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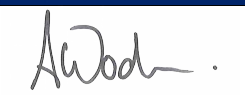
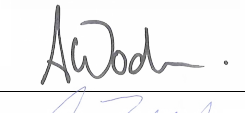
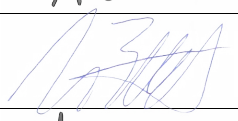
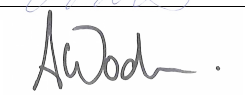
NORTHLAKE INVESTMENTS LIMITED
PRIVATE PLAN CHANGE REQUEST

INFRASTRUCTURE REPORT

PROJECT:	Northlake Wanaka – Private Plan Change Request
CLIENT:	Northlake Investments Limited
OUR REF:	W6562
DATE:	February 2022

APPROVALS PANEL:

Task:	Name:	Signature:
Project Manager:	Alex Todd	
Prepared By:	Alex Todd	
Reviewed By:	Mike Botting	
Approved for Issue By:	Alex Todd	

REVISIONS PANEL:

Rev:	Date:	Prepared By:	Reviewed By:	Comments:
0	03/02/2022	AT	MB	Issued for plan change application

CONTENTS

1. Scope

This report has been prepared to support a private plan change request within the Northlake Special Zone in Wanaka to amend part of the current activity areas B2, C1 and E1 to a new activity area B6 along with the remaining portions of C1 and E1. The private plan change seeks to increase the area covered by the new activity area B6 (when compared to the current activity area B2) therefore increasing the residential density yield in this portion of the Northlake Special Zone.

This report covers the availability of the following infrastructure elements and how the amended activity area boundaries and resulting dwelling yields will be suitably serviced within the greater Northlake Special Zone.

- Stormwater
- Wastewater
- Water Supply – Potable and Firefighting
- Network Utility Services (electricity and telecommunications)

A separate report prepared by Carriageway Consultants has been submitted with this plan change request that assess transportation provisions.

2. Dwelling Yield

Figure 1 below identifies and compares the residential yield (du's) of the existing activity areas to which this plan change relates, with the proposed activity areas. Figure 1 is referred to later in this report as well as these numbers being used in the Fluent stormwater and water supply reports. Also refer to Appendix A as this shows both the existing and proposed activity in plan form. A similar yield table to Figure 2 is also shown on these plans in Appendix A.

NORTHLAKE SPECIAL ZONE - YIELD CALCULATIONS				
EXISTING ACTIVITY AREA	**DENSITY / HA**	**AREA (HA)**	**DUs**	**DUs + 15%**
AA-B2 (see note 1)	10	4.774	48	54
AA-C1 (see note 2)	4.5	2.035	9	10
TOTAL				**64**
PROPOSED ACTIVITY AREA	**DENSITY / HA**	**AREA (HA)**	**DUs**	**DUs + 15%**
AA-B6	10	10.908	109	125
AA-C1 (see note 3)	4.5	0.490	2	2
TOTAL				**127**
CHANGE IN TOTAL DU's				**63**

NOTES:	
1	AA-B2 (existing) is only that area which overlaps with AA-B6
2	AA-C1 existing is the combined area of the 3 island AA-C1 activity areas
3	AA-C1 is the remaining AA-C1 island that isnt being re-zoned

Figure 1: Plan change area dwelling yields

Figure 2 below provides a current overall forecast dwelling yield for the Northlake Special Zone.

NORTHLAKE DEVELOPMENT - NUMBER OF RESIDENTIAL LOTS		
RESIDENTIAL STAGES	**NUMBER OF LOTS**	**PROGRESS**
Northlake Investments Limited		
AA-A (1 Acre lots subdivision)	64	Complete
Stages 1-12 & 15	523	Complete
Stage 14	46	Complete
Stage 16	55	Under construction
Stage 17	48	RCA lodged
AA-B6 (based on yield +15%)	125	Subject to Proposed Plan Change
AA-C1 (based on yield +15%)	2	Scheme only
Lot 1005 - Townhouses	27	RCA being processed
Lot 1006 - Apartments	25	Consented
Retirement Village AA-D1 / AA-C1	100	Consented
Sub-total (1)	**1015**	
Other Landowners		
Hikuwai	200	Under construction - approx 50% complete
Allenby Farms	354	ODP approved. No construction
Urquhart & others	23	Not started
Sub-total (2)	**577**	
TOTAL	**1592**	

Figure 2: Northlake Special Zone - Overall Dwelling Unit Forecast

3. Stormwater

Fluent Solutions have prepared a stormwater management concept report for the plan change area. This report in included as **Appendix B** to this report.

The stormwater management concept report describes how the proposed system has been designed to accommodate stormwater within the plan change area and connect to the downstream primary reticulated network and secondary overland flow paths.

The stormwater management concept report concludes that the proposed system represents a feasible solution to stormwater management for the site and that further detailed design will be required as this project progresses through the various regulatory approval / acceptance processes.

4. Wastewater

A wastewater modelling report has been requested from QLDC by the applicant. QLDC advised it expected this report to be available late January 2022 i.e. prior to the lodgement of the plan change application, however it has yet to be completed. The following explanation as to the availability of suitable wastewater infrastructure is therefore prepared without the benefit of the QLDC modelling information.

The Northlake Special Zone was originally approved as Plan Change 45. Included with that plan change application was a feasibility of utility services and infrastructure report prepared by Hadley Consultants (refer to **Appendix F**). The Hadley Consultants report outlined that approximately 1707 new dwellings were anticipated within the Northlake zone. In relation to wastewater, this report concluded that the wastewater generated from the Northlake zone should be disposed of to the existing QLDC reticulated network in Aubrey Road and that once a certain threshold was reached, that significant upgrades would be required to the existing network. The Hadley report did not identify what the threshold for these upgrades is.

Since Plan Change 45 was approved in 2016, the Northlake zone has been partially developed with two of the four landowners (Northlake Investments Limited and Hikuwai) now significantly advanced with their respective developments. The third landowner, Allenby Farms, has obtained approval for an Outline Development Plan that consists of 354 residential lots but has not yet progressed to further subdivision consents or construction, whilst the fourth landowner (Urquhart and others) has not yet commenced any regulatory process for their potential 23 lot development.

As outlined in Figure 2, Northlake has now completed the original 64 large lot subdivision of Activity Area A as well as 15 of its planned 18 residential development stages[1]. Northlake has also obtained consent for 25 residential apartments in the village centre as well as a 100-unit retirement village and associated facilities within AA-C2 adjacent to Outlet Road. Northlake has a further resource consent application currently being processed by QLDC for 27 townhouses. Overall, the current forecast total development yield within Northlake is approximately 1015 dwelling units.

Looking now at the Northlake Special Zone as a whole, Figure 2 shows that the total forecast development yield is approximately 1592 residential units. This forecast is approximately 100 dwellings less than originally forecast in the Hadley Consultants Report.

Email correspondence in May 2021 with QLDC (refer to **Appendix G**) outlines that at that time, QLDC were nearing completion of the design phase of the North Wanaka wastewater upgrade project and that these works result in a change to the overall wastewater network configuration, which in turn would result in a release of previously allocated capacity in the Aubrey Road pipe that the Northlake Special Zone utilises.

In summary, the overall Northlake Special Zone development yield, which includes the additional residential lots being applied for in the plan change area, is less than was originally forecast when PC45 was approved. Additionally, QLDC has indicated that the North Wanaka wastewater upgrades project will release previously allocated capacity in the existing Aubrey Road wastewater pipes. We therefore anticipate that the QLDC wastewater modelling report will indicate that existing network has capacity for the proposed plan change area. If the modelling report does in fact reveal capacity issues, then there are options available to enable the proposed plan change yield e.g., a pump station within the plan change area that will act as a buffer and only add wastewater flows to the downstream network at non-peak times.

5. Water Supply

Fluent Solutions have prepared a water supply report for the plan change area. This report is included as **Appendix C** to this report.

The water supply report describes the basis on which the water supply demand for the plan change area has been calculated as well as outlining the modelling that Fluent have undertaken as part of their analysis.

The water supply report concludes that the proposed plan change area will be able to receive sufficient potable water flows and pressures that meet QLDC's Level of Service. In the event of a fire, the proposed plan change area will be provided with appropriate pressures to meet the requirements under SNZ PAS4509:2008 firefighting supply standards. This report further concludes that detailed design will be required as this project progresses through the various regulatory approval / acceptance processes.

[1] The proposed plan change area is Northlake Stage 18 and is shown in Figure 2 as AA-B6 and AA-C2

6. Electrical Supply

PowerNet, as design and operations consultants to Electricity Southland Limited, have reviewed the proposed plan change and conclude that an electrical supply can be made available to all of the proposed dwellings units. A copy of this confirmation letter is included at **Appendix D**.

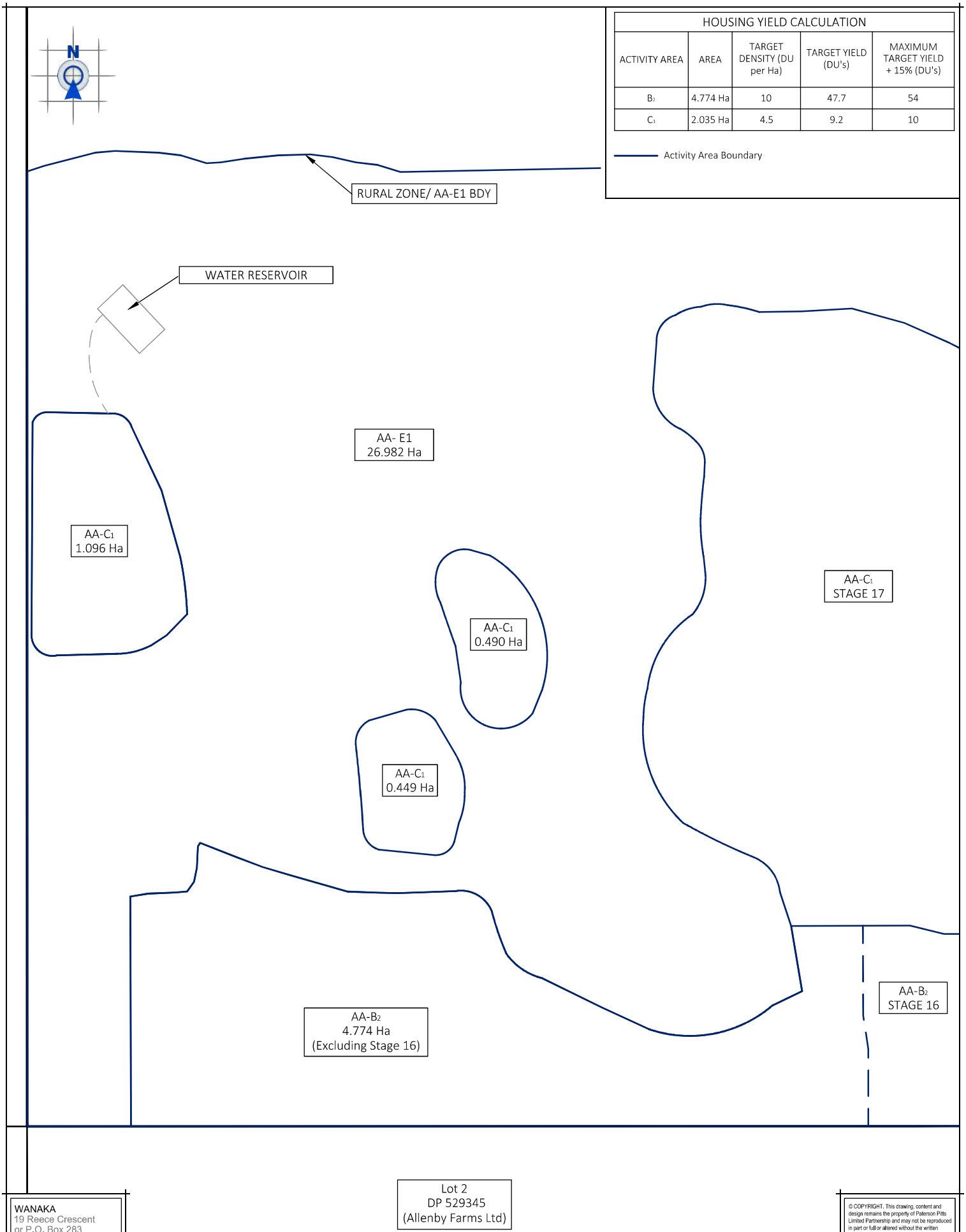
7. Telecommunications Supply

Chorus have reviewed the proposed plan change and have provided feedback via email that an telecommunications supply can be made available to all of the proposed dwellings units. A copy of this confirmation email is included at **Appendix E**. We acknowledge that the supplied confirmation from Chorus is not in the usual form expected by QLDC and we are working with Chorus to obtain this same confirmation in a more familiar format. This will be supplied to QLDC as soon as it is available.

8. Conclusion

The capacity of the existing and proposed three waters infrastructure has been assessed in terms of the amended Structure Plan. No infrastructure constraints or adverse effects have been identified that would result from the proposed changes to the activity areas and therefore the proposal is considered appropriate from an infrastructure point of view.

Appendix A: PPG – Residential Density Yield Plans



HOUSING YIELD CALCULATION				
ACTIVITY AREA	AREA	TARGET DENSITY (DU per Ha)	TARGET YIELD (DU's)	MAXIMUM TARGET YIELD + 15% (DU's)
B_2	4.774 Ha	10	47.7	54
C_1	2.035 Ha	4.5	9.2	10

Activity Area Boundary

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

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Purpose & Drawing Title:
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CURRENT YIELD

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Drawn by:	AGM		DO NOT SCALE
Checked by:	AGT		
Approved by:	AGT		
Job No: W6562	DWG No: 004	Sheet No: 100	Revision No: 4
			Date Created: 03/02/2022

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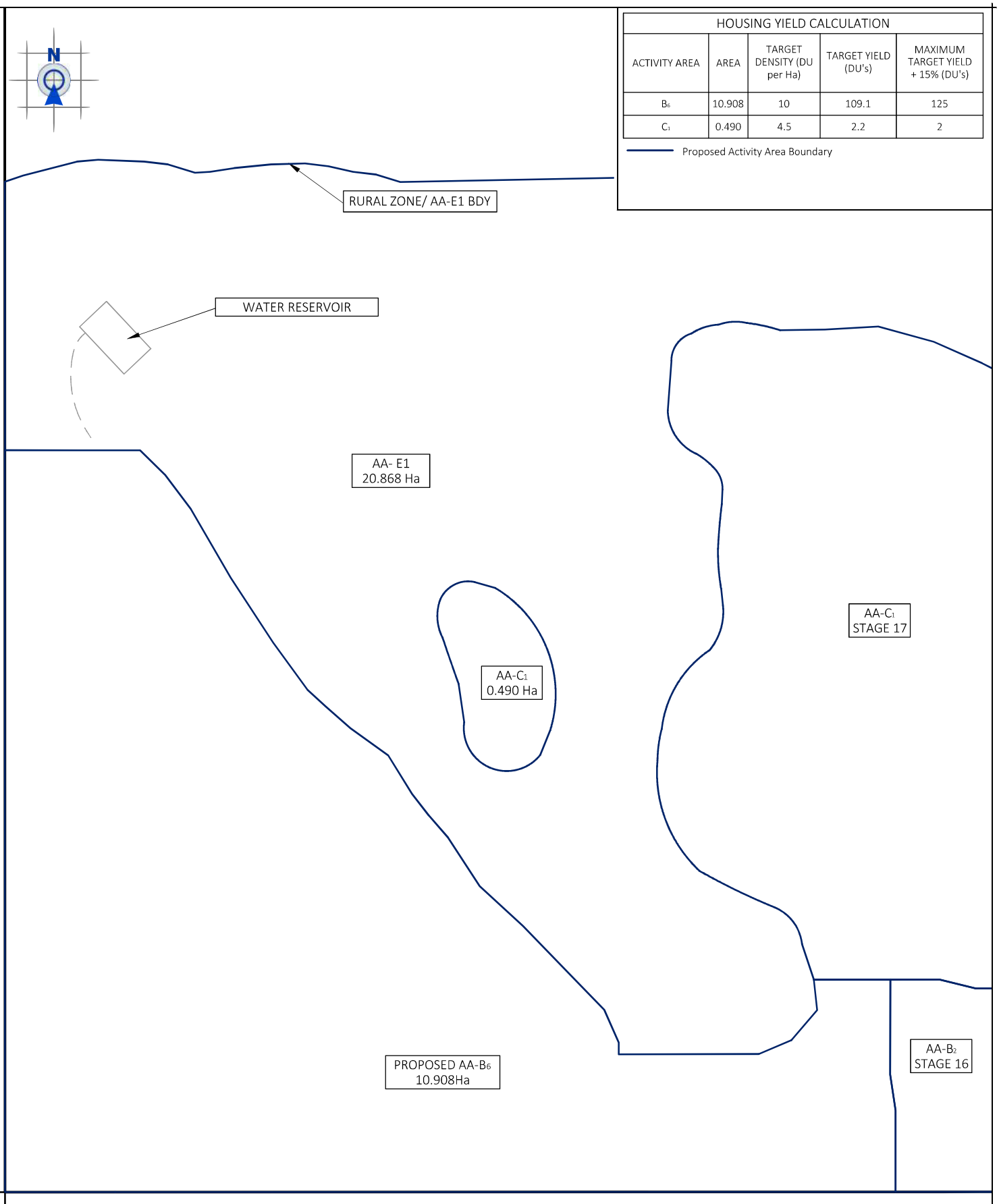

HOUSING YIELD CALCULATION				
ACTIVITY AREA	AREA	TARGET DENSITY (DU per Ha)	TARGET YIELD (DU's)	MAXIMUM TARGET YIELD + 15% (DU's)
B_6	10.908	10	109.1	125
C_1	0.490	4.5	2.2	2

Proposed Activity Area Boundary

Lot 2
DP 529345
(Allenby Farms Ltd)

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

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Client & Location:
NORTHLAKE
wanaka

Purpose & Drawing Title:
PROPOSED PLAN CHANGE
PROPOSED YIELD

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Designed by:	PPG/CLIENT		
Drawn by:	AGM		DO NOT SCALE
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Approved by:	AGT		
Job No: W6562	DWG No: 004	Sheet No: 101	Revision No: 1
			Date Created: 03/02/2022

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Appendix B: Fluent Solutions – Stormwater Management Concept

Northlake Investments Limited

Stormwater Management Concept

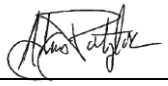
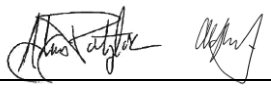
Northlake Proposed Plan Change Area

January 2022

Fluent SOLUTIONS

Northlake Investments Limited

Stormwater Management Concept
Northlake Proposed Plan Change Area

Task	Responsibility	Signature
Project Manager:	Alexis Patrylak	
Prepared By:	Hopcyn Matthews	
Reviewed By:	Alexis Patrylak / Anthony Steel	
Approved For Issue By:	Anthony Steel	

Issue Date	Revision No.	Author	Checked	Approved
1 February 2022	1	H Matthews	A Steel	A Steel
3 February 2022	2	H Matthews	A Patrylak	A Steel

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Job No.: Q000335
Date: 3 February 2022
Reference: RP-22-01-25 HM Q000335 Rev2.Docx

Northlake Investments Limited

Stormwater Management Concept
Northlake Proposed Plan Change Area

1.0 Introduction

Fluent Solutions has been engaged by Northlake Investments Limited (NIL) to develop a stormwater management concept for the next development stage of the Northlake Special Zone (NSZ). The area is identified as 'Proposed Plan Change Area' which comprises of Activity Areas (AA) B6 and C1.

The stormwater management plan provided in this report has been prepared to support an application for a private plan change for the development of AA-B6 and AA-C1 of the NSZ. Figure 1.1 below provides the location of the Proposed Plan Change Area development area.

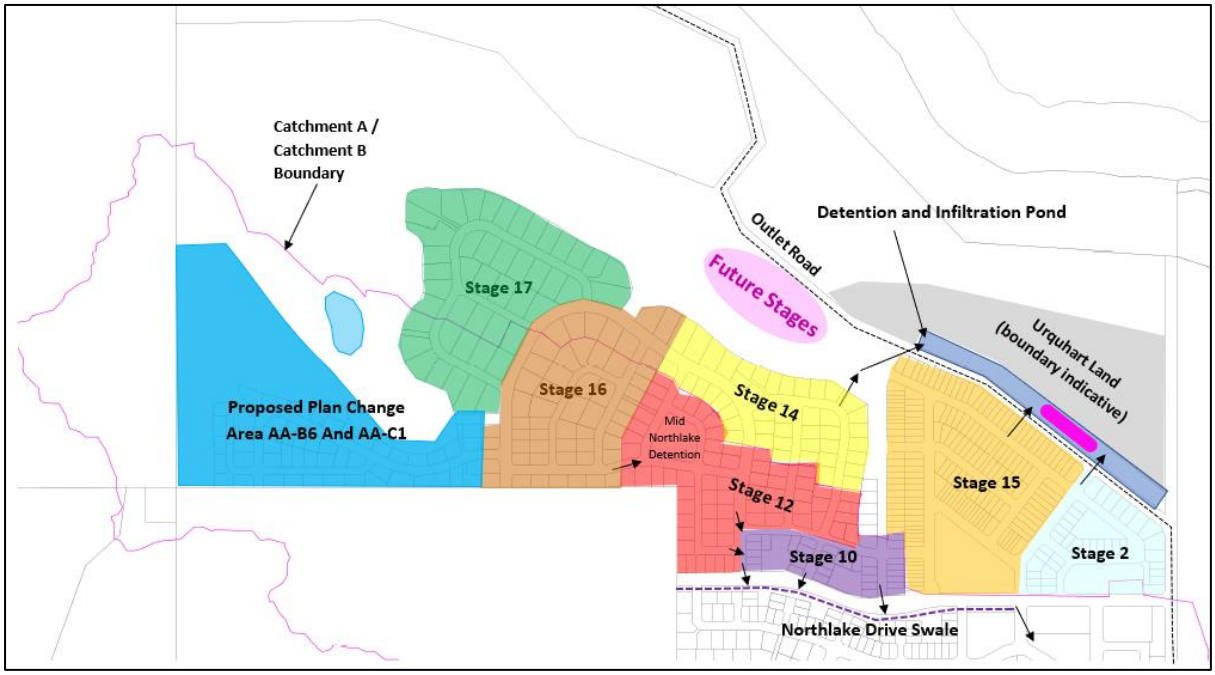

Figure 1.1: Northlake Special Zone Development Areas and Catchment Separation

This report describes a stormwater management concept for the Proposed Plan Change Area AA-B6 and AA-C1 of the development and outlines how the system has been designed to minimise adverse effects on the downstream environment. It is noted that as part of the detailed design process, the layout and sizing of the stormwater system would be reviewed and updated.

It is proposed to discharge the stormwater from the site into the neighboring Stage 16 development.

Note that this report has been provided to support the overall plan change application and only deals with stormwater management. Other servicing assessments are dealt with as part of other reports.

2.0 Background

2.1 Local Stormwater Catchments

Stormwater within the overall Northlake development area is managed through two main stormwater catchments referred to as Catchment A and Catchment B. Figure 2.1 below shows the stormwater catchments and their associated sub-catchments in and around the Northlake Special Zone.

2.1.1 Catchment A Stormwater Flow Paths

Catchment A consists of four sub-catchments: Upper Northlake, Mid Northlake, Lower Northlake, and the "Allenby Farms" development area. Stormwater runoff from the Upper Northlake sub-catchment flows into the Mid Northlake sub-catchment where a detention pond ("Mid Northlake Detention") collects flows and discharges stormwater into the Lower Northlake sub-catchment via the Stage 12 and Stage 10 pipe network as shown in Figure 2.1.

Refer to Figure 2.2 below which illustrates the stormwater flow paths in Catchment A. A further description is provided below.

Flows from the Stage 10 area including the Catchment A areas noted above are discharged to the Northlake Drive Swale (NDS) which also conveys stormwater from the Allenby Farms (AF) to an existing 1050mm diameter stormwater pipe at the eastern end of the Northlake Drive swale. Flows are discharged from the 1050mm dia. stormwater pipe into downstream Detention Basin 10 (constructed as part of Stages 1 to 3 of the development) before stormwater is discharged from the site to the east via two 900mm dia. pipes located under Outlet Road. Flows then travel through the Hikuwai development before eventually discharging into the Clutha River 1.2km to the northeast of the Outlet Road crossing location.

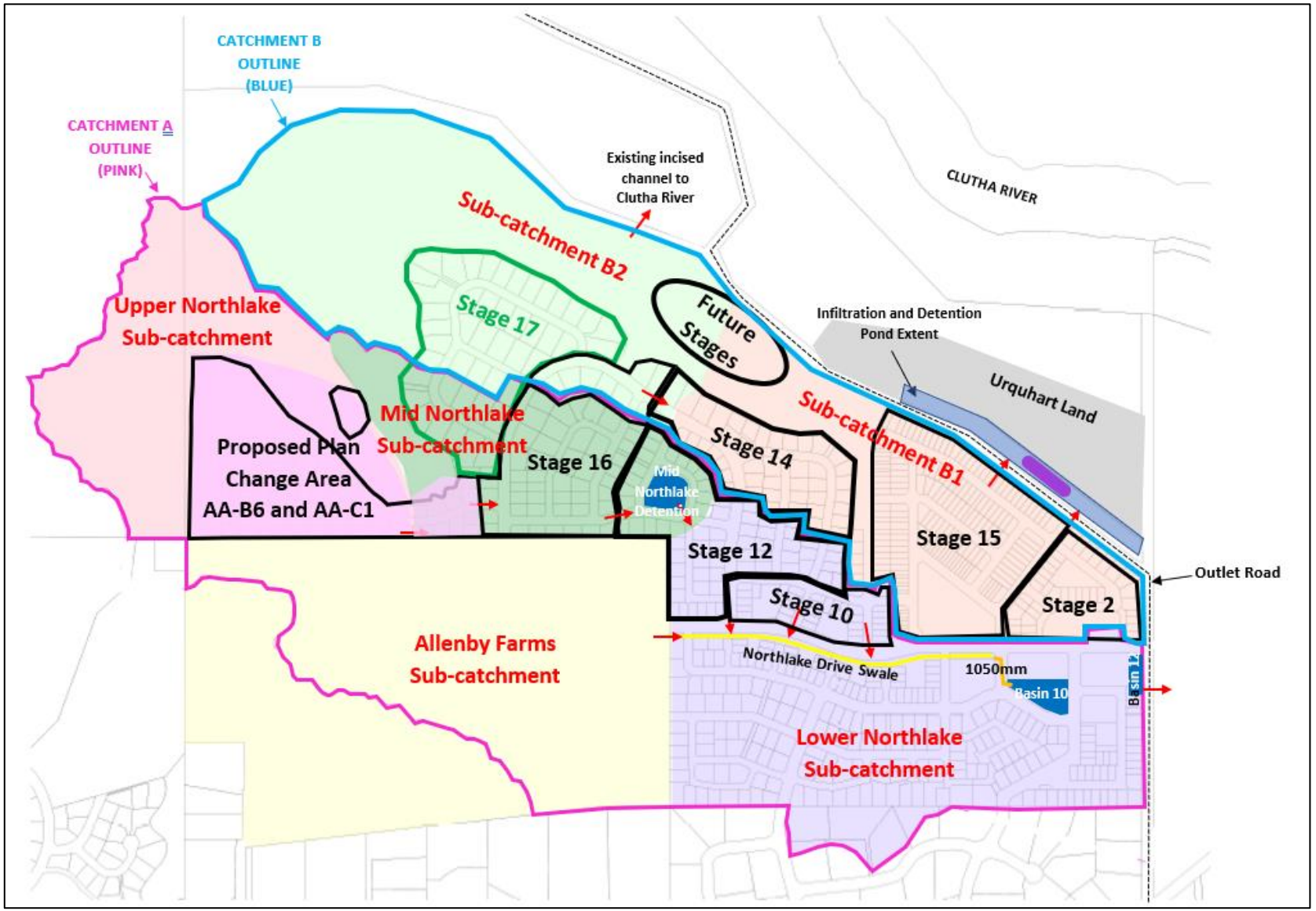

Figure 2.1: Northlake Catchment Location Reference (Catchment boundaries and lot layouts are indicative only)

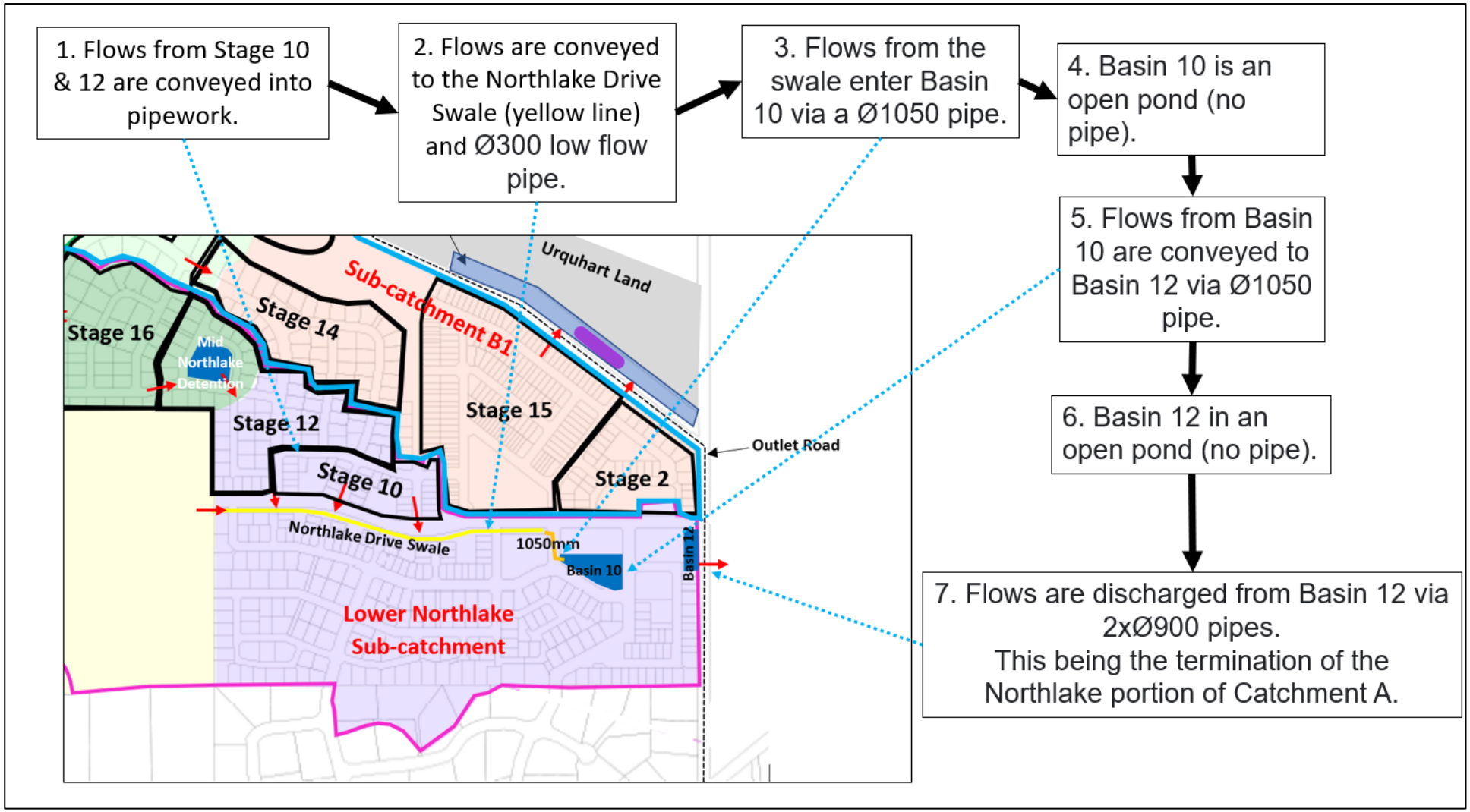

Figure 2.2: Catchment A Stormwater Flow Paths

2.1.2 Catchment B Stormwater Flow Paths

Catchment B drains to the north and east. The only areas within the Proposed Plan Change Area which would drain towards Catchment B is a potential new driveway. The driveway would connect to the adjacent AA-C1 area. Therefore, the effects on Catchment B drainage would be considered minimal and is not detailed in this report.

3.0 Proposed Development Plan

As part of the private plan change area, it is proposed to increase the zoned development area as shown in Table 3.1 and Figure 3.1 below.

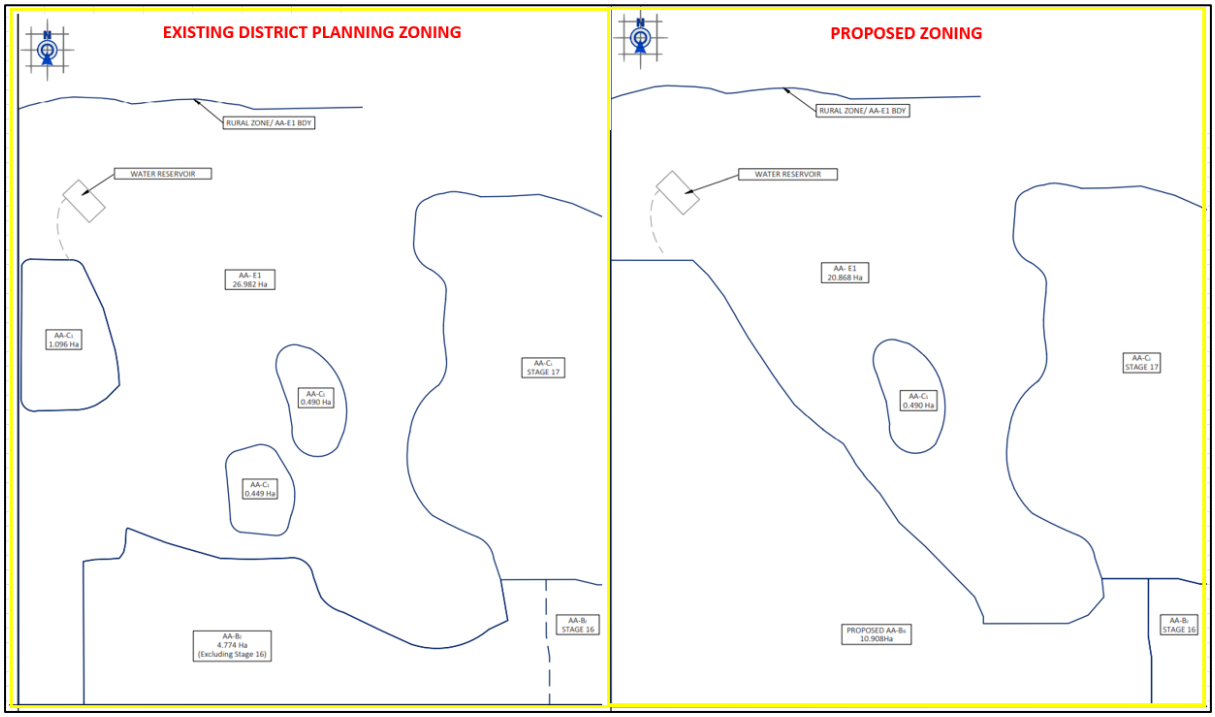

Figure 3.1: Existing District Planning Zoned and Proposed Plan Change Areas

Table 3.1: Existing District Planning Zoned and Proposed Plan Change Areas

	Total Developed Area (Ha)
Existing District Planning Zoned	6.809 Ha (Activity Areas B2 and C1)
Proposed Plan Change Zoning	11.398 Ha (Activity Areas B6 and C1)

4.0 Stormwater Management Overview

4.1 Purpose

The purpose of the stormwater management system within the development site is to:

- Describe conveyance of stormwater flows through the developed residential areas of the Proposed Plan Change Area.
- Include provision for capacity and adequate freeboard above the 100yr ARI flood water levels.
- Ensure discharges to the downstream development area are mitigated to pre-development levels for the peak flows in the 20yr and 100yr ARI events taking climate change into consideration.
- Assess the frequent type storm events such as the 2yr and 10yr ARI flows.
- Consider extreme storm events such as the 250yr ARI event.

4.2 Description

Figure 4.1 shows the proposed stormwater management system for the Proposed Plan Change Area of the development. The components of the stormwater management strategy are described in more detail below.

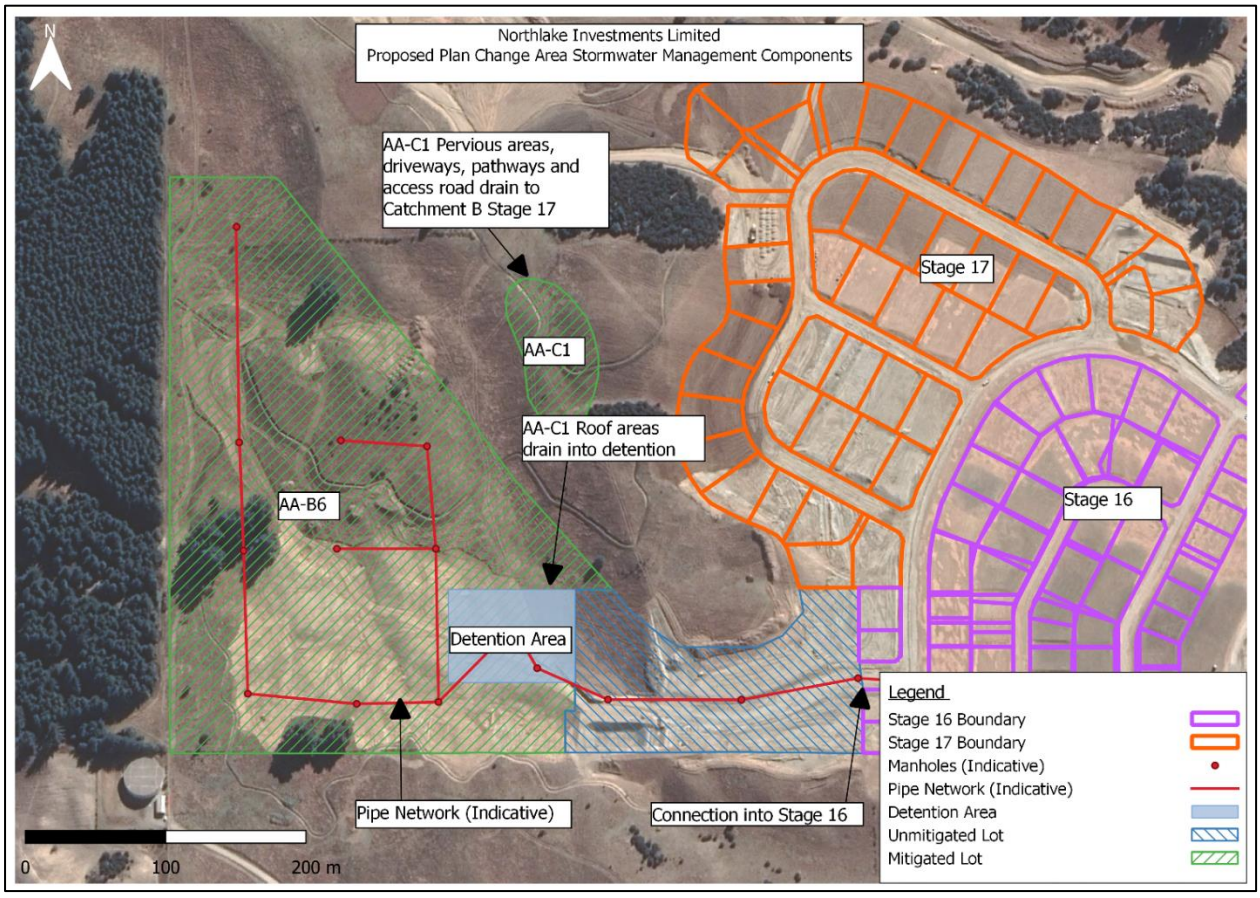

Figure 4.1: Proposed Plan Change Area Stormwater Management Components

4.2.1 Site Stormwater Collector System

The proposed stormwater collector system has been designed to collect stormwater runoff from the Proposed Plan Change Area. The system is to be designed at a minimum to carry the 20yr ARI peak flow (primary system). The size of the inlet pipe into the detention pond however, also needs to be able to convey the full 100yr ARI flow, so that all flows from the site upstream of the detention ponds are able to be discharged into the detention ponds.

The catchment areas feeding to the collector system include impervious (buildings roads, driveways, patios, etc.) areas and pervious grassed areas between the buildings and behind the footpaths. The location of the stormwater collector system generally follows the road layout.

4.2.2 Secondary Overland Flow Paths

The secondary overland flow paths for the site are the roadways. Large grated inlets (such as Humes Hush Pits) are proposed to be used near the detention pond inlet in order to collect any residual overland flows (flows above the 20yr ARI pipe network design flows) from the road and discharge them directly into the detention pond. There are proposed to be two overland flow inlets into the detention pond (one on each side of the road), given the road formation is a central crest with kerb and channeling each side.

4.2.3 Stormwater Treatment

Stormwater from the developed site will be treated with a combination of road-side catch pits and storage and settlement in the detention pond.

4.2.4 Detention Pond

There is one detention pond proposed in the site which will be used to mitigate outflows from the proposed development area. Figure 4.2 identifies the details of the detention pond. Runoff from the properties located downstream of the detention pond will not be collected in the detention pond, but the unmitigated flow from these lots has been incorporated into the sizing of the detention pond to limit post development flows leaving the site to pre-development levels.

In the base of the detention pond, it is proposed to utilise 600mm high a v-notch weir at the pond base to help to control discharge from low flow events. It is noted that a small orifice outlet (<100mm) for the small events was not selected as the risk of blockage would be high.

The outlet structure for the pond is to consist of a low level 350mm pipe orifice and scruffy dome lid as a high level weir as shown in Figure 4.3 below. Please also note, Figure 4.3 identifies the estimated detention pond water levels for specific storm events.

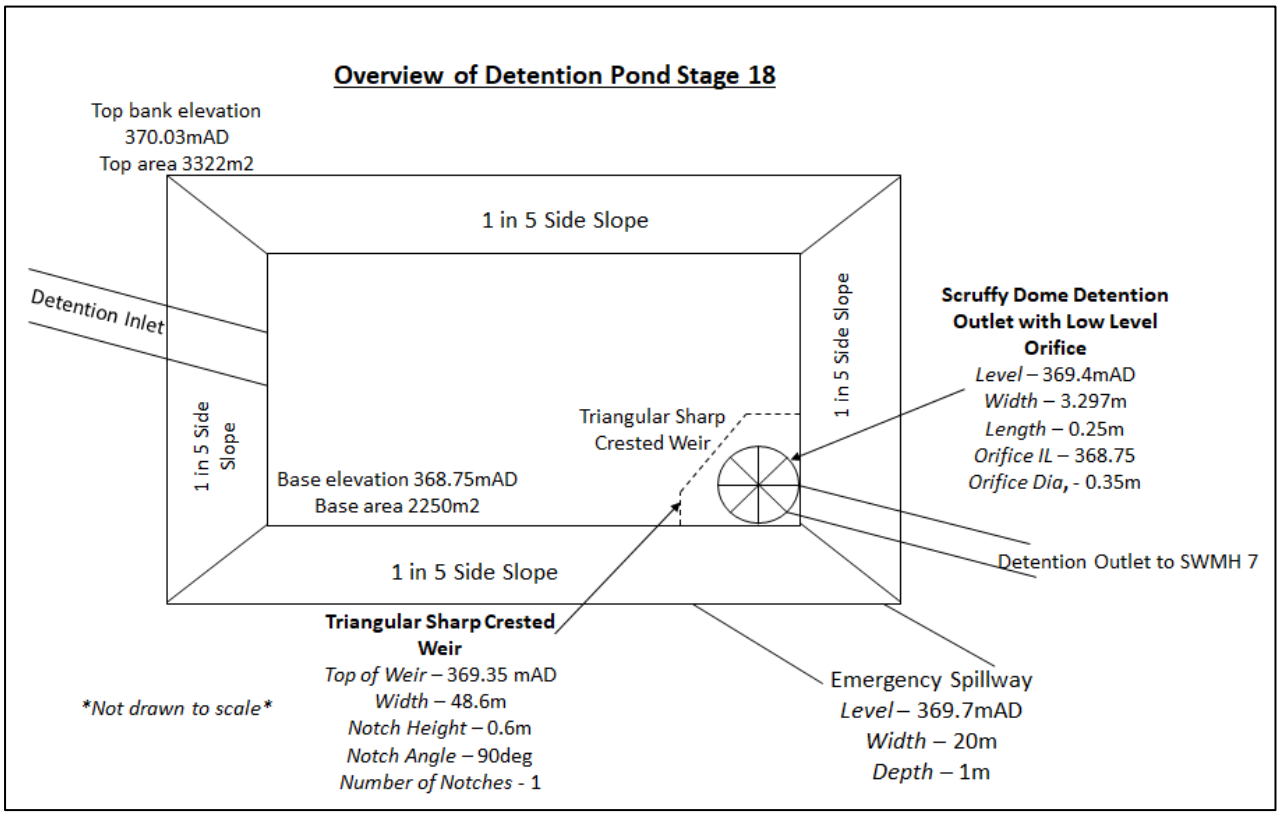

Figure 4.2: Proposed Plan Change Area Stormwater Management Components Overview of Detention Pond

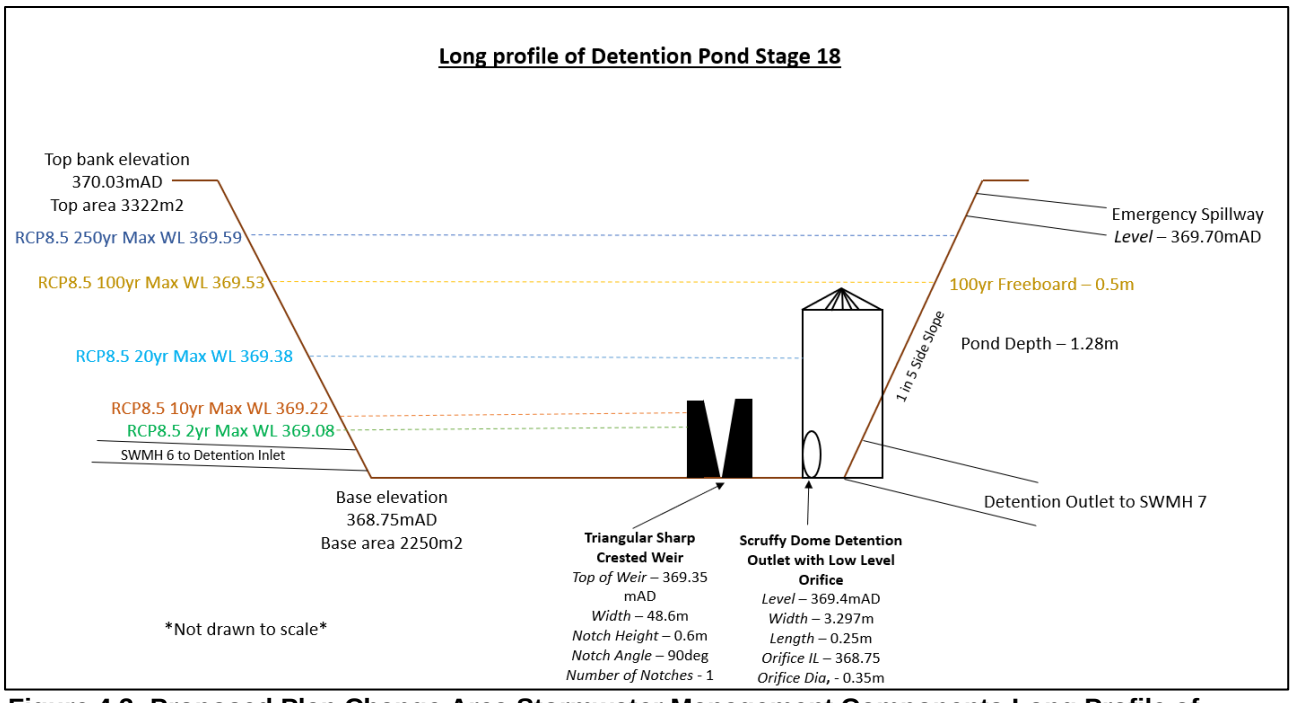

Figure 4.3: Proposed Plan Change Area Stormwater Management Components Long Profile of Detention Pond

Table 4.1 summarises the detention pond components at this preliminary design stage. The pond floor is to be sloped towards the outlet.

Table 4.1: Post-development Detention Pond Characteristics

Characteristic	Detention 1
Pre Development Overland Flow Area Draining to Detention Pond (Ha)	17.8Ha
Pond Batter Slopes	1V:5H
Pond Batter Surfacing	Grassed
Pond Base Surfacing	Grassed
Top of Bank (m)	370.03m
Area at Top of Bank (m^2)	3,322m^2
Outlet Control Low Level Orifice Diameter (m)	0.35m
Outlet Control Low Level Orifice RL (m)	368.75m
Outlet Control High Level Weir (Scruffy Dome Inlet) RL (m)	369.4m
Emergency Spillway RL (m)	369.7m

Additionally, erosion protection in the form of riprap aprons are to be provided at the detention pond inlets and outlets.

4.2.5 Hill Catchment Inflows

An allowance is to be made to incorporate inflows from the natural hill catchment above the development area. These have been included in the modelling to date. Inflows may consist of collection via a piped or swale system.

4.2.6 Total Site Discharge Pipe

The pipe network downstream of the Upper Northlake Detention Pond is sized to convey the full mitigated discharge from the pond outflow as well as capacity for the unmitigated lots downstream of the Upper Northlake Pond and into Stage 16.

5.0 Stormwater Mitigation Design Analysis

5.1 Methodology

Hydraulic and hydrological modelling software Infoworks ICM (ICM) was used to estimate the site runoff for the proposed residential development. The results of the assessment were used to estimate detention pond sizing and outlet controls to ensure surface water flow off the Proposed Plan Change Area site are mitigated to the pre-development flow rates.

Note that the below information would be developed as part of the overall development design and more detail would be presented and confirmed as part of the detailed design reporting.

5.2 Model Parameters Summary

5.2.1 Site Land Use and Drainage Pathways

The pre- and post-development site drainage catchments and flow paths are shown in Figures 5.1 and 5.2 below.

In the pre-development case (Figure 5.1), the natural drainage flow path for the catchment flowed towards the south into the Allenby Farms neighbouring site to the south and then back into the Northlake site to the east. For the purposes of this report, the existing pre-development flow has been taken as the flow into Allenby Farms to the south (the flow measure line is shown in green in Figure 5.1 below).

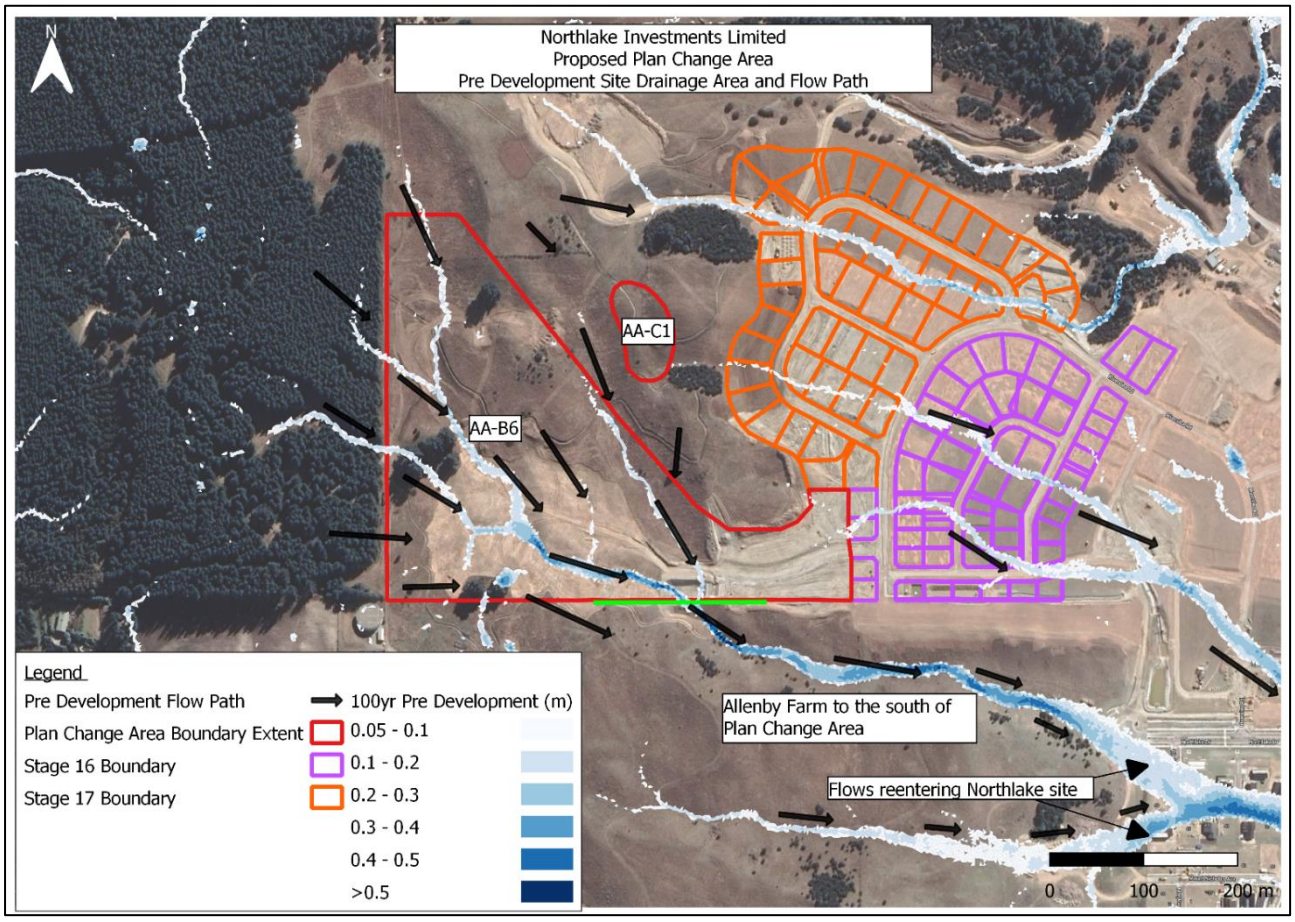

Figure 5.1: Pre-development Site Drainage Area and Flow Paths

In the post-development case, almost all of the Proposed Plan Change Area development surface water is directed to Upper Northlake Detention Pond and subsequent pipe connection into neighboring Stage 16 area as shown in Figure 5.2. The AA-C1 roof area will likely also be connected to the main detention pond and discharged to Stage 16. All other impervious and pervious areas of the AA-C1 development will discharge into Stage 17. Note that inflows from the wider hills pre-development catchment have been allowed as inflows into the proposed Plan Change Area piped network system. These flow paths into the site are to be detailed as part of a later design phase.

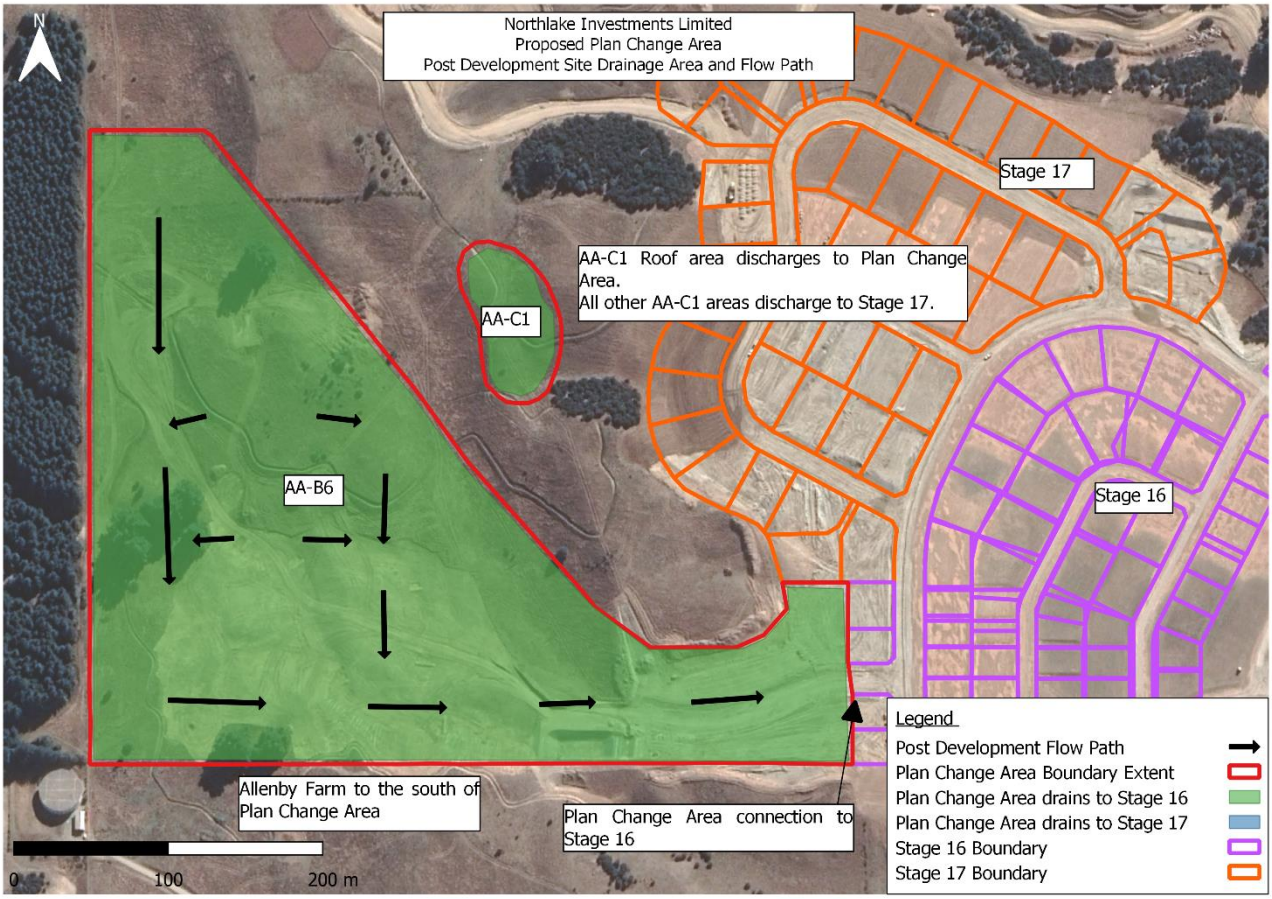

Figure 5.2: Post-development Site Drainage Area and Flow Paths

It is noted that in the pre-development case, virtually all of the site area is classed as pervious. For the post-development conditions, the following impervious area assumptions used for the site were as follows in Table 5.1. Note that an indicative lot layout was assumed for the site based on a representative lot density for similar stages in the Northlake development.

Table 5.1: Lot Impervious Areas Allowance

Lot Size	Roof Area Allowance (m^2)	Driveway Allowance (m^2)	Patio/Footpath Allowance (m^2)
<449	175	32	24
450 - 550	200	32	24
551 - 750	225	48	32
>751	250	48	32
AA-C1	400	80	64

As shown in Table 5.1, the AA-C1 lots are likely to be large family homes or similar. To account for the larger sizes, the driveway, footpath and roof area have been increased.

The total post-development site impervious area was estimated to be 48.8% of the total area as outlined in Table 5.2 below. As stated above, inflows from the remaining hill catchment areas have also been included in the overall design.

Table 5.2: Post-Development Impervious and Pervious Surface Comparison

Site	Impervious Area (Ha)	Pervious Area (Ha)	Total Plan Change Area (Ha)	%age Impervious
AA-C1 Post-development	0.11	0.38	0.49	22.4
AA-B6 Post-development	5.45	5.45	10.90	50.0
Total Post-development	5.56	5.83	11.39	48.8

5.2.2 Soil Characteristics

Pre-development

The pre-development flow was modelled using a 2D surface based on 3D LiDAR information. The Horton methodology was used for estimating infiltration losses to the soil of the applied "rain on grid" using the surface created from the 3D LiDAR data. The specific infiltration values used were based on a dry silty loam soil with little to no vegetation (values adopted from Akan 1993). The initial infiltration (fo) adopted was 76.2mm/hr and ultimate infiltration (fc) was assumed to be 7.0mm/hr. The decay rate used was 4.1/hr. These are described further in the sections below.

Initial Infiltration (F0)

The selected Horton infiltration values were based on the data available from Akan 1993 which includes initial infiltration values ranging from 7.6 to 254mm/hr based on differing vegetation covers, soil types, and soil moisture antecedent conditions (based on published scientific study and data). These values are copied below for reference. The ICM manual also references use of the Akan 1993 data. There is also guidance provided in the ICM manual which suggests sensitivity factors to account for antecedent soil moisture as presented in the extracts from the Akan publication and ICM manual presented below.

Soil Type	Initial infiltration capacity	
	in/hr	mm/hr
Dry sandy soils with little to no vegetation	5	127
Dry loam soils with little to no vegetation	3	76.2
Dry clay soils with little to no vegetation	1	25.4
Dry sandy soils with dense vegetation	10	254
Dry loam soils with dense vegetation	6	152.4
Dry clay soils with dense vegetation	2	50.8
Moist sandy soils with little to no vegetation	1.7	43.18
Moist loam soils with little to no vegetation	1	25.4
Moist clay soils with little to no vegetation	0.3	7.62
Moist sandy soils with dense vegetation	3.3	83.82
Moist loam soils with dense vegetation	2	50.8
Moist clay soils with dense vegetation	0.7	17.78

Representative values of Maximum (Initial) Infiltration Capacity, *F0*		
A. DRY soils (with little or no vegetation)	**in./hr**	**mm/hr**
Sandy soils	5	127
Loamy soils:	3	76.2
Clay soils	1	25.4
B. DRY soils		
Multiply values given in A by 2		
C. MOIST soils (for single event simulation)		
Soils which have drained but not dried out: Divide values from A and B by 3		
Soils close to saturation: Choose value close to saturated hydraulic conductivity		
Soils partially dried out: Divide values from A and B by 1.5 – 2.5		

The adopted soil values used in the model were based on a dry silty loam soil with little to no vegetation with an initial infiltration rate of 76.2mm/hr.

A sensitivity check was also undertaken to consider varying initial infiltration rates based on antecedent soil situations. A situation where the soils were only partially dried out (dry soil divided by a factor of 2.5) was also selected for assessment (initial Infiltration rate = 30.5mm/hr).

Ultimate Infiltration (Fc)
It should be appreciated that ultimate infiltration values as determined by infiltrometer studies are highly variable and can show an order of magnitude variation on seemingly similar soil types.

Additionally, the ultimate infiltration rate has been suggested to be driven by the saturated hydraulic conductivity (McLaren, Cameron 1996).

Akan 1993 also provides a table of ultimate infiltration rates based on various soil types. An ultimate infiltration value of 7.0mm/hr was selected for the design.

Soil Type	f_c mm/hr (in/hr)	
Clay loam, silty clay loams	0–1.3	(0–0.05)
Sandy clay loam	1.3–3.8	(0.05–0.15)
Silt loam, loam	3.8–7.6	(0.15–0.30)
Sand, loamy sand, sandy loams	7.6–11.4	(0.30–0.45)

Decay (k)
The rate of decay selected drives how fast the initial or maximum infiltration decreases to the ultimate infiltration rate. A larger decay rate means that the soils become saturated faster and it takes less time to go from the initial to the ultimate infiltration rate.

Akan 1993 suggests a decay rate equivalent to 4.14 hr-1 (1.15x10^-3 s-1) for all soil types. This value was adopted for the design.

Roughness
Additional to the soil characteristics, the roughness characteristics and channelisation of the pre-development flow scenario was also analysed. A variety of roughness values (Manning's n (n)) were applied throughout the site to represent the different flow characteristics. A roughness Manning's n (n) of 0.2 was chosen to represent the sheet and shallow flow which retards the flow of water through the pastoral areas in pre-development condition found on site.

Post-development
The site is proposed to be developed for mainly residential use which creates a high degree of impervious surfaces through the buildings, accessways, driveways and other hard surface areas.

The post-development model comprises of 1D rainfall-runoff calculations to estimate the conveyance effects of the post-development topography. For the purposes of this assessment, the road reserves were assumed to be fully impervious as a conservative approach. The lot areas were assumed to have an impervious surface as described in Section 5.2.1 above. Additionally, inflows from the undeveloped areas of the catchment were included in the assessment as described in Section 4.2.5 above.

Impervious areas withing the lots and roads were assumed to fully runoff (100% run-off). The pervious areas within the lots were assumed as the same Horton infiltration values as in the pre-development situation. The pipe network and detention storage was a 1D modeling network.

5.2.3 Design Storm Events

The Queenstown Lakes District Council Code of Practice requires that a primary stormwater or flood management system be designed to convey, as a minimum a 20yr Average Recurrence Interval (ARI) storm event, taking into account climate change.

Where a secondary flow path is available, it is required to convey the balance of a 100yr ARI flow without damage to property and to provide continued freeboard. If a secondary flow path is not available, the primary system is required convey a 100yr ARI flows.

Additionally, the 250yr ARI event was analysed to represent an extreme event.

The stormwater runoff assessment was assessed for the 2yr, 10yr, 20yr, 100yr, and 250yr ARI events for the following storm durations: 10min, 30min, 1hr, 2hr, 6hr, 12hr, and 24hr.

5.2.4 Rainfall Hyetographs

A series of triangular rainfall hyetographs (rainfall depth versus time graph) were developed for a range of storm durations. The developed rainfall hyetographs and the upper catchment source points were imported into the Infoworks ICM model and used for the runoff flow estimates.

The triangular hyetograph methodology adopted by the Christchurch City Council *"Advanced Analysis" method provided in the "Waterways, Wetlands and Drainage Guideline"* using recorded data at the Wanaka Airport has been applied for this effects assessment. In the past few years, other Councils such as the Dunedin City Council have also adopted this methodology. The triangular hyetograph utilises the average rainfall intensity for a given duration as the basis for design with the peak intensity being at 2 times the average intensity and occurring at 0.7 times the duration.

5.2.5 Climate Change

The design rainfall hyetographs utilised in the design included an allowance for an assumed increase in average annual temperature following the RCP8.5 climate change projection scenario for the period 2081-2100 (published by NIWA in HIRDS Version 4).

5.3 Detention Pond Flow and Level Analysis

Table 5.3 below shows the estimated water levels in the detention pond and when the various control devices are in use.

Table 5.3: Detention Pond Flow and Levels
RCP8.5 (2081-2100) Climate Change Factor - Dry Soil Conditions

Storm Event	Peak WL in Pond (m)	V-notch Weir Overtopping? (WL > 369.35m)	Low Level Orifice Operating?	High Level Weir / Scruffy Dome Inlet Operating? (WL > 369.40m)
2yr 0.16hr	368.81	No	Yes	No
2yr 0.5hr	368.87	No	Yes	No
2yr 1hr	368.93	No	Yes	No
2yr 2hr	369.00	No	Yes	No
2yr 6hr	369.08	No	Yes	No
2yr 12hr	369.07	No	Yes	No
2yr 24hr	369.03	No	Yes	No
10yr 0.16hr	368.86	No	Yes	No
10yr 0.5hr	368.95	No	Yes	No
10yr 1hr	369.04	No	Yes	No
10yr 2hr	369.13	No	Yes	No
10yr 6hr	369.22	No	Yes	No
10yr 12hr	369.17	No	Yes	No
10yr 24hr	369.10	No	Yes	No
20yr 0.16hr	368.89	No	Yes	No
20yr 0.5hr	368.99	No	Yes	No
20yr 1hr	369.10	No	Yes	No
20yr 2hr	369.26	No	Yes	No
20yr 6hr	369.38	Yes	Yes	No
20yr 12hr	369.25	No	Yes	No
20yr 24hr	369.12	No	Yes	No
100yr 0.16hr	368.99	No	Yes	No
100yr 0.5hr	369.16	No	Yes	No
100yr 1hr	369.36	Yes	Yes	No
100yr 2hr	369.49	Yes	Yes	Yes
100yr 6hr	369.53	Yes	Yes	Yes
100yr 12hr	369.47	Yes	Yes	Yes
100yr 24hr	369.28	No	Yes	No
250yr 0.16hr	369.07	No	Yes	No
250yr 0.5hr	369.29	No	Yes	No
250yr 1hr	369.46	Yes	Yes	Yes
250yr 2hr	369.58	Yes	Yes	Yes
250yr 6hr	369.59	Yes	Yes	Yes
250yr 12hr	369.52	Yes	Yes	Yes
250yr 24hr	369.41	Yes	Yes	Yes

Note that in the 2yr and 10yr ARI events, the V-notch weir does not overtop. Any flow going through the system would be moderated by the notch.

5.4 Pre- and Post-development Flow Assessment

Table 5.4 below compares the pre-development, direct post-development and mitigated post-development peak stormwater runoff flows for the site using the mitigation tools described above. Note that the values in Table 5.4 represent flows inclusive of a climate change factor including the RCP8.5 (2081-2100) scenario. The flow measure point is located at the outlet from the Proposed Plan Change Area and entrance to Stage 16 and includes the lots downstream of the detention pond.

As can be seen in Table 5.4 the maximum mitigated flows for the 10yr, 20yr, and 100yr ARI post-development situations, are reduced to less than the pre-development scenario.

The post-development flow through the detention pond for the 2yr ARI event is greater than the pre-development flow of estimated <10 L/s for the dry soil conditions. In order to meet this pre-development flow condition, soakage to ground or full attenuation of the event would be required which would be impractical given the sizing and limited gravel soakage availability. The use of the v-notch weir limits flow to a peak 2yr ARI flow from a peak flow estimate of 350 L/s direct with no mitigation to a peak flow estimate of 100 L/s with the detention pond and associated weir and outlet structures which would have a minimal effect on the downstream system.

Table 5.4: Pre- and Post-Development Stormwater Peak Discharges
RCP8.5 (2081-2100) Climate Change Factor
Dry Soil Conditions

Storm Event	PRE Peak Flow (m^3/s)	POST DIRECT Peak Flow (m^3/s)	POST MITIGATED Peak Flow (m^3/s)
2yr, 10min	<0.01	0.35	0.09
2y, 0.5hr	<0.01	0.35	0.09
2yr, 1hr	<0.01	0.30	0.08
2yr, 2hr	<0.01	0.24	0.08
2yr, 6hr	<0.01	0.16	0.10
2yr, 12hr	<0.01	0.11	0.09
2yr, 24hr	<0.01	0.08	0.07
10yr, 10min	<0.01	0.63	0.02
10y, 0.5hr	<0.01	0.60	0.15
10yr, 1hr	<0.01	0.50	0.14
10yr, 2hr	0.06	0.40	0.16
10yr, 6hr	0.29	0.30	0.22
10yr, 12hr	0.17	0.20	0.17
10yr, 24hr	0.07	0.12	0.11

Storm Event	PRE Peak Flow (m^3/s)	POST DIRECT Peak Flow (m^3/s)	POST MITIGATED Peak Flow (m^3/s)
20yr, 10min	<0.01	0.81	0.20
20y, 0.5hr	<0.01	0.75	0.19
20yr, 1hr	0.02	0.65	0.19
20yr, 2hr	0.30	0.68	0.28
20yr, 6hr	0.27	0.52	0.28
20yr, 12hr	0.12	0.26	0.23
20yr, 24hr	0.02	0.28	0.13
100yr, 10min	<0.01	1.37	0.32
100yr, 0.5hr	0.02	1.41	0.35
100yr, 1hr	0.15	1.49	0.47
100yr, 2hr	0.98	1.43	0.51
100yr, 6hr	0.56	0.87	0.64
100yr, 12hr	0.27	0.53	0.43
100yr, 24hr	0.09	0.28	0.24
250yr, 10min	0.09	1.85	0.43
250y, 0.5hr	0.54	2.00	0.51
250yr, 1hr	1.29	2.08	0.62
250yr, 2hr	1.44	1.84	0.86
250yr, 6hr	0.75	1.07	0.89
250yr, 12hr	0.35	0.65	0.59
250yr, 24hr	0.13	0.35	0.28

Additionally, it is necessary to mention that a small portion of the AA-C1 developed site will drain back into Stage 17, Catchment B. The estimated peak 100yr ARI flow draining into Catchment B from the small catchment is estimated to be 72 L/s. This flow is not considered to cause adverse effects to the Catchment B development and will be considered in more detail at a later design phase.

The peak 2yr ARI event for a partially dried antecedent soil condition in the pre and post - development scenario has also been assessed, results are shown in Table 5.5 below (refer to Section 5.2.2 above). The peak 2yr ARI pre-development is estimated to be 30 L/s. The difference between the peak 2yr ARI post- and pre-development flows for the partially dry soil conditions is 70 L/s. This difference is less than in the dry soil condition case, which had a difference of 100 L/s.

Table 5.5: 2yr ARI Pre- and Post-Development Stormwater Peak Discharges
RCP8.5 (2081-2100) Climate Change Factor
Partially Dried Antecedent Soil Conditions

Storm Event	PRE Peak Flow (m^3/s)	POST MITIGATED Peak Flow (m^3/s)
2yr, 10min	<0.01	0.09
2y, 0.5hr	<0.01	0.09
2yr, 1hr	<0.01	0.08
2yr, 2hr	0.03	0.08
2yr, 6hr	0.02	0.10
2yr, 12hr	<0.01	0.09
2yr, 24hr	<0.01	0.07

5.5 Secondary Overland Flow Paths and Blockage Assessment

A blockage assessment of the surface water detention system identifies the detention pond outlets as the main critical location. If the outlet for the low level orifice or scruffy dome inlet is impeded, the water will continue to fill the pond to the maximum level. A relief spillway is proposed to be installed on the downstream end of the detention pond and will allow any emergency overspill to flow back into the new access road. The level of this spillway (RL 369.7m) is located above the estimated 250 year ARI flood level and will remain dormant unless a blockage occurs.

If blockage of the road inlets in the Proposed Plan Change Area were to occur, flows would be conveyed down the new access road to neighboring Stage 16. From Stage 16 the overland flow would follow the secondary overland flow path down Road 18 (Riverslea Road) to Road 23 (Lammermoor Street) to the Mid Northlake detention pond. From here the secondary overland flow paths are well established in previous approvals however they ultimately lead to the 2 x DN900 culverts under Outlet Road.

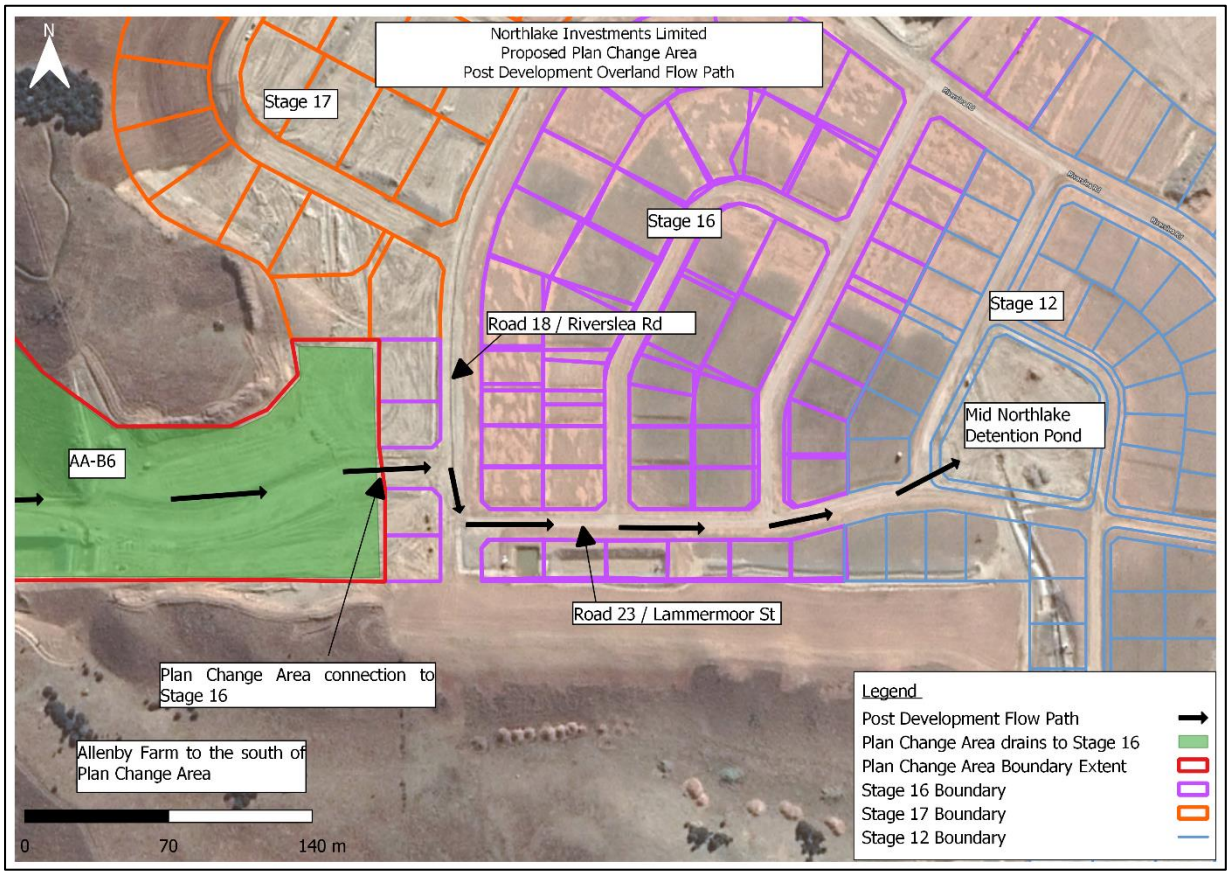

Figure 5.3: Overland Flow Path

5.6 Freeboard Provisions

The Queenstown Lakes District Council Code of Practice requires a minimum 0.5m freeboard to buildings above the 100yr ARI flood level. The relevant Clause 4.3.5.2 is copied below:

> The minimum freeboard height additional to the computed top water flood level of the 1% AEP design storm should be as follows or as specified in the district or regional plan:
>
> | Freeboard | Minimum height |
> |---|---|
> | Habitable dwellings (including attached garages) | 0.5 m |
> | Commercial and industrial buildings | 0.3 m |
> | Non-habitable residential buildings and detached garages | 0.2 m |
>
> The minimum freeboard shall be measured from the top water level to the building platform level or the underside of the floor joists or underside of the floor slab, whichever is applicable.

The Proposed Plan Change Area includes residential buildings and therefore all buildings are to be situated at least 500mm above the 100yr ARI flood level in the pond.

6.0 Safety

The creation of the detention pond has associated risks which under the Health and Safety at Work Act need to be identified. The Proposed Plan Change Area development features a

detention pond used for drainage of stormwater. The detention pond is not a swimming pool and therefore the Building Act for fencing of swimming pools does not apply. There is no national guidance on the fencing requirements for detention ponds. Any fencing around the ponds is recommended to be low and/or see-through fence, dense bank planting, or wetland buffers. These will provide a barrier around the detention pond.

Debris grates should be installed on the pipe inlets and outlets which act as a strainer and prevent harmful debris from entering associated stormwater pipes.

The side slopes for the pond have been suggested at 1 in 5. The pond batters of 1 in 5 are easily mowed and provide access in the case of an emergency. Steeper planted batters would also be another design option.

7.0 QLDC Code of Practice Downstream Flow Considerations

The Queenstown Lakes District Council (QLDC) Code of Practice outlines the mitigation requirements for management of peak discharge rates as well as overall considerations for the downstream effects. The relevant clauses are noted below.

Clause 4.3.5.1:

> *"Overland flow downstream discharges of the 1% AEP post-development peak flowrate shall be no greater than the 1% AEP pre-development peak flowrate. The location and type of overland flow downstream discharges are to mimic pre-development scenarios unless otherwise approved by Council. If the pre-development scenario is not mimicked it shall be justified to Council satisfaction why this can't be achieved and why the altered scenario is acceptable."*

Clause 4.2.4:

> "*The implications of future development on adjoining land should be on the basis of replicating the pre-development hydrological regime whereby the maximum rate of discharge and peak flood levels post-construction are no greater than pre-development."*

Clause 4.2.7:

> *"Downstream impacts could include (but are not limited to) changes in flow peaks and patterns, flood water levels, contamination levels and erosion or silting effects, and effects on the existing stormwater system. Where such impacts are more than minor, mitigation measures such as peak flow attenuation, velocity control, and treatment devices will be required."*

Please refer to Section 4 above outlining the post-development flow mitigation through use of the detention pond.

8.0 Conclusion

The Proposed Plan Change Area, comprising of areas AA-B6 and AA-C1 is the next residential development phase of the Northlake Special Zone (NSZ) site.

The stormwater management plan for the Proposed Plan Change Area development has been prepared to:

- Describe conveyance of stormwater flows through the developed residential areas of the Proposed Plan Change Area.
- Include provision for capacity and adequate freeboard above the 100yr ARI flood water levels.
- Ensure discharges to the downstream development area are mitigated to pre-development levels for the peak flows in the 20yr and 100yr ARI events taking climate change into consideration.
- Assess the frequent type storm events such as the 2yr and 10yr ARI flows.
- Consider extreme storm events such as the 250yr ARI event.

It is proposed to discharge the stormwater from the plan change area into the downstream development area of Stage 16. Residential areas downstream of the proposed detention pond will not flow into the detention pond but have been incorporated as part of the mitigated flows, as shown in Figure 4.1.

The roof areas of the AA-C1 development will be discharged into the detention pond and incorporated with the main discharge connection into Stage 16. The remaining impervious and pervious areas of the AA-C1 development will be discharged into neighboring Stage 17. The estimated peak 100yr ARI flow from area AA-C1 to Stage 17 is 72 L/s. This is not considered to cause adverse effects and will be considered in more detail at a later design phase.

The stormwater management concept for the Proposed Plan Change Area of NSZ development presents a solution to mitigate the effects of the development on the surrounding environment.

Additional design work will be completed as part of the detailed design, but the overall management scheme represents a feasible solution to stormwater management for the site.

Appendix C: Fluent Solutions – Water Supply Report

Northlake Investments Limited

Northlake Proposed Plan Change Area

Water Supply

December 2021

Fluent SOLUTIONS

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Northlake Investments Limited

Northlake Proposed Plan Change Area - Water Supply

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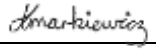
Prepared By:	Klemens Markiewicz	
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Northlake Investments Limited

Northlake Proposed Plan Change Area - Water Supply

1.0 Introduction

Fluent Solutions have been engaged by Northlake Investments Limited (NIL) to develop a water supply system to service the Northlake development - particularly in relation to the elevated lots in the proposed plan change area.

Previously consented stages for the development have water supplied by Beacon Point reservoir and the water trunk mains off Aubrey Road. For the elevated lots, provisions will be put in place to deliver a potable water supply system with two pressure zones. The proposed plan change area is located at the western end of the development as shown in Figure 1.2 below.

The boundary between the upper and lower pressure zones has been determined based on ground elevation (approximately 350m RL) and hydraulics. Figure 1.1 below shows the various development stages and the boundary (blue dotted line) between the upper and lower pressure zones.

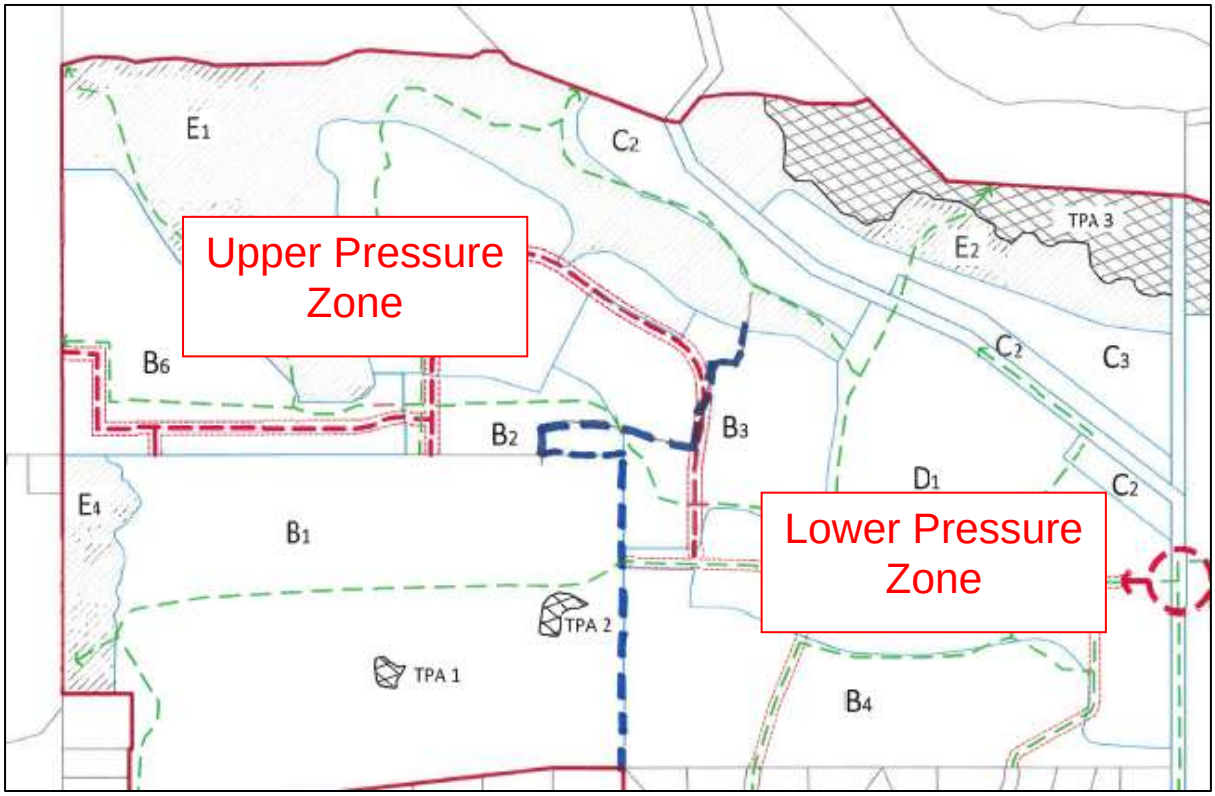


Figure 1.1: Northlake Development Water Supply - Pressure Zone Boundary

Figure 1.2 below shows the proposed plan change area abutting the Allenby Farms land to the south and the Sticky Forest area to the west. Based on the target density of development Area AA-C1 has capacity for 2 lots and Area AA-B6 has capacity for 125 lots.

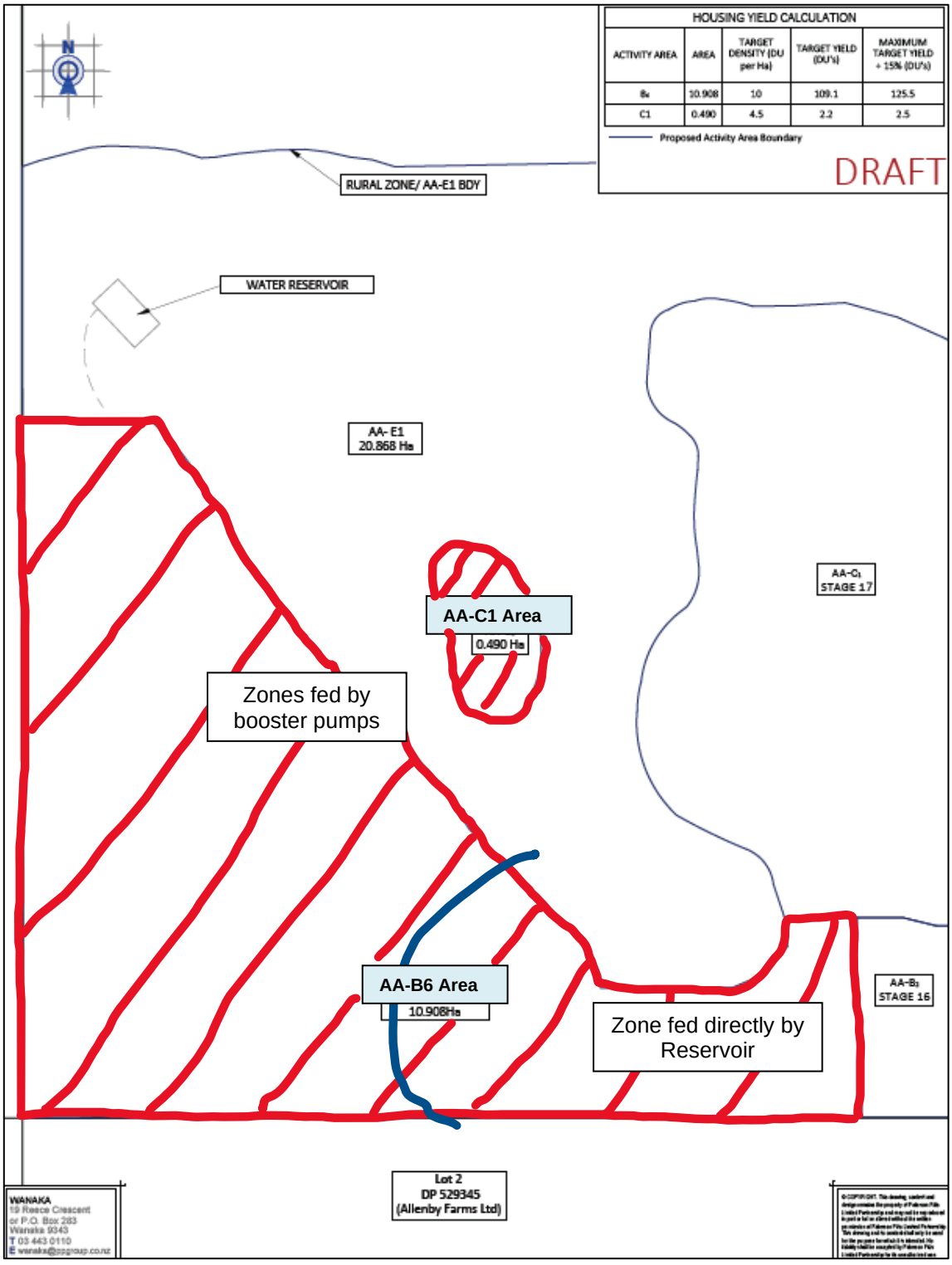


Figure 1.2: Northlake Development - Proposed Plan Change Areas AA-C1 and AA-B6

2.0 Background

Fluent Solutions has been working with Northlake and QLDC over the last few years to design a new high-level reservoir to service the upper levels of Northlake and Allenby Farms area. The reservoir construction and associated works are almost complete.

This report identifies the design process followed for the upper pressure zone water supply and confirms that the new water supply will be able to service the proposed plan change area of the development.

3.0 Water Demands

3.1 Water Supply Zone Extent

As can be seen from Figure 1.1 the water supply pressure zone boundary runs through part of Stages 12 and 14 and along the boundary with Allenby Farms to the southwest of the Northlake development.

The total number of lots to be served by the upper pressure zone has been calculated to be between 547 - 613 lots. This number also includes provision for 350 lots in the Allenby Farms land. It should note however, that 40 of the 350 lots could also be fed from the lower pressure zone supply as they are at elevations low enough to receive the required pressures and flows during peak domestic demand periods from the lower pressure zone.

Based on the elevation range of the proposed plan change area, it has been determined that 127 lots in the proposed plan change area would be located in the upper pressure zone.

3.2 Assumptions and Design Data

The following assumptions and modelling data have been used for the upper pressure zone water supply:

- Total lots being supplied: 547 - 613
- One residence per lot (no allowances have been made for secondary dwellings)

3.3 Water Demands

Clause 6.3.5.6 of QLDC's current Land Development and Subdivision Code of Practice, 2018 states that water demands should be calculated based on:

- Average daily demand per lot: 2100L
- Peak day factor = 2 x average day

Following a review of the original reservoir sizing report by QLDC P&I team in June 2019, QLDC advised that the following criteria should be used:

- Average daily demand per lot: 1000L
- Peak day factor = 2 x average day

As the revised demand criteria differed significantly from QLDC's standards, a review of water design standards published by other Local Authorities around New Zealand was undertaken. This review determined:

- Average daily demand per lot: 1350L
- Peak day factor = 2.7 x average day

Subsequent to the June 2019 advice, data has now been provided by QLDC (August 2019) detailing that the average water usage per connection in the **Wanaka area** based on flow meter records as noted below:

- Average daily demand per lot: 1400L
- Peak day factor = 2.4 x average day

As the latest criteria has been based on actual flow meter records, the water storage and reticulation design used in determining of the upper pressure zone has now been based on the latest data. The water demand estimates presented below assume that all the lots in the Allenby Farms land are supplied by the upper pressure zone. As noted above, this may not be the case, and hence the design is conservative.

The Maximum Estimated Average Daily Demand for the Upper Pressure Zone is therefore calculated to be:

613 x 1400 = 858m^3/day.

The Maximum Peak Daily Demand for the Upper Pressure Zone is therefore calculated to be:

613 x 1400 x 2.4 = 2,060m^3/day (23.8L/sec).

QLDC's current subdivision standard states that the Peak Hourly Demand to be used for the Wanaka reticulation design is to be 6.6 x the Average Daily Demand.

The Maximum Peak Hourly Demand for the Upper Pressure Zone is therefore calculated to be:

613 x 1400 x 6.6 = 5,664m^3/day - which equates to 65.6L/sec.

3.4 Firefighting Flows

Based on SNZ PAS 4509_2008 Firefighting Supply it is assessed that the development will require a fire risk classification of FW2. This requires the water supply reticulation to be able to supply 12.5L/sec each from 2 hydrants located within 270m of a dwelling and fire-fighting water storage of 45m^3.

Clause 4.2 of the standard also recommends that water supply reticulations be designed to provide 60% of peak daily demands in addition to the fire flow. The maximum estimated flow requirement is therefore calculated to be**: 0.6 x 23.8 + (2 x 12.5) = 39.3L/s**.

4.0 Water Supply Network Modelling

4.1 General

The proposed plan change area of the development will have house lot sites ranging in elevation from RL397m down to RL360m. The floor level of the high-level reservoir is at RL404.2m. As a result, domestic water pressures at some of the lots will fall below the QLDC Code of Practice requiring a minimum water pressure of 300kPa at peak hourly demand flows.

In relation to fire-fighting flows, the elevation of the hydrants being used to fight fires in the AA-B6 area including the highest house will still be able to receive pressures above the 100kPa minimum as required under SNZ PAS 4509_2008 Firefighting Supply standards. Providing a sufficient water supply to fight fires at the dwellings in the AA-C1 area is discussed further below.

4.2 Domestic Demands - High Levels

It is proposed to rectify the low domestic water supply pressures situation by placing a small booster pump set adjacent to the high-level reservoir and supply domestic water flows to the lots in a domestic water reticulation. The domestic water reticulation pipes would be fed water from the high-level reservoir outlet pipeline with the pressures boosted using pumps with variable frequency drives to maintain a minimum domestic pressures of 300kPa to all the lots being served.

Based on the potential density of development and the topography of the proposed plan change area it is estimated that approximately 107 lots would be serviced by this system.

Using the Peak Hourly Demand calculation strategy described above, the estimated peak hourly flows for the boosted pressure zone are calculated to be:

107 x 1400 x 6.6 = 989m^3/day - which equates to 11.4L/sec

To ensure a minimum domestic pressure of 300kPa is provided to these lots, it was assumed the booster pump would provide at least 25m of additional pressure.

Further to the higher level houses in the proposed plan change area, there is also the potential for a few high level houses in the Allenby Farms area to be connected to this boosted water supply. When the detailed design of this booster pumping station and upper level pressure zone reticulation is completed, the potential additional demand in the upper level Allenby Farms lots will also be considered.

Using the layout of the site and the demands presented above, a hydraulic network model of the Northlake development water supply reticulation was completed using InfoWorks WSPro. An output from the model for the estimated peak hourly flows is presented in Figure 4.1 below. The points north-west of the red dividing line are the high-level lots serviced by the booster pump. The colour scheme shows pressures between 30m and 50m as green and pressures between 50m and 60m as blue. Note the high-level reservoir booster pump

connection is represented by the blue triangle in the top left corner of Figure 4.1, the other blue triangle is the other high-level reservoir falling main connection.

The water demands at the demand points shown in the figures have been adjusted pro-rata to represent the 107 lots in the High Level.

4.3 Proposed Plan Change Area Domestic Demands - Low Levels

As noted in Section 3 above it is estimated that the total number of lots in the proposed plan change area will equate to 127. It is estimated that 20 of these lots (127 - 107) will be able to be fed directly from the 315OD PE trunk main feeding the upper pressure zone that includes Allenby Farms and Stages 16 and 17 of the Northlake development - to the east of the blue line in Figure 1.2.

Using the Peak Hourly Demand calculation strategy described above, the estimated peak hourly flows for these 20 lots are calculated to be:

20 x 1400 x 6.6 = 185m^3/day - which equates to 2.1L/sec

The estimated peak hourly flows for the Low Level lots were also modelled to assess the provided pressures also taking into consideration other flow demands in the associated pressure zone including Allenby Farms. This is illustrated below in Figure 4.1 with the points south-east of the red dividing line as the Low Level lots. The colour scheme shows pressures between 30m and 50m as green. The water demands at the demand points shown in the figures have been adjusted pro-rata to represent the 20 lots in the Low Level.

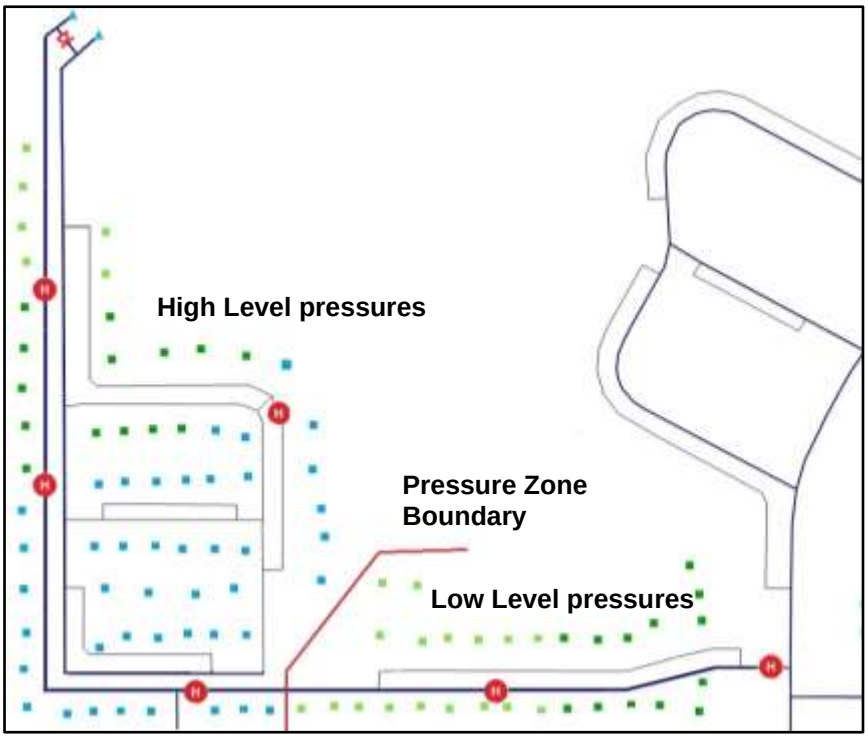


Figure 4.1: Proposed Plan Change Area
High Level and Low Level Pressures for Peak Hour Demand

4.4 Proposed Plan Change Area Fire Flows

Based on the potential density of development and the topography of the proposed plan change area it has been confirmed that the new high-level reservoir will be able to provide water supply pressures for the FW2 firefighting flows throughout the AA-B6 area including Allenby Farms and Stages 16 and 17 of the Northlake development at pressures meeting SNZ PAS 4509_2008 Firefighting Supply standards. Note that all the hydrants are located more than 10m below the floor level of the reservoir.

As can be seen in Figure 4.2 most of the hydrants are connected to the 315OD high-level reservoir pressure zone pipeline. It is also intended to connect the high-level reservoir zone pipeline to the domestic water reticulation pipes with a non-return valve preventing the pump boosted pressures from being transferred into the high-level reservoir zone feed. If there is the occasion of hydrants pulling water off the domestic water reticulation, the domestic pumps will not be able to meet the demand and the pressures will drop accordingly. At this stage, flow will feed into the domestic reticulation from the high-level reservoir zone through the non-return valve providing adequate pressures to all the hydrants.

Given the ground elevations in the AA-C1 area (up to RL 395m) there is the potential that hydrants in that area connected to the 315OD high-level reservoir pressure zone pipeline may not receive sufficient pressures. As a result, it is proposed that the 2 dwellings in the area may be better served by their own on-site fire-fighting water storage tanks - similar to rural properties in the QLDC district. This will be confirmed at the detailed design stage once lot platform elevations have been determined.

Figure 4.2 below shows the lot's residual pressure for a 25L/sec fire-fighting demand from the highest hydrant located closest to the high-level reservoir in the Plan Change area. This hydrant has a residual pressure of 14m as it is the highest elevated hydrant on the falling main. This is greater than the minimum 10m therefore complies with SNZ PAS 4509_2008 Firefighting Supply standards. The fire hydrants are represented by the red circles.

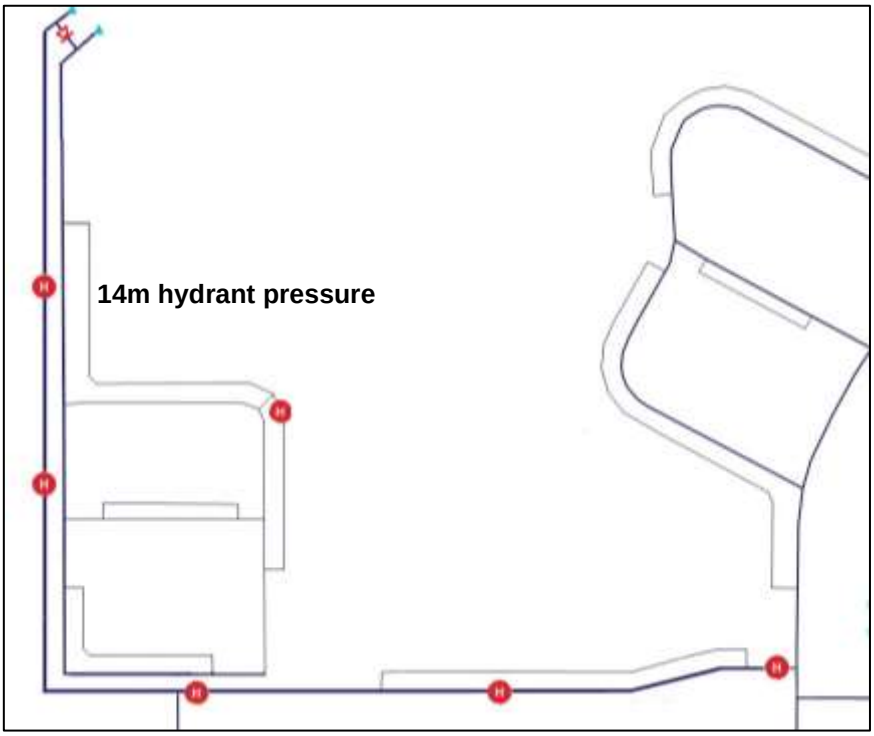


Figure 4.2: Proposed Plan Change Area
Low Level Pressures for FW2 Firefighting Flows

5.0 Conclusion

As can be seen from the report, the proposed plan change area of the development will be able to receive sufficient potable water flows and pressures meeting QLDC's Level of Service. In the event of a fire, the proposed plan change area will be provided with appropriate pressures to meet the requirements under SNZ PAS 4509_2008 Firefighting Supply standards. Albeit that the sizes of all the water pipelines have been determined during the hydraulic network modelling, the extent, and sizes of the proposed reticulation in the proposed plan change area will be shown in the Engineering Approval application.

Appendix D: PowerNet – Confirmation of Electrical Supply

251 Racecourse Road, PO Box 1642,
Invercargill 9840, New Zealand
P: 03 211 1899
F: 03 211 1880
E: enquiries@powernet.co.nz

27 January 2022

Northlake Investments Ltd
C/- Winton
Po Box 250, Wanaka
Attn: Marc Bretherton

Dear Marc,

Northlake – Proposed Plan Change

PowerNet understands that Northlake Investments Limited (NIL) is requesting a change to the operative Queenstown Lakes District Plan (ODP) to enable legal access and infrastructure corridor through the Northlake Special Zone (NSZ) to Sticky Forest, to the west, and to expand the area available for urban residential purposes in the western part of the NSZ.

Please accept this letter as confirmation that there is a satisfactory high/low voltage network in place to supply electricity to the proposed plan change area at Northlake.

Further parts of the network will be installed as the development proceeds and will meet the Powernet Design Standards.

As part of the development once complete PowerNet on behalf of Electricity Southland Limited will accept the ownership and all further fault restoration and maintenance obligations for all network installed within the road reserve.

Yours faithfully

p.p

Tony Rooke
Senior Project Manager
137 Glenda Drive, Queenstown, PO Box: 1642, Invercargill 9840, New Zealand
Phone: +64 3 211 1899, Mobile: +64 27 256 3814
www.powernet.co.nz

Appendix E: Chorus – Confirmation of Telecommunications Supply

Alex Todd

To: Innes Forbes
Subject: RE: [PPG-W6562] Files Issued - Northlake Wanaka - Proposed Plan Change

From: Innes Forbes <Innes.Forbes@chorus.co.nz>
Sent: Tuesday, 1 February 2022 5:12 pm
To: Alex Todd <Alex.Todd@ppgroup.co.nz>; Richard Mould <Richard.Mould@chorus.co.nz>; Chorus Property Developments <develop@chorus.co.nz>; Danny Masterson <Danny.Masterson@chorus.co.nz>
Cc: marc.bretherton@winton.nz; George Condon <George.Condon@chorus.co.nz>
Subject: RE: [PPG-W6562] Files Issued - Northlake Wanaka - Proposed Plan Change

HI Alex

Forwarded to Chorus Property Group who action and process the required correspondences for developments

Chorus Network Planner was only copied in for information.
i.e. For this development no planner input required, as capacity already exists at boundary through previous stages.
Subject Chorus development contracts and contributions.

Regards

Innes Forbes | **Network Planner**

CHORUS | **T** +6439460011 | **M** +64274401038

From: Alex Todd <Alex.Todd@ppgroup.co.nz>
Sent: Tuesday, 1 February 2022 4:57 pm
To: Richard Mould <Richard.Mould@chorus.co.nz>; Chorus Property Developments <develop@chorus.co.nz>; Danny Masterson <Danny.Masterson@chorus.co.nz>; Innes Forbes <Innes.Forbes@chorus.co.nz>
Cc: marc.bretherton@winton.nz; George Condon <George.Condon@chorus.co.nz>
Subject: RE: [PPG-W6562] Files Issued - Northlake Wanaka - Proposed Plan Change

Hi Innes,

How are we looking here? We really need a letter from Chorus tomorrow as we will be lodging the application on Thursday 3/2.

Kind regards

Alex Todd
Principal, MS+SNZ
M 021 0825 2333
E alex.todd@ppgroup.co.nz

Paterson Pitts Limited Partnership, trading as:
PATERSONPITTSGROUP
Surveying • Planning • Engineering
Your Land Professionals

From: develop@chorus.co.nz <develop@chorus.co.nz>
Sent: Friday, 28 January 2022 8:08 am
To: Danny Masterson <Danny.Masterson@chorus.co.nz>
Cc: marc.bretherton@winton.nz; alex.todd@ppgroup.co.nz; Richard Mould <Richard.Mould@chorus.co.nz>; George Condon <George.Condon@chorus.co.nz>
Subject: RE: [PPG-W6562] Files Issued - Northlake Wanaka - Proposed Plan Change

Hi All, There is no reason why Chorus cannot supply services to this development
Richard Mould is the Chorus area planner for this location.

Thanks

From: Alex Todd <Alex.Todd@ppgroup.co.nz<mailto:Alex.Todd@ppgroup.co.nz>>
Sent: Monday, 24 January 2022 4:23 pm
To: Chorus Property Developments <develop@chorus.co.nz<mailto:develop@chorus.co.nz>>; Danny Masterson <Danny.Masterson@chorus.co.nz<mailto:Danny.Masterson@chorus.co.nz>>
Cc: marc.bretherton@winton.nz<mailto:marc.bretherton@winton.nz>
Subject: [PPG-W6562] Files Issued - Northlake Wanaka - Proposed Plan Change

Hi Danny & Chorus Team,

Happy new year. I hope you had a good break.

I thought I had already sent this through but it seems I haven't....so apologies for the lateness of this request.

The summary is that Northlake Investments Limited are looking to increase the number of lots we are able to produce in the NW corner of the Northlake development in Wanaka from 65 lots under the current rules up to 128 lots under the proposed rules.

I have annotated the relevant area in the snip below as well as attaching both the proposed structure plan and yield plans to this email.

Can you please provide a brief letter to confirm that subject to the usual service contracts and detailed design, Chorus will be able to supply a telecommunications connection to all future lots within the proposed Activity Area B6.

We will be lodging the plan change request with QLDC early next week and your confirmation letter will form part of the PPG infrastructure report.

Please give me a ring if you have any queries.

[cid:image002.png@01D81375.66751480]

Kind regards

Alex Todd
Principal, MS+SNZ
M 021 0825 2333
E alex.todd@ppgroup.co.nz<mailto:alex.todd@ppgroup.co.nz>

Paterson Pitts Limited Partnership, trading as:
PATERSONPITTSGROUP
Surveying * Planning * Engineering

Your Land Professionals
19 Reece Crescent, Wanaka 9305
or P.O. Box 283, Wanaka 9343, New Zealand
T 03 443 0110
W www.ppgroup.co.nz<http://www.ppgroup.co.nz/>

Appendix F: Hadley Consultants – Plan Change 45 Infrastructure Report

hadley consultants LTD
CONSULTING CIVIL & STRUCTURAL ENGINEERS

Michaela Ward Meehan

Northlake Plan Change

Feasibility of Utility Services & Infrastructure Report

Michaela Ward Meehan

Northlake Plan Change

Feasibility of Utility Services & Infrastructure Report

March 2013

Hadley Consultants Limited
44 Robins Road
P.O.Box 1356
Queenstown

Phone: +64 3 450 2140 Fax: +64 3 441 3513

Document Status

Revision	Author:		Reviewer:		
	Name	Signature	Name	Signature	Date
Final	J McCartney		J McCartney		13/3/2007

Contents

1. Introduction

This report has been prepared to support a private plan change request to re-zone approximately 256 of land in Wanaka from Rural Residential and Rural General to a new zone ("the site"). The site is referred to as "Northlake". The private plan change requestor is Michaela Ward Meehan.

The site is located on the north side of Aubrey Road, Wanaka, with Outlet Road running through the site. The site is contained in five parcels held by four land owners and is currently zoned Rural General and Rural Residential under the Queenstown Lakes District Plan.

The private plan change request seeks the re-zoning of the site to give effect to the community's long term intentions for the land, as described in the Wanaka Structure Plan (2007), by enabling residential development of approximately 1,707 new dwellings.

Michaela Ward Meehan (MWM) has engaged Hadley Consultants Limited (HCL) to investigate and report on the feasibility of providing utility services and the necessary development infrastructure for the development of the subject site at Outlet Road, Wanaka.

This report considers the nature of the proposed development, the site conditions affecting the implementation of the necessary utility services and development infrastructure and describes the proposed implementation of the following elements:

- Water supply reticulation
- Wastewater reticulation
- Stormwater control
- Gas supply

2. Nature of Proposed Development

MWM proposes to develop the existing site adjacent to Outlet Road in Wanaka. The site, located to the north-east of Wanaka and covering around 256 hectares will cover land legally described as Lot 1 DP 27290, Lot 3 DP 300408 and Lots 65, 66, 67, 68 & 69 DP 371470.

The structure plan for the development is yet to be finalised. However, it is expected that the structure plan will indicate areas of open space and varying density of housing development. The maximum proposed number of new house sites is estimated at 1,707.

We note that the assessment of the necessary development infrastructure provided below is limited to consideration of the scale of the development as it is currently proposed and excludes consideration of specific stages and the specific locations of future dwellings and infrastructure within the site.

3. Site Description

The area of the plan change request is located on 256 ha of land to the north of Aubrey Road and on both sides of Outlet Road in Wanaka. The current access to the site is from Aubrey Road, Outlet Road and from Peak View Ridge. There is existing infrastructure for water supply and wastewater located along Aubrey Road and the Beacon Point rising main and reservoir are sited along the western boundary of the site.

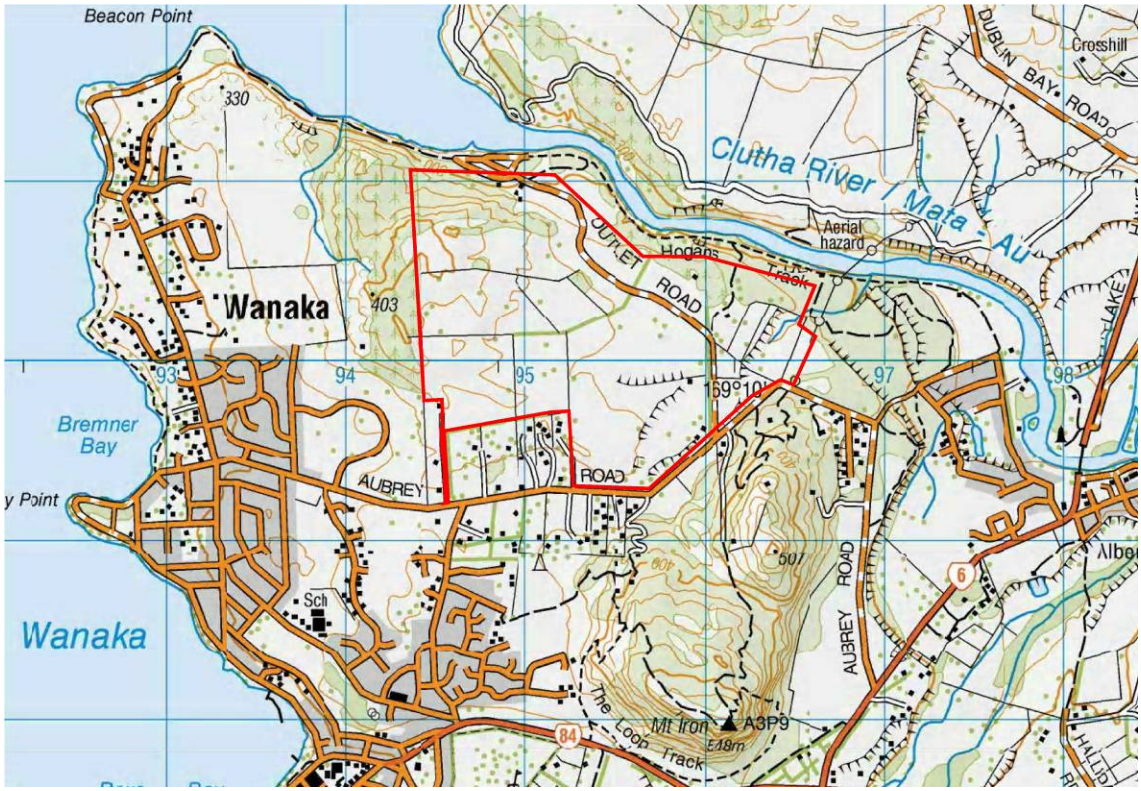


Figure 1 - Topographical map excerpt showing subject site

The site comprises gently sloping land in the central and southern areas with more moderate to steep gradients along the northern boundary where the land falls to the Clutha River. The overall topography of the site is gently falling to the north east.

Based upon the published geological information (Institute of Geological and Nuclear Sciences (IGNS), 1:250,000 Geological Map 18, Geology of the Wakatipu) and geological examination carried out by others the underlying geological materials within the central and western areas is glacial till, whilst the eastern areas are likely covered by outwash gravels. These soils overlie schist bedrock that can be seen as an outcropping a short distance to the south of the site on the slopes of Mount Iron and on the northern bank of the Clutha River.

The existing land use at the site comprises mainly farmland with some forestry and scrub covered areas. Vegetation covering the area is mainly that associated with highly modified farmland and consists of rough pasture, woodlots, shelter belts of mature pines and infestations of broom. However, there are small areas of native vegetation such as kanuka and matagouri. These native plants tend to occupy areas of the site characterised by steeper terrain.

There are no areas of naturally occurring standing water such as streams or saturated, swampy soils. However, it is possible that ephemeral watercourses may be formed in some of the topographic depressions on site during periods of high precipitation.

The proposed development site and surrounding Wanaka area experience generally cold winters with severe frosts at times and hot dry summers. Strong north-westerly winds are also a climatic characteristic of the area. The land receives approximately 700mm of rainfall per annum and may be subject to drought conditions during the summer months.

4. Water Supply

4.1 General

The Beacon Point reservoir is located in an allotment on the western boundary of the subject site. In addition, the rising main from the Lake Wanaka water intake and the falling main from the reservoir run in easements adjacent to the western boundary of the site.

4.2 Water Demand Assessment

Peak water demand would be expected during the summer months when seasonal populations are at their peak and irrigation usage will be at its highest. The following design figures have been adopted.

Demand Item	Potable Demand (litres/day)	No.	Total (litres/day)
Dwelling (average day)	2,100	1,707	3,584,700

The additional average daily water supply demand of 3,585 m³ per day equates to 41.5 litres per second average flow over twenty four hours.

From the QLDC amendments to *NZS4404:2004 Land Development and Subdivision Engineering*, the peaking factors for the Wanaka water supply are as follows:

Item	Peaking Factor
Average daily flow to peak daily flow	3.3
Average daily flow to peak hourly flow	6.6

Using the QLDC peaking factor, the peak hour flow is estimated at 273.8 litres per second.

4.3 Fire Fighting Demand

In accordance with *SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice,* the usage for the developed site is expected to fall into the *"Housing: includes single family dwellings, multi-unit dwellings but excludes multi storey apartment blocks"* category. This will result in a fire fighting water supply classification of FW2. An FW2 classification requires 12.5 l/s of water flow available within a distance of 135 metres and an additional 12.5 l/s of water flow available within a distance of 270 metres.

4.4 T&T Modelling Results

Water supply modelling was undertaken for a previous development proposal on the site. This modelling was undertaken by Tonkin and Taylor Ltd (T & T) who operate and maintain the water reticulation model for QLDC and involved modelling for a new demand across the site of 800 residential dwellings. The results of this concept level modelling for the proposed development are set out below. T&T have used an assumed future reticulation layout and trunk mains network.

Key findings from the modelling work are:

- The higher elevations of the site will require boosting to ensure adequate pressures and fire flows. Dependent upon the final reticulation layout, boosting will be required for all allotments above 348 metres.
- Connection to the falling main from the Beacon Point reservoir may be problematic (as there is no isolation valve) requiring a complete emptying of the Beacon Point Reservoir. Alternatively, connection could be made to the water main in Aubrey Road at the intersection with Peak View Ridge. Due to head losses, this point of connection would result in more of the development site requiring boosting.
- T & T have commented that the reservoir storage volume would need to be considered at the time of development. The suitability of the capacity of the existing reservoir will depend upon the timing of the construction of the planned Hawthenden Reservoir and the construction of the subdivision.

T & T have indicated that there are no problems with the capacity of the existing raw water intake, rising main and treatment plant. The two main restrictions on the water supply for the development highlighted by the modelling report are the capacity of the Beacon Point reservoir and the requirement for boosting of flows in order to achieve the required water pressures in higher areas of the proposed site.

A copy of the report from T & T is included in Appendix 1.

4.5 QLDC Liaison

Discussions with Mr Gerry Essenberg (the Queenstown Lakes District Council Infrastructure Services Three Waters Manager) have been held regarding the current 1,707 residential dwelling proposal.

He has confirmed that water supply will be available from Queenstown Lakes District Council (QLDC) reticulation at Beacon Point. He has also confirmed that there is no need for additional modelling at this time as the likely existing demand on the reticulation will change prior to the

development actually occurring and QLDC is currently working hard on reducing demand through the implementation of the Water Demand Strategy.

The timing of any necessary upgrades to the reservoir and associated facilities will be dependent upon the uptake of sections across a number of growth areas within Wanaka including Three Parks, North Three Parks and West Meadows amongst others. These all draw water from the same pressure zone and the speed of dwelling construction across the entire Wanaka water supply area will determine the timing of any future infrastructure upgrade.

QLDC have indicated that the significant capital expenditure items such as reservoirs would be funded by Developer Contributions. In order to give QLDC as much time to plan for future infrastructure upgrades, they have requested indicative staging information for the development be supplied as soon as it is available.

Mr Essenberg has confirmed that QLDC are interested in talking with the developer about the specific reticulation connections and design at the detailed design stage so that the most cost effective solutions are developed. He anticipates that all new water supply infrastructure will be required to be constructed to applicable QLDC standards.

4.6 Reservoir Capacity

In order to better understand the reservoir capacity restriction we have undertaken further analysis of the existing and future storage requirements.

The storage in the existing Beacon Point reservoir is 3,500 m^3. The most recent report prepared for Council relating to reservoir capacity is the report by MWH New Zealand Ltd titled “Queenstown Lakes District Council – Strategic Water Review” and dated February 2006. This indicated that in 2005, the storage capacity needed at Beacon Point for the population at that time was 3,200 m^3.

Based on the expected number of allotments, an additional 3,166 m^3 of storage is required for the subject site alone.

Since 2005, the zone of Wanaka that is serviced by the Beacon Point Reservoir has experienced significant growth with the establishment of Peninsula Bay subdivision, further stages at the Penrith Park subdivision, development of further stages of the Riverside Park subdivisions, establishment of initial stages of the West Meadows subdivision and other developments on Cardrona Valley Road and Golf Course Road. In addition, it is anticipated that there are other growth areas that will also increase the demand from the Beacon Point reservoir; these include the Three Parks development and the increases to the Ballantyne Road industrial zone.

We estimate that the Beacon Point reservoir is approaching capacity now with regards to storage. This will mean that the development of the subject land will require additional reservoir storage to be built prior to the first stages of the development. In the previous Long Term Council Community Plan (LTCCP), QLDC had programmed the Beacon Point reservoir upgrade to occur during the 2018-19 financial year. In the most recent LTCCP (2012-22), QLDC has not programmed the Beacon Point reservoir upgrade within the 10 year timeframe of the plan.

The upgrading of this reservoir will need to be discussed with QLDC once a site concept has been finalised and the timing for development evaluated. A cost sharing arrangement may need to be achieved to ensure a suitable outcome for all parties.

4.7 Water Supply - Option 1

The first option to address the water supply issues highlighted by the T&T modelling report would be to upgrade the water storage available within the existing Wanaka mains system by construction of an additional storage reservoir. The sizing of such a reservoir would be up to 3,166 m^3 as set out in Section 4.6 above.

We have viewed the as-built drawings for the existing reservoir (copy attached in Appendix 2) and it appears that there is sufficient area on the reservoir site to allow for the construction of a second reservoir. Should this area be insufficient for the size of reservoir required, we can confirm that there is land within the development's boundaries and adjacent to the Beacon Point reservoir that may be able to be utilised for the needed storage.

However, in order to achieve the required minimum residual pressure of 300kPa an elevation difference between supply point and consumer of approximately 30m is needed. The Beacon Point reservoir is located at approximately 380m which means that boosting of flows will be required for elevations of the site above approximately 348m in order to meet the minimum residual pressure. The area requiring boosting is shown in Figure 2 below.

If a new storage reservoir is to be constructed then the problem of low pressures could be addressed to a certain degree by locating the reservoir at a higher elevation (approximately 410m) on the western boundary of the site as shown in Figure 2 below. The increased hydraulic head achieved by locating a reservoir at this higher point would mean that boosting would be required for elevations above approximately 378m only. This would equate to a much larger area of the total site being fed by gravity flows than that possible from the lower elevation Beacon Point reservoir.

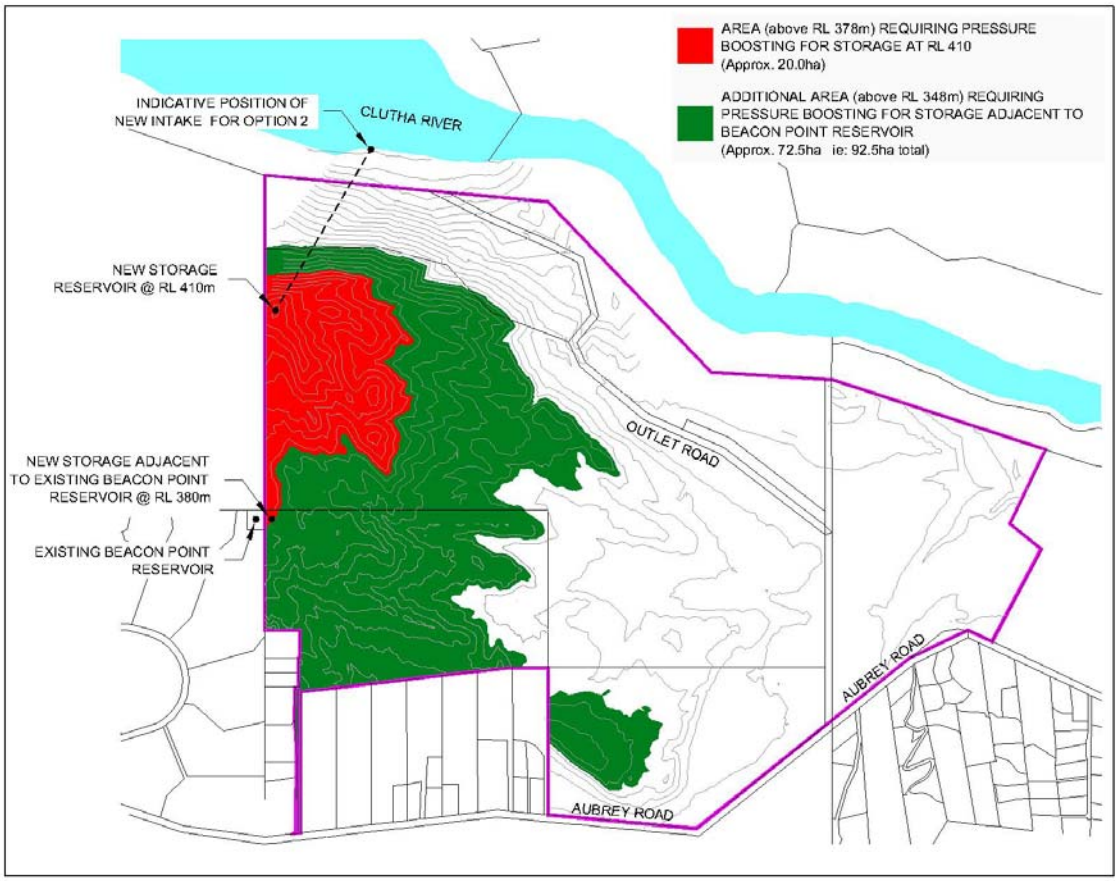


Figure 2 Map showing areas requiring boosting of water supply and indicative layout for Option 2.

It should be noted however that a pump station would be required to feed the new reservoir from the main supply if it was located at this high point. This would be in addition to the boosting pump station required for areas above 378m.

Another solution may be to construct a relatively small reservoir at the high point of RL 410m that just services the land above RL 348m and additional storage at the same level as the existing reservoir (RL 380m) is constructed to supply the remainder of the zone.

4.8 Water Supply - Option 2

The second option for providing a water supply for the development would be to construct a completely new water intake in the indicative location shown in Figure 2. In reality the intake could be at any number of locations along the river frontage of the subject site. This would mean that the North Wanaka development site would have a standalone water supply that was separate from the Wanaka area mains supply.

The basic components of such a system would include the water intake and pumps, rising main and storage reservoir as well as a water treatment system sufficient to bring the supply in line with Drinking Standards for New Zealand 2005 (Revised 2008) (DWSNZ).

The water supply storage reservoir for the development, based upon the reservoir capacity set out in Section 4.5, would be up to 3,166 m^3. The reservoir would just below located at the highest point within the development area at 410m near the site's western boundary and the water treatment facilities would either be adjoining to the reservoir site or would be sited adjacent to the intake itself. Locating the reservoir at this high point would enable much of the development to be serviced without the need of additional booster pumps. However, water supply flows for areas above 380m would still require to be boosted as shown in Figure 2 above.

As well as the physical construction issues involved with this option a number of consenting and maintenance matters would also need to be addressed. A resource consent will be required to construct the intake structure and it is likely that a further consent will be required for the water take itself as both the calculated total daily demand and the peak hourly flow exceed the permitted water take rates set out in the Otago Regional Council's Regional Plan for Water. Land use and building consents may also be required for the reservoir and water treatment facilities.

The main issue to be considered with regards to this option would be the on-going maintenance and management of the water supply and treatment system. One option would see the system vested with Council. Council may resist this because of the additional on-going costs a further intake, treatment plant and associated infrastructure would entail. Alternatively, the water supply could be owned by a lot owners association (or similar) responsible for the on-going management and maintenance of the infrastructure. A similar system to this has been used at Jacks Point near Queenstown.

4.9 Conclusions and Recommendations

Both of the two options outlined above to supply water to the subject site are feasible. Further investigation, consultation with Council and cost analysis will be necessary to establish the final methodology used.

Due to the site topography, elevated areas of the site will require boosting to provide the required pressure and flows. For Option 1 this would equate to an area up to 92.5 ha depending on reservoir location and for Option 2, 20 ha. Boosting flows in this manner is feasible and has been undertaken in other parts of Wanaka and across the QLDC district.

5. Wastewater Disposal

5.1 General

A Council reticulated sewerage scheme exists along Aubrey Road from near the Outlet Road intersection.

5.2 Demand Assessment

Peak wastewater generation is expected to coincide with peak water demand. The following design figures have been adopted:

Wastewater Generation Item	Potable Demand (litres/day)	No.	Total (litres/day)
Dwelling (average day)	1,050	1,707	1,792,350

The additional average daily wastewater generation of 1,792 m^3 per day equates to 20.74 litres per second average flow over twenty four hours.

From the QLDC amendments to *NZS4404:2004 Land Development and Subdivision Engineering*, the peaking factors for the wastewater network are as follows:

Item	Peaking Factor
Dry weather diurnal peak flow	2.5
Wet weather dilution/infiltration factor	2

Using the QLDC peaking factors, during the wet weather peak flow is estimated at 103.7 litres per second.

5.3 Council Reticulated Scheme

Hadley Consultants Ltd have previously been engaged by QLDC to carry out design and construction review for wastewater upgrades in the Aubrey Road area of Wanaka. We are fully aware of what has been allowed for in the design of the existing infrastructure and what upgrades will be required.

The Council reticulation on Aubrey Road comprises a 450mm diameter wastewater gravity main draining from near the Outlet Road intersection through to the Gunn Road intersection. From the

Aubrey Road Gunn Road intersection, there is temporary 150mm diameter pipe connecting into the Albert Town reticulation on Gunn Road.

The section of 450mm diameter main in Aubrey Road was constructed in 2008/09 and this size pipe is ultimately anticipated to be constructed all the way to the recently commissioned Project Pure Pump Station near the intersection of Aubrey Road and State Highway 6 and the connection into the Gunn Road reticulation will be removed (thereby effectively bypassing the Albert Town reticulation). This upgrade has been programmed in the most recent QLDC LTCCP (2012/22) for construction in the 2018/19 financial year. The development of the subject site will trigger the need for the extension of the 450mm diameter pipe along Aubrey Road.

Previous work has not identified how much residual capacity is available in the Albert Town reticulation. It is anticipated that the Northlake land will be developed in stages and that the Aubrey Road upgrade will not be triggered by the initial stage(s). This will need to be confirmed at the design phase for each stage of the development.

There are further measures open to the development of the Northlake land that could delay the need for the Aubrey Road upgrade. These include storing some or all of the wastewater flows and then draining these to the network in off peak times.

The Northlake development will require the proposed Aubrey Road wastewater upgrade project listed on the current LTCCP to be completed. This wastewater upgrade has been included in the contributions calculations for the Wanaka wastewater scheme and it is anticipated that Council will fund and construct this upgrade when required.

A sketch showing the existing and proposed wastewater pipe layout is below:

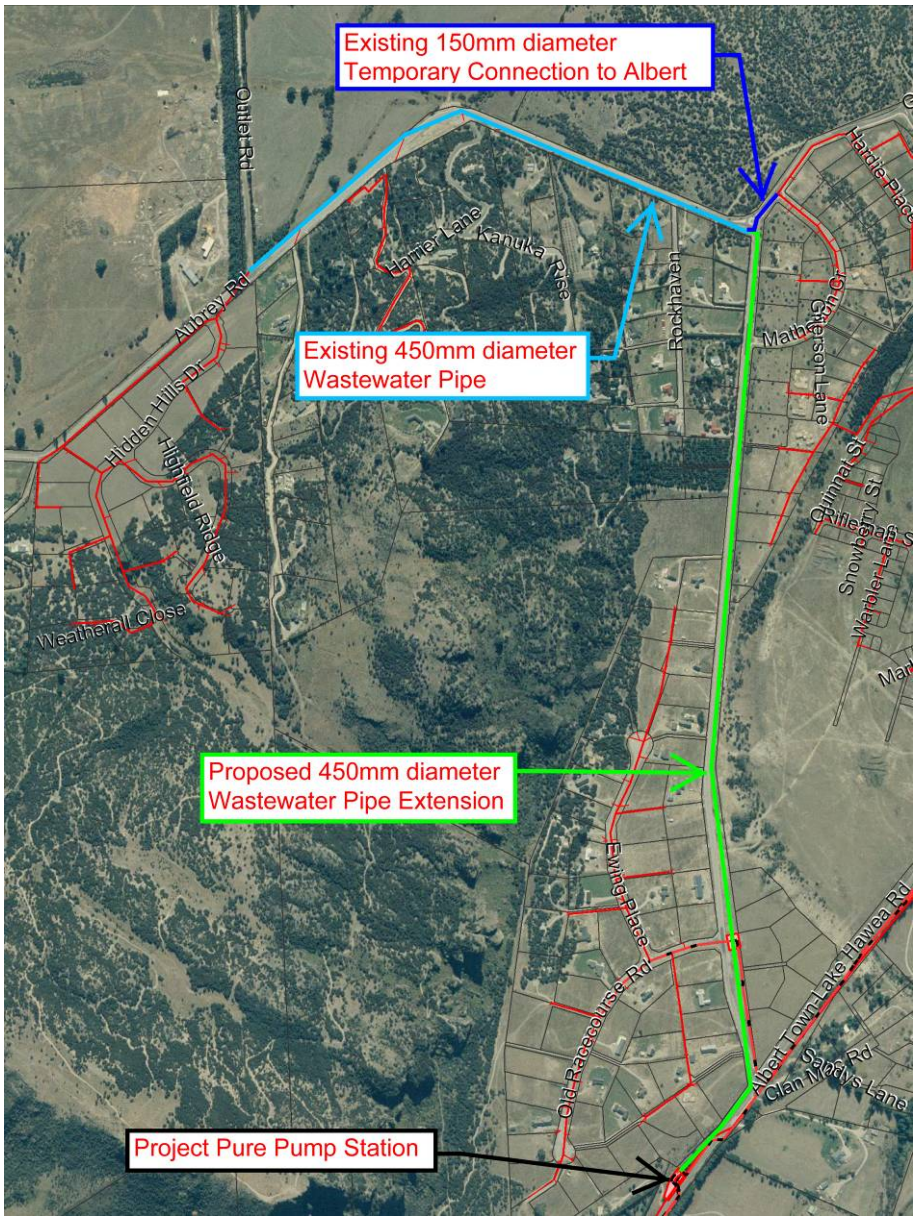


Figure 3 Existing and Proposed Wastewater Reticulation in Aubrey Road

5.4 QLDC Liaison

Discussions with Mr Gerry Essenberg (the QLDC Infrastructure Services Three Waters Manager) have been held regarding the current 1,707 residential dwelling proposal.

He has confirmed that a connection to the wastewater drainage network will be available from QLDC. He has also confirmed that there is no need for additional modelling at this time as the likely existing demand on the reticulation will change prior to the development actually occurring. The scale of the proposed development may require upgrades to Council wastewater pump stations and treatment facilities. The timing and scale of any upgrades will be dependent upon the rate of

growth across the entire Wanaka wastewater catchment and would need to be evaluated as development progressed.

QLDC have indicated that the significant capital expenditure items such as pump stations and treatment plant upgrades would be funded by Developer Contributions. In order to give QLDC as much time to plan for future infrastructure upgrades, they have requested indicative staging information for the development be supplied as soon as it is available.

Mr Essenberg has confirmed that QLDC are interested in talking with the developer about the specific reticulation connections and design at the detailed design stage so that the most cost effective solutions are developed. He anticipates that all new wastewater infrastructure will be required to be constructed to applicable QLDC standards.

5.5 Internal Reticulation

As previously stated, the site slopes generally to the east. The existing Council reticulation on Aubrey Road is on the southern side of the site. It is anticipated that much of the site will be able to be drained using standard trunk and lateral gravity pipelines.

Some areas on the northern and eastern side of the site will likely require the construction of pump stations at suitable low points to convey the wastewater flows into the existing reticulation. Provided appropriate infrastructure master planning for the site is carried out at the detailed design stage, the location of any pump stations will be able to be optimised in order to ensure least cost lifetime options are adopted.

5.6 Conclusions and Recommendations

It is recommended that the wastewater generated from the proposed development be disposed by way of connection to the QLDC reticulated scheme. The feasibility of this has been confirmed by work previously undertaken by QLDC. A significant upgrade will be required along Aubrey Road once a certain threshold of wastewater flows from the site has been reached. The Council has programmed to undertake this work, but the timing of the upgrade will depend upon the pace of development and the possible buffering of flows to off peak periods.

6. Stormwater Disposal

6.1 General

Generally, it is proposed to maintain the runoff characteristics of the existing catchment. However the proposed development on the site will alter the existing stormwater run off patterns and will serve to increase the peak flow runoff. We propose to collect and control the stormwater runoff and dispose via connection to the Clutha River or to dispose of on site using stormwater infiltration and soakage features.

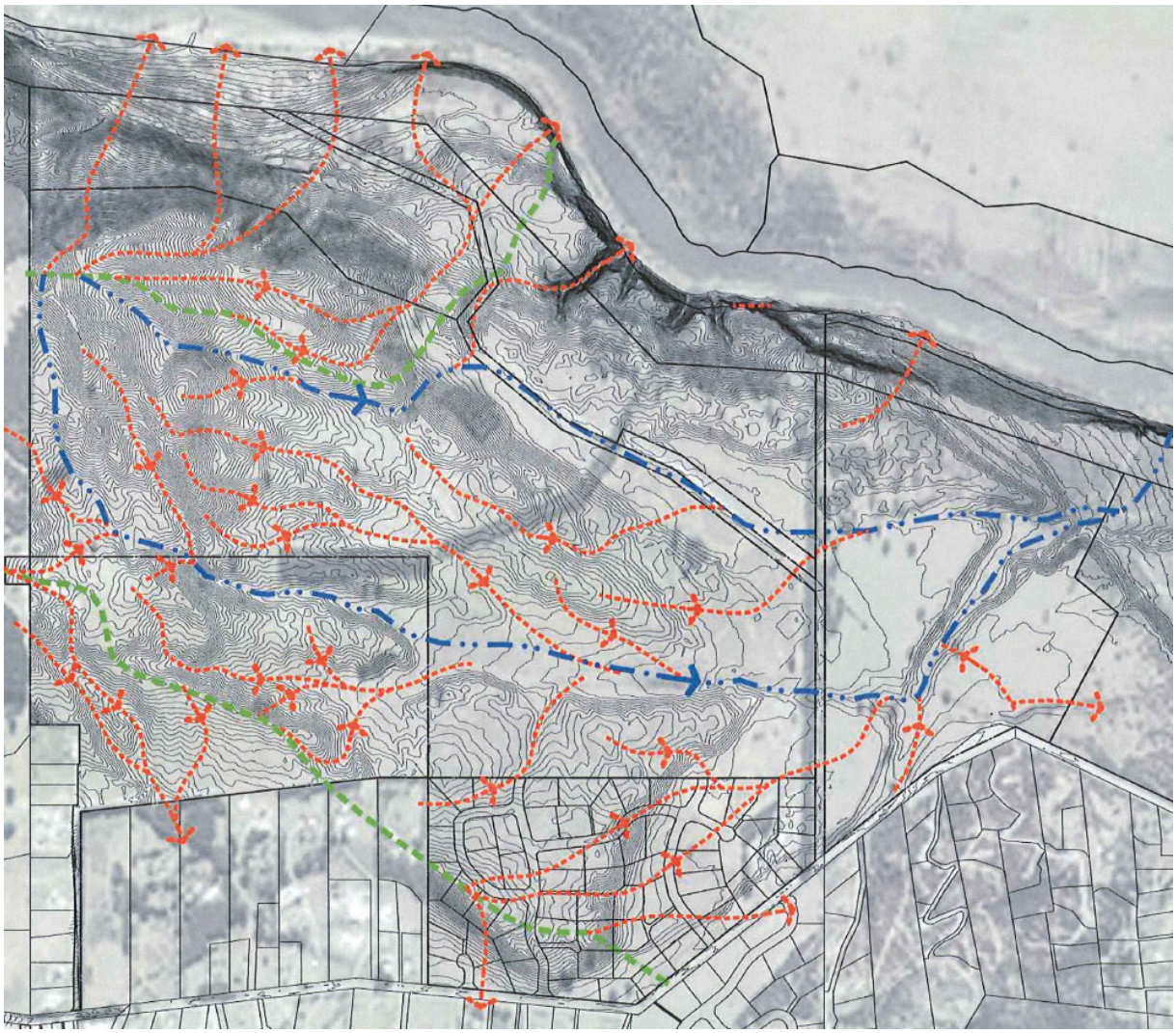


Figure 4 - Stormwater runoff paths (see Appendix 3)

6.2 Planning Rules and Regulations

Rule 12.5.1.1 of the Regional Plan: Water for Otago states that the discharge of drainage water to water (or onto land where it might enter water) from any drain is a permitted activity so long as certain conditions are met. The conditions of particular relevance to the discharge of stormwater from the proposed new roads and domestic allotments are as follows:

12.5.1.1 (b) The discharge, after reasonable mixing, does not give rise to all or any of the following effects in the receiving water:

(i) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials; or

(ii) Any conspicuous change in the colour or visual clarity; or

…

(v) Any significant adverse effects on aquatic life.

It is further stated that:

The discharge of drainage water under Rule 12.5.1.1 will have no more than minor adverse effects on the natural and human use values supported by water bodies, or on any other person. This rule is adopted to enable drainage water to be discharged while providing protection for those values and the interests of those people. Any other activity involving the discharge of drainage water is a restricted discretionary activity in order that any adverse effects can be assessed.

Contaminants associated with vehicular traffic can include oils, rubber, heavy metals and sediments. In large amounts these contaminants can greatly decrease the natural and human use values of bodies of water. As the stormwater from the site will likely be discharging either directly into the Clutha River or to ground, appropriate protections will need to be installed in the on-site drainage system in order to remove such contaminants from the stormwater. The aim of stormwater quality treatment used at the site would be to ensure that the runoff from the new development is in a similar condition to that being achieved before the development. Of particular concern are the “first flush” flows that carry the highest pollutant loadings.

Appropriate technologies to separate contaminants from the stormwater flows might include the use of mud-tanks located in the on-site drainage sumps and a vortex separator mechanism such as a Hynds Downstream Defender which provide high removal efficiencies of suspended solids and floatables over a wide range of flow rates.

Careful design of the stormwater reticulation for the site will ensure that the requirements set out in the Regional Plan: Water for Otago are met.

6.3 Stormwater Quantities

At this early stage in the development of the proposed zone, it is difficult to determine the increase in storm water runoff from the site. Initial calculations have been undertaken and these indicate that for a 10 minute rain event with an average reoccurrence interval (ARI) of 10 years the development is expected to increase the storm water flow rate by approximately 10 m^3 per

second. This will vary depending upon the density of the development and the permeability of the site.

This level of increase in runoff would result in very large infrastructure if the traditional approach of reticulating all the flows from the site was adopted. If a single point of discharge was developed, the required outlet pipe would be approximately 2.4 metres in diameter. This level of infrastructure would be expensive and can be mitigated using a Low Impact Design (LID) approach.

From NZS4404:2010 Land Development and Infrastructure:

> *Low impact design aims to use natural processes such as vegetation and soil media to provide stormwater management solutions as well as adding value to urban environments. The main principles of low impact design are reducing stormwater generation by reducing impervious areas, minimising site disturbance, and avoiding discharge of contaminants. Stormwater should be managed as close to the point of origin as possible to minimise collection and conveyance. Benefits include limiting discharges of silt, suspended solids, and other pollutants into receiving waters, and protecting and enhancing natural waterways.*

And:

> *Low impact design is a type of storm water system that aims to minimise environmental impacts by:*
> *(a) Reducing peak flow discharges by attenuation;*
> *(b) Eliminating or reducing discharges by infiltration or soakage;*
> *(c) Improving water quality by filtration;*
> *(d) Installing detention devices for beneficial reuse.*

The types of low impact devices and practices that could be included in the zone include the following:

(a) Detention Ponds;
(b) Vegetated swales;
(c) Rain gardens;
(d) Rainwater tanks;
(e) Soakage pits and soak holes;
(f) Filter strips; and
(g) Infiltration trenches/basins.

Subdivision urban design principles may also assist in mitigating runoff from the site. These include clustering development to increase open area around developed areas and decreasing road setbacks in order to decrease the likely impervious areas.

In addition to reducing the peak discharge from the site, LID approaches may also improve the quality of the runoff from the site.

It is noted that due to the local topography, the area in the southwest corner of the site drains off site and through private land. The storm water runoff solutions in this area will need to ensure that the post development runoff is no greater than the pre-existing development runoff. It is expected that the use of specific soakage and attenuation devices will be used to meet this requirement.

6.4 QLDC Liaison

Discussions with Mr Gerry Essenberg (the QLDC Infrastructure Services Three Waters Manager) have been held regarding the current 1,707 residential dwelling proposal.

He has confirmed that a combination of reticulation and low impact design approaches would be generally acceptable to QLDC.

Mr Essenberg has confirmed that QLDC are interested in talking with the developer about the specific reticulation connections and design at the detailed design stage so that the most cost effective solutions are developed. He anticipates that all new stormwater infrastructure will be required to be constructed to applicable QLDC standards.

6.5 Conclusions and Recommendations

We consider that the collection and subsequent disposal of stormwater from the proposed development is entirely feasible via collecting and controlling the stormwater runoff and disposing by draining to the Clutha River passing the site.

Dependent upon the overall design approach for the subdivision, the storm water runoff leaving the site could be greatly reduced by the introduction of low impact design approaches including the use of attenuation and filtration devices.

7. Gas Supply

Discussions have been undertaken with Rockgas. Rockgas own and operate a reticulated gas supply network in Wanaka. They have indicated that they are interested in supplying reticulated gas to the proposed development site. This would need to be progressed by negotiations between Rockgas and the developer in order to ensure suitable terms for both parties.

Supply confirmation for the gas reticulation has been provided from Rockgas and is included in Appendix 4.

8. Conclusions and Recommendations

The subject site and the proposed development have been assessed to determine the suitability for development in relation to infrastructure services. No significant constraints have been identified and the site is suitable for the proposed development from an infrastructure servicing viewpoint.

There are two options for supplying water to the site. The first option would be to utilise the QLDC reticulated water supply. This would require the construction of additional water storage which could be achieved either in conjunction with the QLDC (subject to agreement) or as a standalone reservoir on the subject land. In addition, the necessity for reticulation to the higher elevations of the site would require the construction of a water supply boosting pump station. The second option would be to install a new, private water intake with the reservoir located at the highest point on the subject land. As with Option 1, sections of the subject site would still require a water supply boosting pump station but they overall area would be smaller than that required for Option 1. The final decision on which methodology to use will be decided at a later point following further investigation, consultation and cost analysis.

Wastewater drainage reticulation from the site will be able to be initially catered for with the existing QLDC reticulation. Later stages will require construction of a planned Council upgrade along Aubrey Road (between Gunn Road and the Project Pure Pump Station). The majority of the site will be able to be reticulated by the construction of gravity sewer pipes. However, it is anticipated that parts of the development site will require pump stations in order to convey flows to the existing QLDC infrastructure.

Stormwater runoff from the site can be satisfactorily disposed of by the construction of necessary reticulation with disposal to Clutha River. It is recommended that in order to reduce the peak runoff and to improve runoff quality, low impact design approaches are adopted.

The gas supply company Rockgas has confirmed that they are interested in reticulating the proposed development with an underground gas supply connected to their existing Wanaka reticulation network.

Overall, we confirm that there are no significant impediments to development of the site with respect to Infrastructure Services. The need for off-site upgrades of existing QLDC infrastructure will be required for later stages of the development and it is anticipated that these upgrades are able to be constructed without any major impediment.

We recommend that the timing and scale of the proposed infrastructure upgrades be further assessed once the layout of the proposed zone has been further progressed and staging of development has been confirmed.

9. Limitations

This report has been written for the particular brief to HCL and no responsibility is accepted for the use of the report for any other purpose, or in any other context or by any third party without prior review and agreement.

Appendix 1

Tonkin and Taylor Ltd

Water Modelling Report

Tonkin & Taylor

T&T Ref: 51556.013
02 August 2010

Hadley Consultants Ltd
PO Box 1356
Queenstown 9348

Attention: John McCartney

Dear John

Results of water modelling for proposed East Wanaka development rezoning, Aubrey Road, Wanaka

Following your email received 3:59 pm 19 July 2010, and in accordance with your request and our conditions of engagement, we have run our Wanaka water supply model to check the levels of service for the proposed East Wanaka development, between Aubrey Rd and the Clutha River, Wanaka. This work was performed for Hadley Consultants Ltd as our client.

Modelling proceeded at a concept level on the basis of 800 residential lots, as per the drawings provided by you (Darby Partners Ltd drawings RS-00 & 03, titled "*East Wanaka Resource Study*", dated 22 & 28 June 2010, attached).

Development setting

The proposed development is in the Beacon Point pressure zone, supplied from the Beacon Point Reservoir via the 575 mm NB PVC falling main. The Wanaka water supply network near the proposed development is shown in Figure 1 below.

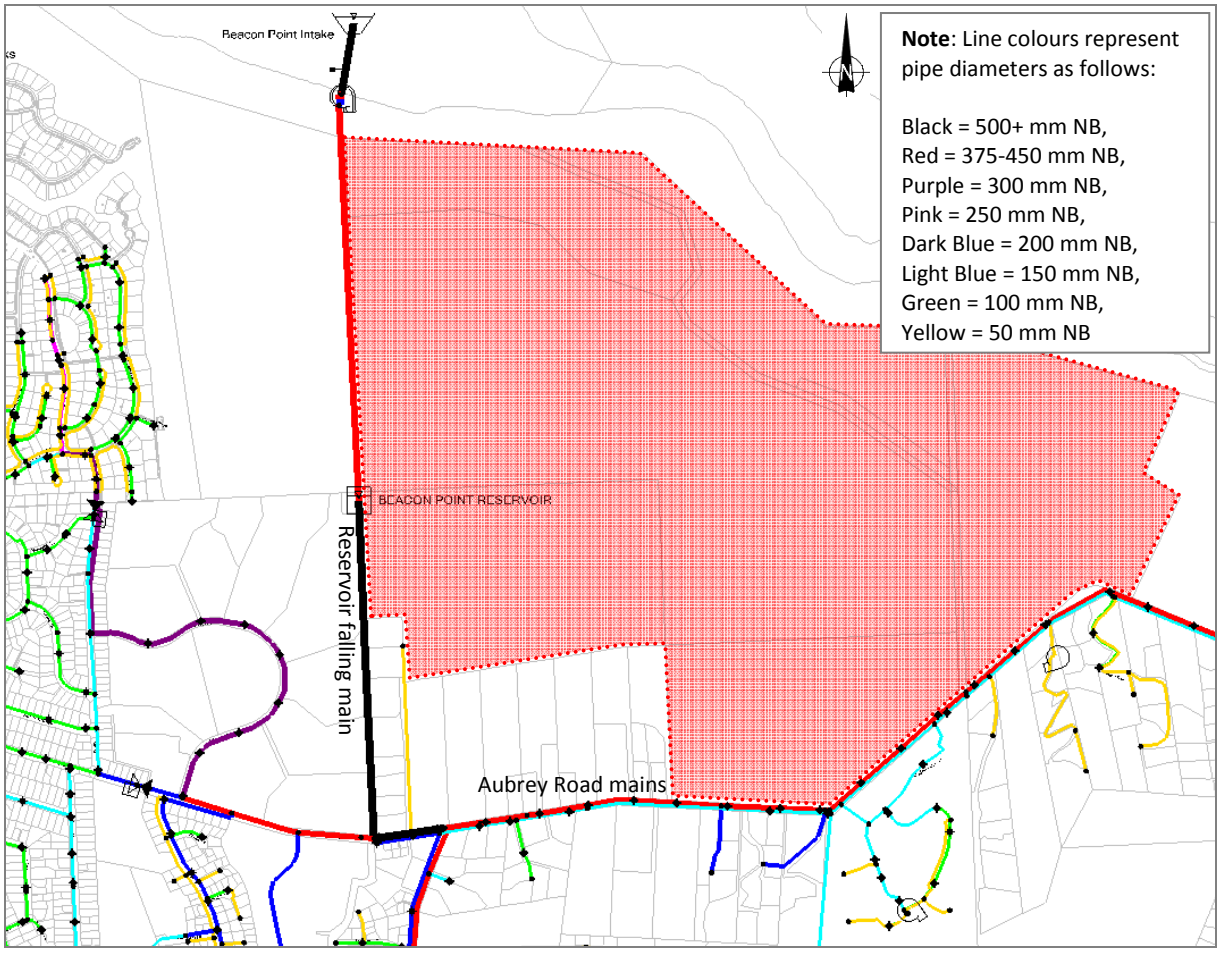


Figure 1 *Wanaka water supply network near the proposed rezoning (site outlined/shaded in red) [Not to scale]*

We understand that only that land south of the "outer growth boundary" is to be developed (see attached drawings).

Modelling methodology

The modelled demand scenarios used to determine levels of service for the Wanaka water supply network were

- **Peak day demand** - To determine whether available fire flows meet fire fighting requirements [1], and
- **Peak hour demand** - To determine whether minimum residual pressures at each connection are ≥ 300 kPa [2]

[1] Fire flow requirements are in accordance with SNZ PAS 4509:2008, "*New Zealand Fire Service Fire Fighting Water Supplies Code of Practice*".

[2] The minimum residual pressure requirement is as set out in Queenstown Lakes District Council Amendments and Modifications (2005) to NZS 4404:2004 , *"Land Development and Subdivision Engineering".*

We assumed an approximate layout of the pipe reticulation to cover most of the development area, with 150 mm and 300 mm NB PVC pipes as appropriate, as per Figure 2 below. We have also assumed hydrants at several locations throughout the development in order to gauge available fire flow.

The final proposed development, if constructed, would need to have more extensive reticulation, and more hydrants would be required. The modelling undertaken for this report is at a high-level proof of concept only.

This reticulation includes a connection to the Beacon Point Reservoir falling main at node J-98. We are uncertain at this stage whether such a connection would be practical. Alternative reticulation options are discussed in the Additional Modelling Comments section below.

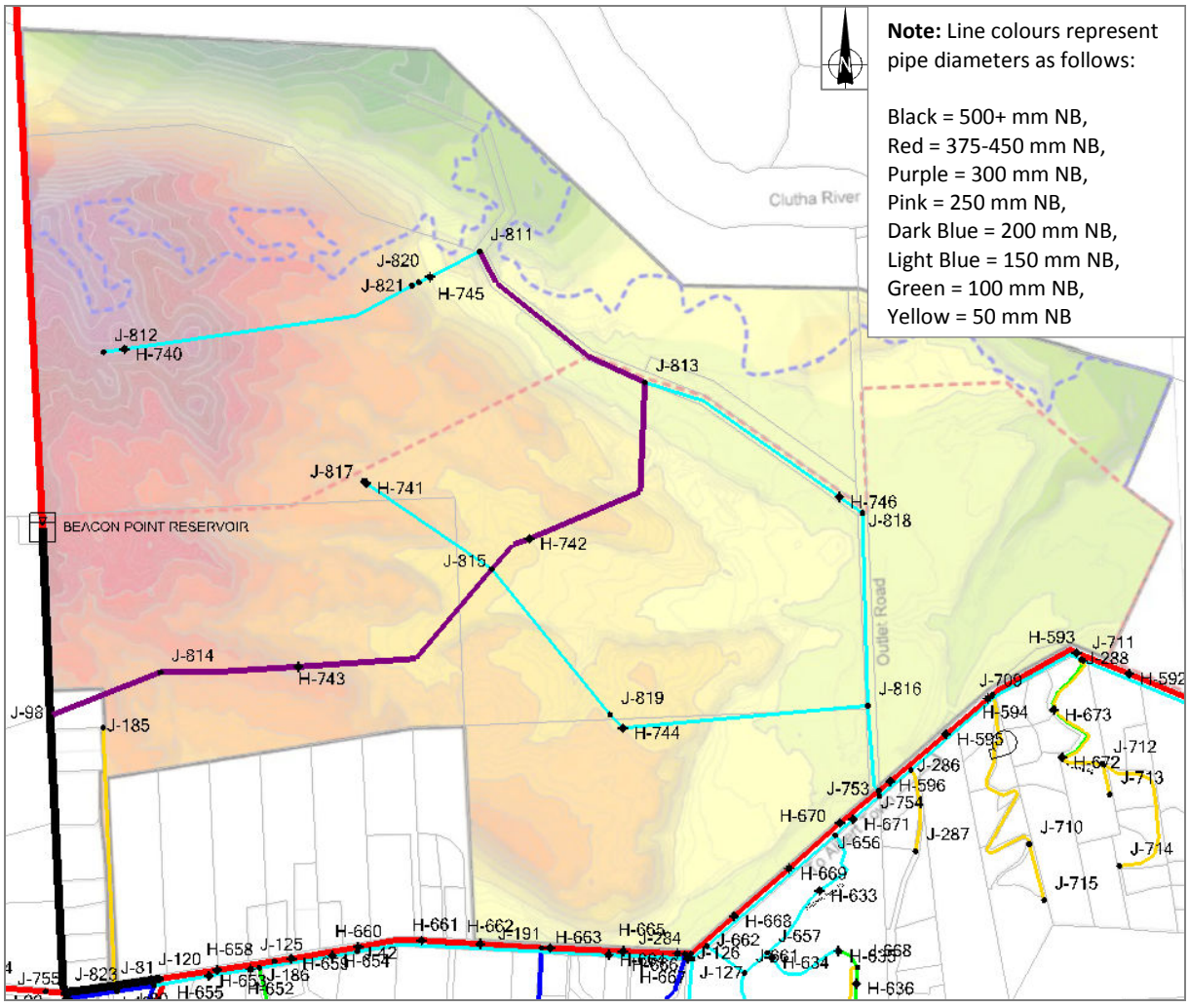


Figure 2 *Modelled reticulation layout for development [Not to scale]. The development area is shown by coloured shading: green = low elevation, red = high elevation.*

Demands

The average daily flow (ADF) demand was calculated assuming an average population of 3 people per residential dwelling and an average daily water consumption of 700 l/person.day, as per QLDC requirements. Development demands during the peak day and peak hour demand scenarios were calculated as follows:

- Peak day flow (PDF) = **3.3** x ADF
- Peak hour flow (PHF) = **6.6** x ADF

The total average daily flow (ADF) demand from the proposed 800 residential units is 1680 m^3/day, or 19.4 l/sec. This corresponds to a peak day flow (PDF) demand of 64.2 l/sec and a peak hour flow (PHF) demand of 128.3 l/sec.

We have added the above demand into our WaterGEMS dynamic network analysis model for Wanaka, last updated February 2010. Demands were entered into the model at nodes J-811 to J-819, (shown in Figure 2 above) as per the distribution in Table 1 below.

Table 1 Demand distribution throughout proposed East Wanaka development

Demand node	Proportion of demand
J-811	5%
J-812	10%
J-813	10%
J-814	10%
J-815	15%
J-816	10%
J-817	10%
J-818	15%
J-819	15%
Total	100%

Modelling results

Modelling results are presented in Table 2 below. Note that these results relate to the East Wanaka rezoning development alone with 2009 design demands, and do not include demands from other proposed developments recently modelled by Tonkin & Taylor.

Table 2 Minimum pressures and fire flow availability

Nodes assessed	Elevation (m RL amsl)	Residual pressure (kPa) [1]	Fire flow available (l/sec) [2][3]
J-811	325	540 ≥ 300 **OK**	-
J-812	395	< 0 **Not OK**	-
J-813	328	520 ≥ 300 **OK**	-
J-814	354	300 ≥ 300 **OK**	-
J-815	341	390 ≥ 300 **OK**	-
J-816	329	500 ≥ 300 **OK**	-
J-817	350	300 ≥ 300 **OK**	-
J-818	329	490 ≥ 300 **OK**	-
J-819	344	350 ≥ 300 **OK**	-
H-740	395	-	0 ≤ 25 **Not OK**
H-741	356	-	58 ≥ 25 **OK**
H-742	340	-	200 ≥ 25 **OK**
H-743	355	-	200 ≥ 25 **OK**
H-744	345	-	99 ≥ 25 **OK**
H-745	335	-	113 ≥ 25 **OK**
H-746	329	-	127 ≥ 25 **OK**

(1) A minimum residual peak hour pressure of 300 kPa is required as per QLDC amendments to NZS 4404:2004.

(2) A total of 25 l/sec is required from within 270 m of each non-sprinklered, residential dwelling for Class FW2 fire fighting as per SNZ PAS 4509:2008.

(3) A minimum of 12.5 l/sec is required from each hydrant as per SNZ PAS 4509:2008.

Modelling shows that, during the 2009 design peak hour demand scenario, the residual pressures in the development will be less than 0 kPa (without pressure boosting). Hence, the Queenstown Lakes District Council (QLDC) requirement for minimum pressures being ≥ 300 kPa is **not met** within the proposed development. The low pressures are mainly due to high elevations within the development, and partially due to headlosses within the development.

As an approximate guide, pressure boosting would be needed at the following locations:

- Above **348 m** RL above mean sea level (amsl) in the **northwest** of the development
- Above **354 m** RL amsl in the **southwest** of the development, and
- Above **349 m** RL amsl in the **southeast** of the development.

In total, approximately **30%** of the development area would require pressure boosting.

Modelling also shows that, for approximately **80%** of the development area, a minimum of Class FW 2 fire flow **can** be achieved during the 2009 design peak day demand scenario, as required for a non-sprinklered, residential development.

The remainder of the development (near H-740) will require pressure boosting to achieve the required fire flow. Note that this area is covered by the previous requirement for pressure boosting above 348 m RL amsl in the northwest of the development.

Additional Modelling Comments

Wider network effects

Modelling indicates that the effect on fire fighting and residual pressure levels of service in the rest of the network is negligible.

Pressure boosting

A booster pump near H-745 with a design flow of 12.8 l/sec and design head of 58 m would enable land up to 405 m RL amsl in the northwest of the development (near J-812) to achieve 300 kPa. Note that the design head is quite sensitive to the demand flow through the booster station.

The area to the southeast of the development that does not meet residual pressure requirements is only a small area. It is possible that it could be supplied via a separate boosted connection to the Aubrey Road 375 mm NB PVC main. We have not modelled such a connection.

Alternative connection reticulation

Should connection directly to the Beacon Point falling main not be possible, we recommend a connection to the Aubrey Road main at J-823, running up Peak View Ridge to connect at node J-814. This reticulation would result in additional headlosses, for which modelling indicates that residual pressures would reduce by approximately 30 to 40 kPa throughout the development. Approximately 40% of the development area would require pressure boosting.

We have also considered connection at Outlet Road only (using 300 mm and 150 mm sizes in different locations to those assumed previously). Modelling indicates that the additional headlosses along Aubrey Road under this reticulation would reduce minimum residual pressures by 60 to 90 kPa, meaning approximately 50 to 60% of the development area would require pressure boosting.

Where FW2 fire flow is available in the connection scenario of Table 2, FW2 fire flow is still available under the two different connection scenarios mentioned above.

Reservoir storage

We have also checked the reservoir storage capability of the Beacon Point Reservoir. The existing storage capacity under the 2009 design demands is already below recommended storage guidelines set out in a report by MWH[3]. Connection of this development would mean that reservoir storage issues at Beacon Point should be carefully considered by QLDC. Parts of the Beacon Point pressure zone may be supplied from a new reservoir (namely the Hawthenden Reservoir) in the future, which would also affect the storage requirements at Beacon Point.

[3] MWH New Zealand Ltd, *"Queenstown Lakes District Council – Strategic Water Review",* February 2006.

Applicability and Closure

The model is a numerical representation of the physical reality, and subsequently bears some uncertainty. The demands and peaking factors used are based on assumptions regarding the patterns of water use in the township, and are an approximation of the physical reality. Hence, actual demands within the network may differ from those modelled.

This report has been prepared for the benefit of Hadley Consultants 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.

In addition, the modelling results presented in this report show the available levels of service for the **current** Wanaka network, based on the **2009 design demands**, and are not a guarantee of available levels of service in the future.

Finally, this modelling report has considered the development at a high level only. Once development layout is confirmed, additional modelling with more detailed reticulation will be required to confirm levels of service and pumping demands.

We trust this modelling report meets your requirements. Please contact Dominic Fletcher (dfletcher@tonkin.co.nz) on 03 363 2472 if you wish to discuss these results or any other aspect of this modelling report.

Yours sincerely,

TONKIN & TAYLOR LTD

Grant Lovell
CHRISTCURCH GROUP MANAGER

Report prepared by:
Pieter Vanderpoel
CIVIL ENGINEER

Technical review by:
Dominic Fletcher
T&T PROJECT MANAGER

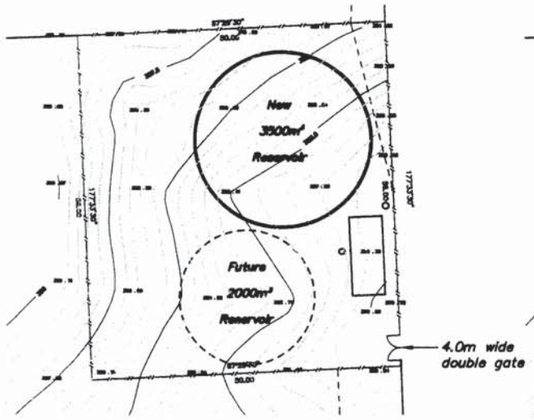
Attachments:

- Darby Partners Ltd drawings RS-00 & 03, titled "*East Wanaka Resource Study*", dated 22 & 28 June 2010.

2-Aug-10
p:\51556\51556.013\workingmaterial\2010-07-30.pav.ltr.water modelling results.doc

Appendix 2

Beacon Point Reservoir Site Plan



FENCING LAYOUT PLAN
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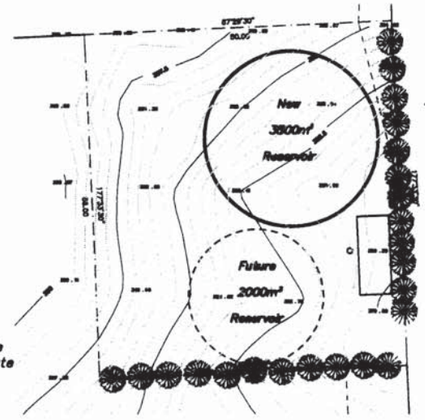
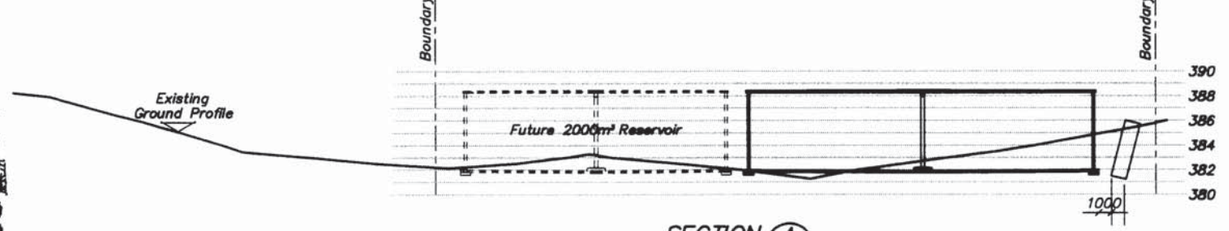
1:1000 at A3



PLANTING LAYOUT PLAN
1:500 at A1
1:1000 at A3



SECTION A
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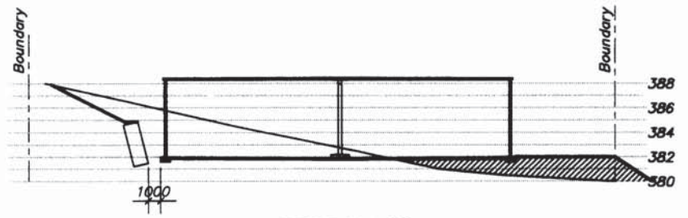

SECTION B
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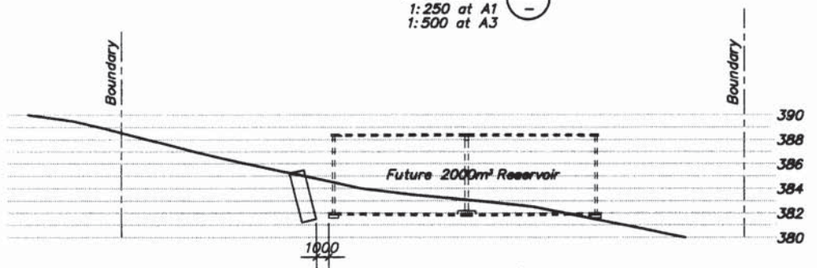

SECTION C
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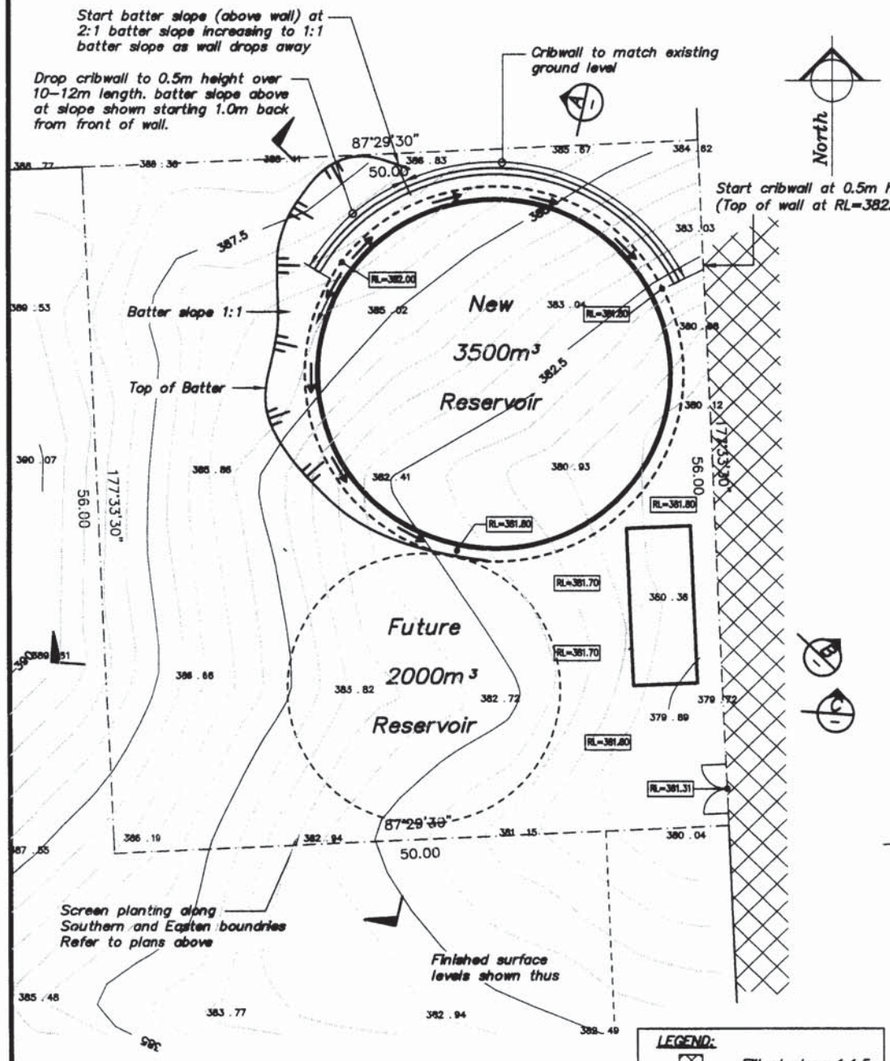
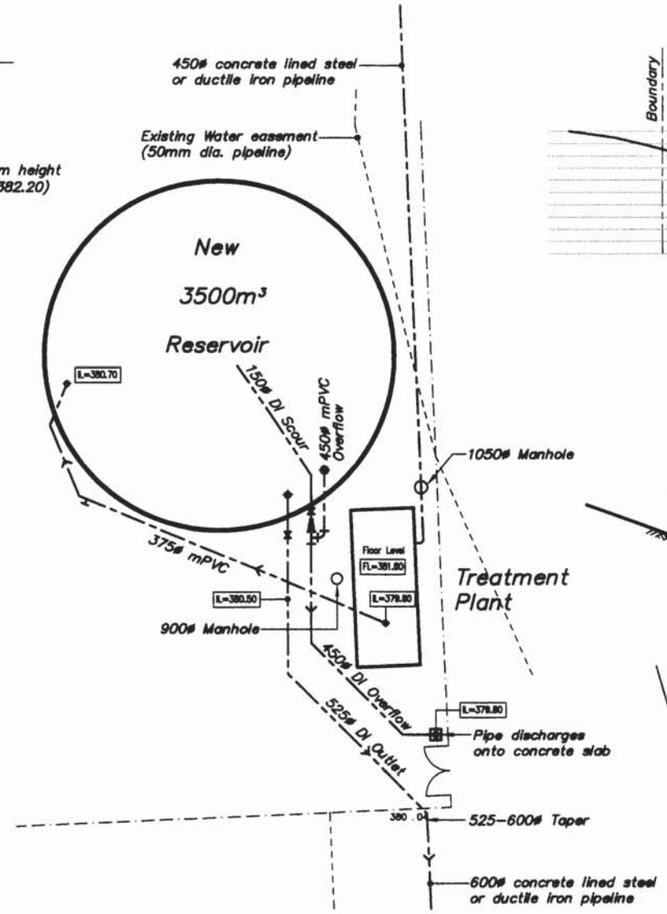


LAYOUT PLAN
1:250 at A1
1:500 at A3

Legal Description: Lot 13 DP 300734

LEGEND:
- Fill at slope 1:1.5
- Rising Main
- Gravity Main
- Crib Wall
- Fencing



PIPELINE LAYOUT PLAN
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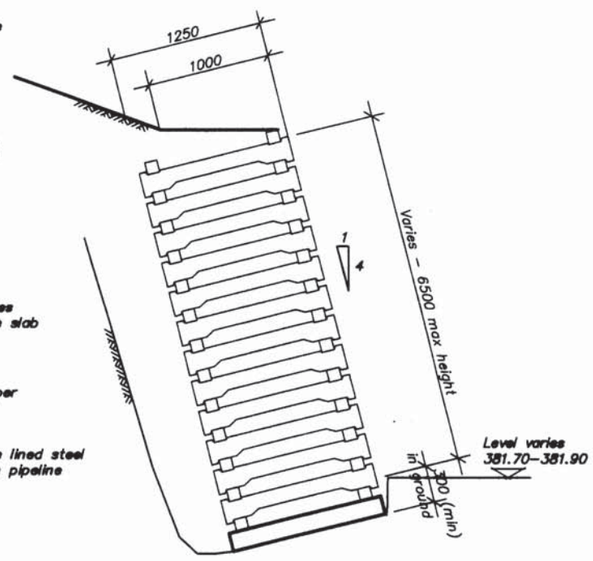


TYPICAL CRIB WALL SECTION
1:25 at A1
1:50 at A3
1200 SERIES CRIB WALL

A	As-Built		23/04
No.	Revisions		Date Appvd
Designed	A.Steel	Date 4/03	Print Date
Drawn	J.Knox	Apr'03	
Checked			
Approved			
File		Ref cRES--L1	

Client: Queenstown Lakes District Council

Project: CONTRACT No 417
WANAKA WATER SUPPLY BEACON POINT SYSTEM

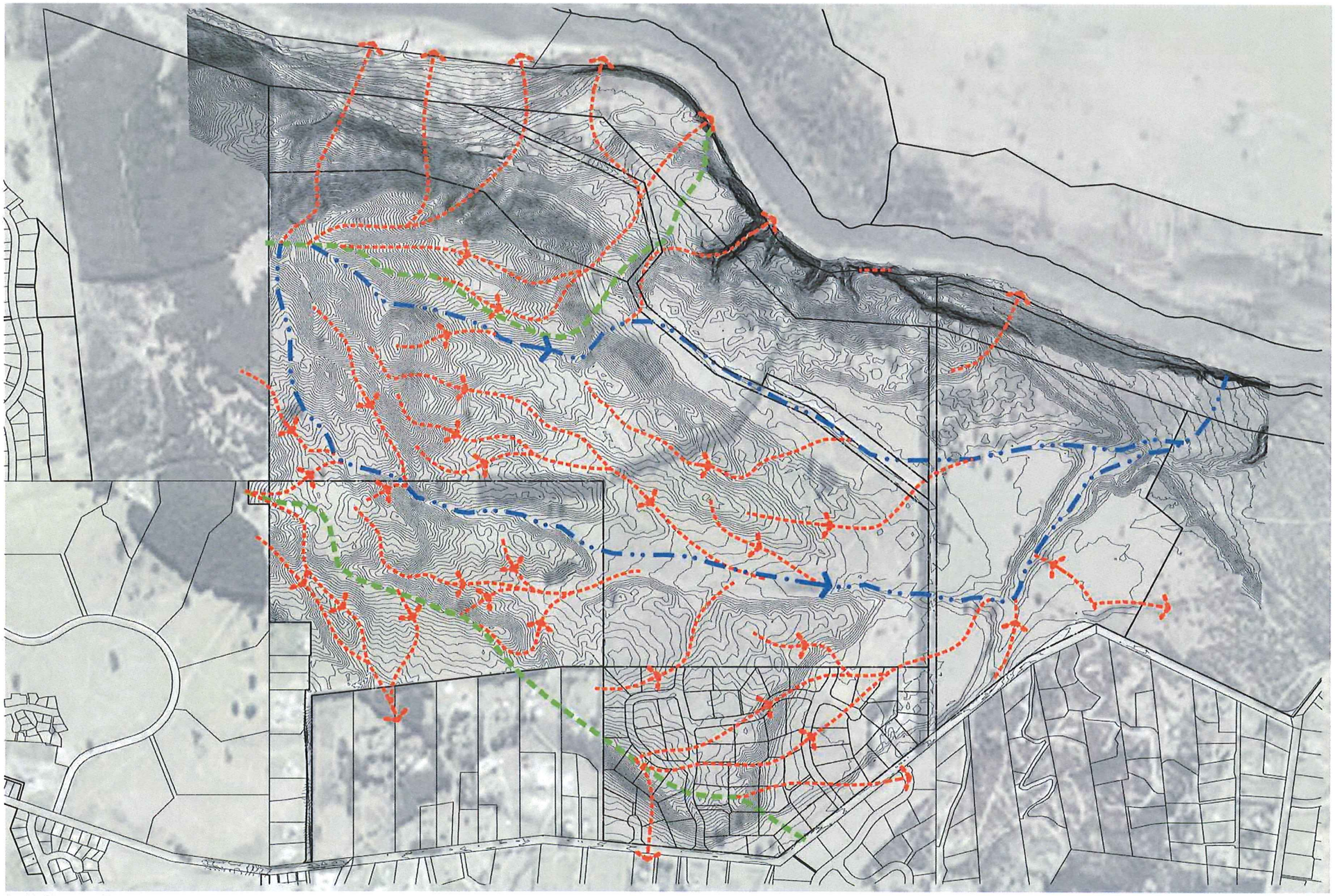
Sheet Title: NEW RESERVOIR SITE LAYOUT PLAN AND TYPICAL SECTIONS

Job No.	Sheet No.	Revision
57388	R1 of shts	A

Duffill Watts King Ltd

Appendix 3

Stormwater Runoff Paths



+ NORTHLAKE
HYDROLOGY

REFERENCE : 1788-G SCALE 1:10000 AT A3 FEB 2013

Plan detail adapted from Darby Partners Ltd plan ref. RS-004 rev C

FIGURE G

baxter design group

Appendix 4

Gas Reticulation Confirmation

John McCartney

From: John McCartney
Sent: Monday, 2 August 2010 12:01 p.m.
To: John McCartney
Subject: FW: North Wanaka Special Zone reticulation
Attachments: image001.jpg; image001.gif; image002.jpg

Sent: Friday, 30 July 2010 3:28 p.m.
To: John McCartney
Subject: FW: North Wanaka Special Zone reticulation

From: Stuart Brown [mailto:Stuart.Brown@contactenergy.co.nz]
Sent: Friday, 30 July 2010 3:17 p.m.
To: Laura Shadbolt
Subject: RE: North Wanaka Special Zone reticulation

Hi Laura

Just to confirm our conversation from Wednesday, We have reticulated gas in Aubrey Rd and Rata St. This is a 200 mm main suppling L.P.G. Vapour @ 70 KPa . This is adjacent to the Koromiko Block in Rata St, runs down Aubrey Rd then up Kings Drive.

Contact / Rockgas would look at extending this main to supply this area subject to securing a sustainable load and meeting supply criteria.

Please contact me directly with any further Questions.

Kindest Regards

Stu Brown
Project Engineer LPG
Queenstown

contact.

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PO Box 215
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From: Laura Shadbolt
Sent: Tuesday, 27 July 2010 5:27 p.m.
To: 'stuart.brown@contactenergy.co.nz'
Subject: North Wanaka Special Zone reticulation

Hi Stuart,

I've attached a drawing of the area concerned, just to confirm that we're on the same page! Very early stages, but indicative road locations are shown by the heavy black line.

If you could, a letter from Rockgas confirming the feasibility of connecting supply, and willingness to put forward a proposal at the appropriate time would be very helpful.

Thanks Stuart,

Laura Shadbolt
Civil Engineer

PO Box 1356
44 Robins Road
Queenstown 9348

Phone: 64-3-450 2140
Fax: 64-3-441 3513
Mobile: 021 1321376
Email: laura@hadleys.co.nz
Web: www.hadleys.co.nz

Appendix G: Wastewater Email with QLDC

Alex Todd

From: Mark Baker <Mark.Baker@qldc.govt.nz>
Sent: Monday, 24 May 2021 1:34 pm
To: Marc Bretherton
Cc: Alex Todd; Ulrich Glasner
Subject: RE: [PPG-W5640] Aubrey Road wastewater upgrade

Marc,
As Ulrich highlights, the key North Wanaka wastewater investment that is near finishing the design phase has been altered to reconfigure the network to pump directly to the Albert Town-Lake Hawea Road WWPS. This change in configuration releases previously earmarked capacity in the Aubrey Road pipe (Outlet Rd to Albert Town-Lake Hawea Road) that North Lake utilises – this investment is therefore is creating capacity across the wider catchment/network for the immediate future without the requirement for a second tranche investment in the near term. It is likely that there will be future upgrades required within the catchment, but at this point further upgrades are not in the proposed 2021-31 LTP window. We will continue to monitor the condition and performance of the network as well as the growth rates, zoning changes, further infill (e.g. addition of res flats) and changes in required Level of Service to ensure our master plan remains current.

Regards,
Mark

Mark Baker CPEng CMEngNZ
Asset Manager – Three Waters | Asset Planning | Property & Infrastructure
Queenstown Lakes District Council
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E: mark.baker@qldc.govt.nz

QUEENSTOWN LAKES DISTRICT COUNCIL
www.qldc.govt.nz

From: Marc Bretherton <Marc.Bretherton@winton.nz>
Sent: Monday, 24 May 2021 10:44 AM
To: Ulrich Glasner <ulrich.glasner@qldc.govt.nz>; Mark Baker <Mark.Baker@qldc.govt.nz>
Cc: Alex Todd <Alex.Todd@ppgroup.co.nz>
Subject: RE: Aubrey Road wastewater upgrade

Many thanks Ulrich.

Mark – appreciate your earliest confirmation.

Regards,

Marc Bretherton

WINTON

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From: Ulrich Glasner <ulrich.glasner@qldc.govt.nz>
Sent: Wednesday, 19 May 2021 11:42 am
To: Marc Bretherton <Marc.Bretherton@winton.nz>; Mark Baker <Mark.Baker@qldc.govt.nz>
Subject: RE: Aubrey Road wastewater upgrade

Hi Marc,

Councils investment through the North Wanaka WW Conveyance project frees up capacity in the pipe in question. Previously we had the proposed pump station pumping to Aubrey Road so the pipe in question previously had capacity allocated to the that project and an upgrade/duplicate planned.
By investing a little more and taking a new alignment and bypassing the pipe in question we have freed up capacity for the Northlake area.

Mark,
Could you confirm please?
Thank you.

Ngā mihi,
Ulrich

Ulrich Glasner CMEngNZ CPEng
Chief Engineer | Property & Infrastructure
Queenstown Lakes District Council
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QUEENSTOWN LAKES DISTRICT COUNCIL
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From: Marc Bretherton <Marc.Bretherton@winton.nz>
Sent: Wednesday, 19 May 2021 11:30 AM
To: Ulrich Glasner <ulrich.glasner@qldc.govt.nz>
Subject: FW: Aubrey Road wastewater upgrade

Hi Ulrich – just following up on this.

Is this Aubrey Road w/w upgrade funded and programmed in upcoming capital works?

Many thanks.

Marc Bretherton

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www.winton.nz

Wanaka
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From: Marc Bretherton
Sent: Wednesday, 12 May 2021 9:34 am
To: Ulrich Glasner <ulrich.glasner@qldc.govt.nz>
Cc: Alex Todd <Alex.Todd@ppgroup.co.nz>
Subject: Aubrey Road wastewater upgrade

Morning Ulrich,

I have attached the LTP submission which we submitted and which I spoke to in Wanaka yesterday.

We are trying to get some clarification as to whether these upgrade works are included in the capital works budgets going forward and when these works will be undertaken.

Can you pls assist?

Many thanks,