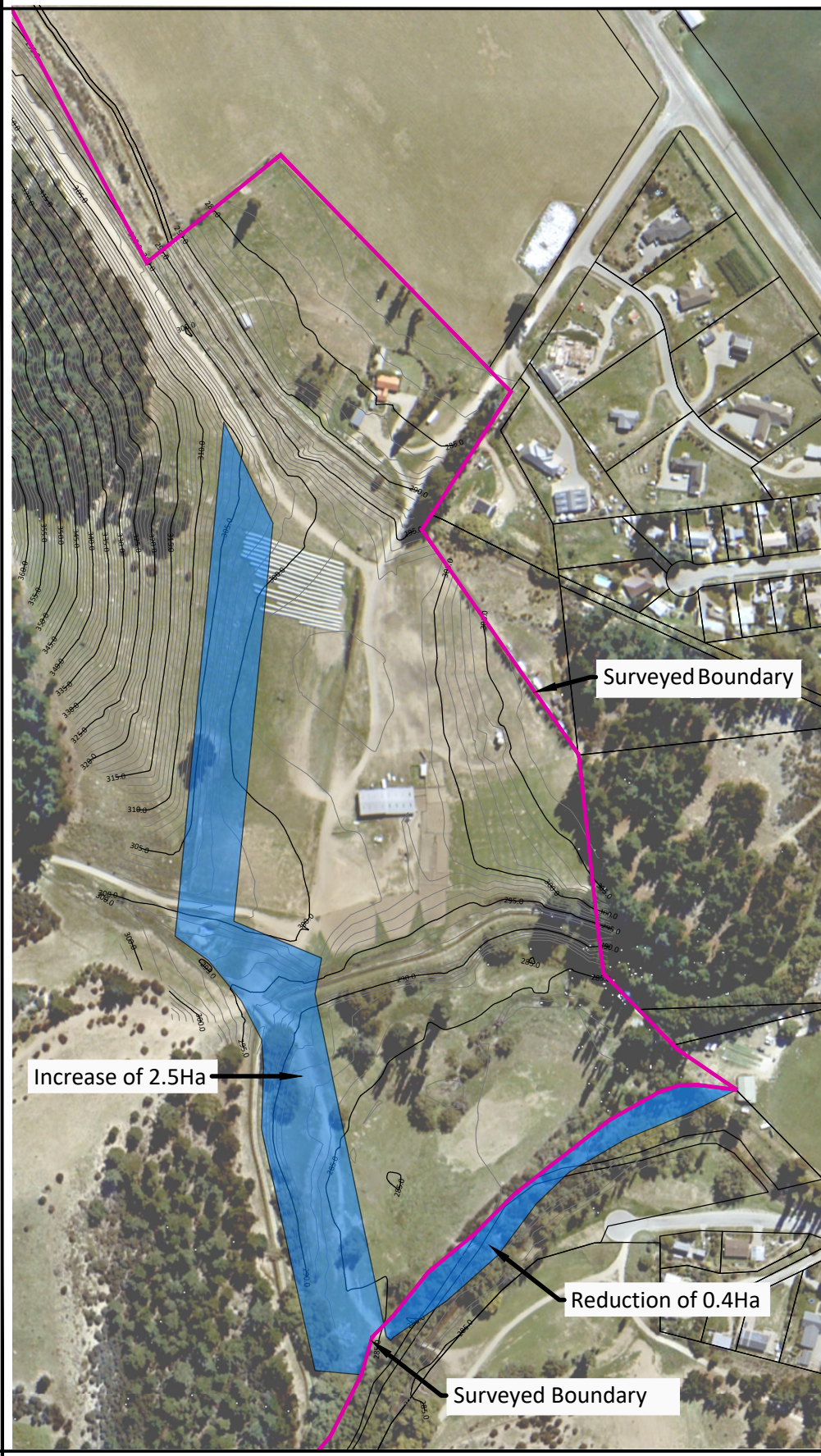
Existing Zone Boundary
Based on Outdated
XML LINZ Boundary
Data



New Zone Aligned
Along Edge of Farm
Track

Surveyed Boundary

Surveyed Boundary



Increase of 2.5Ha

Reduction of 0.4Ha

Surveyed Boundary

Existing Rural Residential (12.3Ha)

Proposed Settlement Zone (14.4Ha)

Difference Between Existing Rural Residential & Proposed Settlement Zone

PATERSONPITTSGROUP
Your Land Professionals
www.ppgroup.co.nz
0800 PPGROUP

WANAKA BRANCH
19 Reece Crescent
or P.O. Box 283
Wanaka 9343
T 03 443 0110
E wanaka@ppgroup.co.nz

Client & Location:

Lake McKay Ltd
Atkins Road
Luggate

Purpose & Drawing Title:
Proposed Settlement Zone Plan

© COPYRIGHT. This drawing, content and design remains the property of Paterson Pitts Limited Partnership and may not be reproduced in part or full or altered without the written permission of Paterson Pitts Limited Partnership. This drawing and its content shall only be used for the purpose for which it is intended. No liability shall be accepted by Paterson Pitts Limited Partnership for its unauthorized use.

Surveyed by:	HBM	Original Size:	A3	Scale:	NTS
Designed by:	MJB				
Drawn by:	BTF				
Checked by:	MJB				
Approved by:	MJB				DO NOT SCALE
Job No:	W5836	DWG No:	001	Sheet No:	100
		Revision No:	A	Date Created:	30/10/2019

Attachment 3

PROPOSED LUGGATE SETTLEMENT ZONE EXTENSION

COMMENTARY ON LANDSCAPE CHARACTER AND VISUAL AMENITY ISSUES

Ben Espie (Landscape Planner)

vivian+espie

12th November 2019

INTRODUCTION

- 1 Stage 3 of the notified Proposed District Plan (**PDP**) includes identifying Settlement Zone (**SZ**) over urban/suburban area of Luggate and identifying an Urban Growth Boundary (**UGB**) around the SZ. Pursuant to the Operative District Plan (**ODP**), this area was zoned Township Zone. The PDP also slightly expands the area that was Township Zone so as to take in a small area that was previously Rural Residential Zone and also excludes some Township Zone areas from the Settlement Zone where natural hazards are at issue.
- 2 Stage 1 of the PDP identified a new area of Rural Residential Zoning (**RRZ**) over a 12.3ha area of land to the west and northwest of Aitkins Road. This land is part of Lake McKay Station and adjoins an area of ODP Rural Residential Zone that sits southeast of Aitkins Road.
- 3 It is now proposed (by way of a submission lodged by Lake McKay LP) to rezone the 12.3ha area of RRZ to become part of the SZ. It is also proposed to slightly change the shape of the zoned area to more accurately follow boundaries and contours and consequently expand the area to 14.4ha. I shall refer to this area of proposed SZ as the site. Consequential amendments to the UGB are also sought.

THE SITE AND CONTEXT

- 4 At the time of Stage 1 of the PDP, Opus International Consultants provided a Landscape and Visual Effects Assessment Report in relation to the then-proposed area of RRZ¹. That report describes the site in its current condition. In summary, the site consists of flat terrace land that is used as improved home paddocks. The northern part of the site is adjacent to, and at the same level as Aitkins Road. This area contains an existing dwelling, gardens and an old stables building. A shallow escarpment of 10 metres elevation separates this northern area from the central part of the site. The central part is again flat pasture and contains a woolshed, yards and holding

¹ Opus International Consultants, *Lake McKay Station Plan Change – Aitkins Road Rural Residential Zone – Landscape and Visual Effects Assessment*, September 2015. Attached to Stage 1 PDP Submission 483.

paddocks. Moving south, elevation drops again by 10 to 15 metres down an escarpment that accommodates a water race, such that the southern part of the site consists of rough flat paddocks adjacent to Luggate Creek.

- 5 The entirety of the site as described above is zoned RRZ, which provides for subdivision down to a 4,000m² minimum lot size, thereby creating a character across the site that is dominated by residential activity, akin to the area immediately southeast of Aitkins Road. However, the Stage 3 notified PDP places a Building Restriction Area (**BRA**) over the southern part of the site, I understand that this is a response to potential flood hazard and also that the current submission seeks to remove this BRA in light of new evidence regarding hazard risk.

THE EFFECTS OF THE RELIEF SOUGHT BY THE RELEVANT SUBMISSION IN RELATION TO LANDSCAPE CHARACTER AND VISUAL AMENITY

- 6 In comparison to the current RRZ zoning across the site, the situation that is sought by submission would significantly increase residential density across the site, providing for subdivision down to a minimum lot size of 800m². A fully residential neighbourhood character would develop, similar to that of Hopkins Street or Alice Burn Drive. The PDP provides for subdivision as a restricted discretionary activity with a relatively broad range of discretion². I consider it reasonable to assume that any subdivision that is undertaken will include appropriate reserves, open space, street trees and other vegetative treatment.
- 7 In terms of the patterns that make up landscape character, the change between a RRZ pattern and a SZ pattern will certainly be noticeable. A more fully urban character will develop with less open space and generally less vegetation. While landscape character within the site itself will markedly change, at a broader scale, Luggate township will expand slightly but in a way that is relatively highly contained by topography and has considerable spatial logic. The expansion is removed from main roads and is within easy walking distance of the amenities of Luggate.
- 8 At the time of the hearings and decisions on Stage 1 of the PDP, the issue of the site being zoned to an urban density was discussed. The QLDC reporting planner (Mr Barr) saw merit in a full urban density across the site but noted that servicing/infrastructure restraints prevented this³.

² PDP (Stage 3 notified version), provision 27.5.7.

³ Queenstown Lakes District Council, Report and Recommendations of Independent Commissioners – Report 16.9, paragraphs 14 and 15.

Additionally, the Commissioners Recommendations Report (adopted by the QLDC), states the following regarding the site:

“Finally, we have considered whether both the submitter’s land [the site] and the adjacent area of Rural Residential zoned land should more properly form part of Luggate Township, potentially within a UGB. We foresee similar issues in enabling growth to occur in a logical manner at Luggate as is now apparent at Hawea, as discussed in Report 16.2. At Hawea, the form of development already established within the Rural Residential zone on the periphery of Hawea township has constrained what would have been more efficient use of land had it been zoned Low Density Residential ... at the outset. The Panel has concluded in Report 16.2 that despite the apparent inconsistencies of an urban zoning being applied to land on the outer edge of existing Rural Residential development, this will still, by some margin, better implement the PDP’s strategic policy framework than the Rural Residential zone within certain areas of Hawea.

As Mr Barr notes, while the Lower Density Suburban Residential Zone would be a more efficient use of land, infrastructure constraints currently preclude its adoption even if it were within our jurisdiction to recommend (which it is not). The concerns Mr Barr expressed about the lack of a clear boundary to the effective expansion of Luggate to the north suggest to us that there would be a case, both for imposition of a UGB and rezoning of Rural Residential land to a fully urban residential zoning on the periphery of the Township within the UGB, when the Council’s plans for infrastructure enhancement at Luggate are clearer”.

9 In my consideration, it is clear that the Commissioners felt that:

- creating an area of RRZ on the periphery of a town can lead to future problems,
- that zoning such an area as SZ rather than RRZ would, by some margin, better implement the PDP’s strategic policy framework; and
- any potential problems relating to the lack of a clear boundary at the northern edge of Luggate could be overcome by the imposition of an UGB (as is now proposed).

10 From a landscape perspective, I agree. I do not see any merit in maintaining the site as RRZ as opposed to SZ. I consider that SZ development over the subject site will read as a logical expansion of Luggate. Notwithstanding that, I have some recommendations/suggestions that I make below.

- 11 I understand that service/infrastructure issues and natural flood hazard issues are no longer constraints to the residential development of the site. In terms of landscape character, I therefore conclude that there are no significant adverse effects of amending the site's zoning from RRZ to SZ.
- 12 In relation to views and visual amenity, the site is well contained. The exception to this is its northern end, i.e. the edges of the northern lower terrace area that is adjacent to Aitkins Road. These edges are exposed to views from SH6 when travelling south towards Luggate.
- 13 As a south-bound traveler passes Shortcut Road and begins the straight part of SH6 that approaches Luggate, the northern edge of the township currently comes into view. As an observer continues along this straight, it is visually clear that they are approaching a town. Some intervening lines of poplars soften the view. As an observer gets closer to Luggate, the dwellings south of Aitkins Road form a straight urban edge, viewed across open pasture land. Under the proposed situation, the urban edge will come further north, will be somewhat separated from the highway and will continue to be viewed across open pasture.
- 14 As set out previously, I consider that the proposed urban extension will have logic in terms of its configuration. In visual terms, it will not appear unusual or unexpected in its context and will be somewhat separated from a highway user. While a hard line between residential development and an open rural area is not problematic, I consider that the actual boundary line should be handled in a soft way such that an abrupt visual barrier (such as a line of pailing fences) is avoided. This is perhaps something to be dealt with at subdivision design stage but relatively simple controls could deal with this issue, for example, for the future lots that adjoin the northeastern and northwestern zone boundaries measures such as the following could be included:
- All fences between a dwelling on the lot and the zone boundary shall be no higher than 1.2 metres and shall be visually permeable (post-and-wire, post-and-rail, or similar).*
- 15 It is inevitable that future lot owners on these edge lots will plant trees between their dwellings and the zone boundary that, while facilitating solar access and views, will provide some privacy, shelter and visual softening. The current edge at Aitkins Road is a good example of this. I consider that a fencing control with some tree planting will provide a pleasant edge to the zone.
- 16 In these views of the northern part of Luggate from a southbound SH6 user, the rounded escarpment that separates to northernmost part of the site from the central part is exposed to

view. This escarpment is approximately 10 metres high and relatively steep (approximately a 1 in 4 gradient). This escarpment also accommodates a functioning water race. Given these factors, I consider that there is merit in excluding buildings from this escarpment slope. This would create a visual break in the urban pattern, provide a green backdrop to the northern lower terrace area, and avoid overly prominent built form cascading down this slope. While the land of this escarpment could be included within individual lots, a BRA and perhaps fencing controls could be applied to it, as is the case with similar escarpments in other suburban areas (for example Albert Town and Lake Hayes Estate). As with my suggested northern boundary restrictions discussed above, I make no recommendation as to when/where restrictions/controls of this sort should be included; at subdivision consent stage or at zoning stage.

- 17 Apart from the northern edge of the proposed SZ area, I see no significant issues in relation to views or visual amenities; the proposed zoning area will visually tie in quite seamlessly with the existing township.

CONCLUSIONS

- 18 Zoning the subject site as SZ rather than RRZ has obvious efficiencies (that are separate to landscape matters) and these were identified at the time of Stage 1 of the PDP process. I consider that, subject to some measures to control the treatment of the northern edges of the SZ, the site can appropriately be included within the SZ without significant adverse effects on landscape character or views and visual amenity.

Ben Espie

vivian+espie

12th November 2019