

Appendix A: Draft Development Plans (Winton Partners)

DRAFT

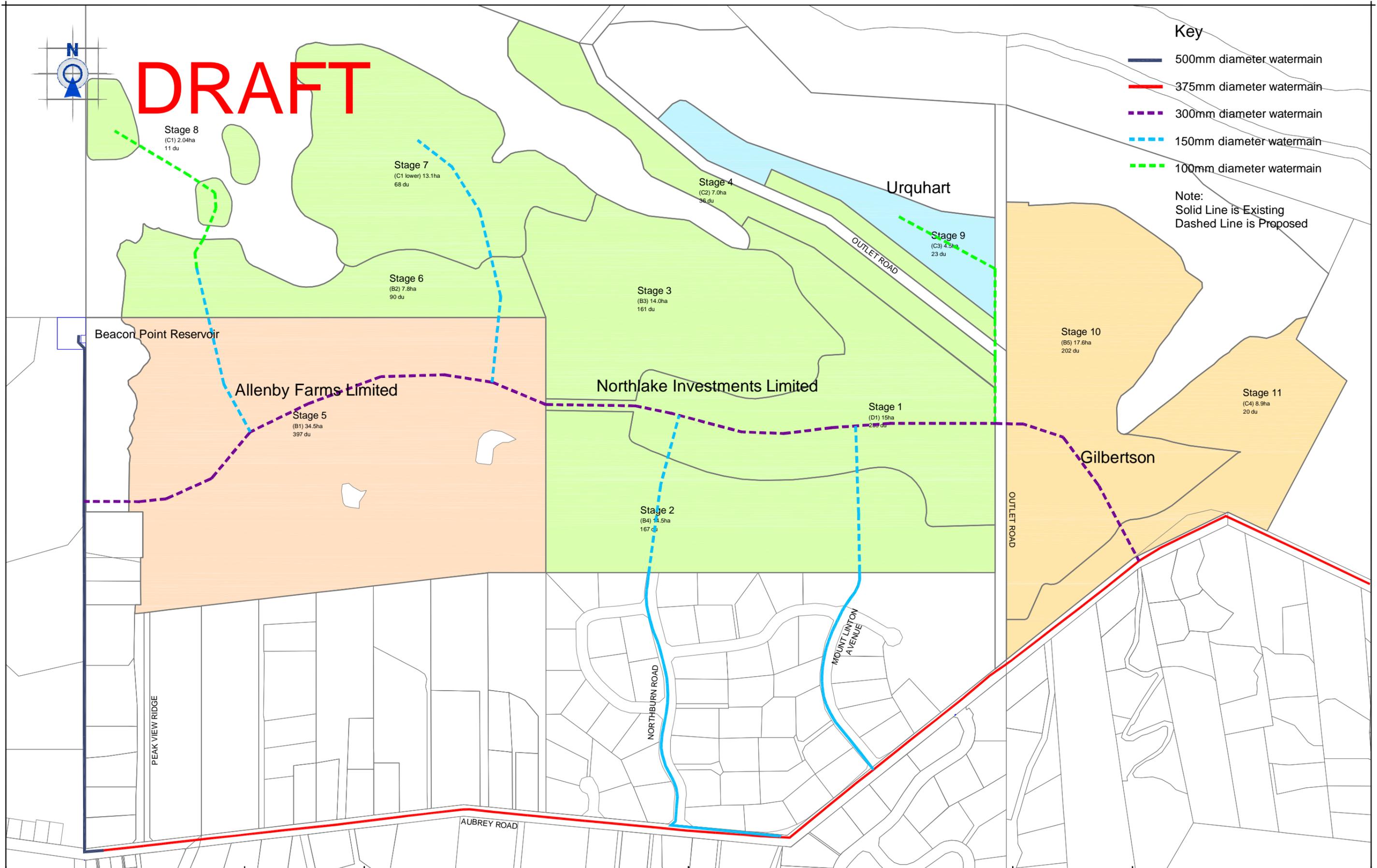


DRAFT

Key

-  500mm diameter watermain
-  375mm diameter watermain
-  300mm diameter watermain
-  150mm diameter watermain
-  100mm diameter watermain

Note:
Solid Line is Existing
Dashed Line is Proposed



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

Client & Location:

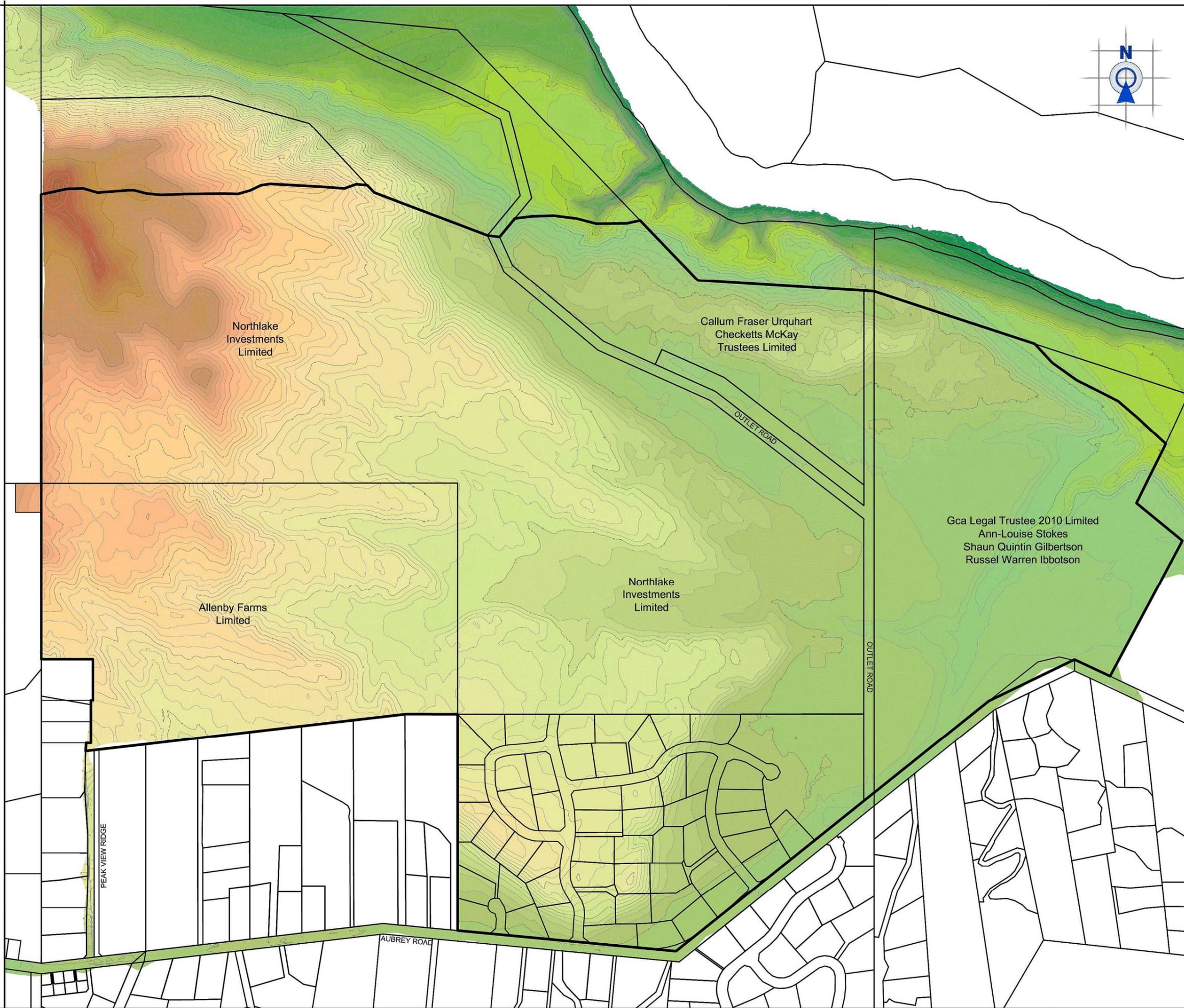
Winton Partners
NORTHLAKE

Purpose & Drawing Title:

Northlake Stages 1 - 11
Primary Watermains

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Designed by:	MJB				
Drawn by:	MJB				
Checked by:	MJB				
Approved by:	MJB				DO NOT SCALE
Job No:	W4481-7	Sheet No:	2e	Revision No:	1
				Date Created:	17/12/2015



KEY

430 - 420m
420 - 410m
410 - 400m
400 - 390m
390 - 380m
380 - 370m
370 - 360m
360 - 350m
350 - 340m
340 - 330m
330 - 320m
320 - 310m
310 - 300m
300 - 290m
290 - 280m
280 - 270m

— Zone Boundary
 - - - Parcel Boundaries
 Contour Interval = 2m

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WANAKA
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 or P.O. Box 283
 Wanaka 9343
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Client & Location:
**Winton Partners
 WANAKA**

Purpose & Drawing Title:
**Northlake
 Contour Plan**

Surveyed by:	-	Original Size:	Scale:
Designed by:	-	A3	1:7000 @ A3
Drawn by:	RP		
Checked by:	MJB		
Approved by:	-	DO NOT SCALE	
Job No:	W4481-7	Sheet No:	102
Drawing No:	006	Revision No:	0
		Date Created:	17/12/2015

Appendix B: Modelling Design Demands

DRAFT

Job no. 50553.324
 Description Northlake Developments Water Supply Modelling Demands
 Computed 15/01/2015 mlaa

NORTHLAKE SUBDIVISION

Density 3 people/lot
 Water allowance 700 l/person/day

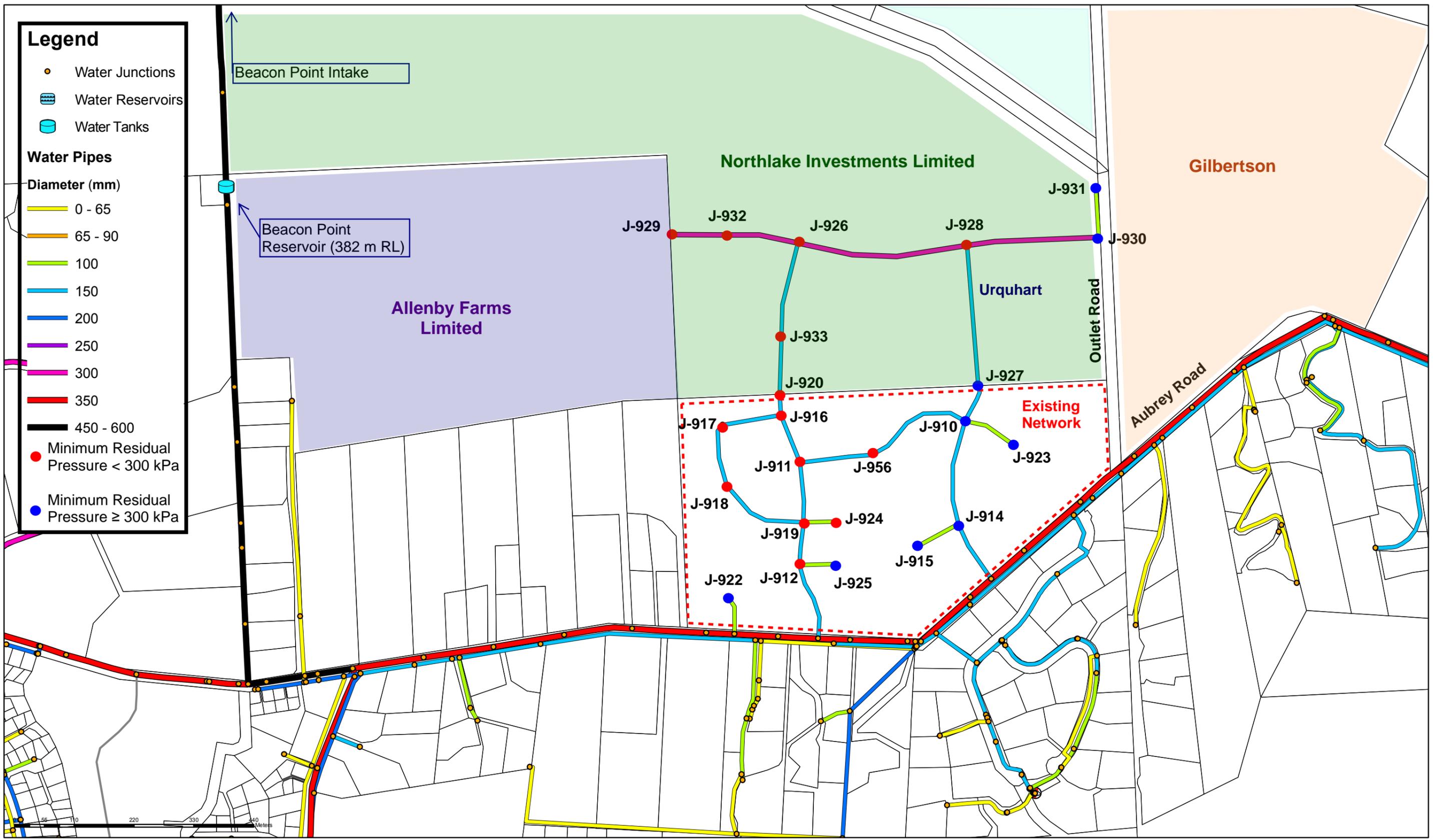
Stage	No. of lots	ADF (l/s)	PDF (l/s)	PHF (l/s)
1	225	5.47	18.05	36.09
2	145	3.52	11.63	23.26
3	140	3.40	11.23	22.46
4	32	0.78	2.57	5.13
Scenario 1 (1-4)	542	13.17	43.47	86.95
5	345	8.39	27.67	55.34
6	78	1.90	6.26	12.51
7	59	1.43	4.73	9.46
8	9	0.22	0.72	1.44
9	20	0.49	1.60	3.21
10	176	4.28	14.12	28.23
11	18	0.44	1.44	2.89
Scenario 2 (1-11)	1247	30.31	100.02	200.04

EXISTING NETWORK NORTH OF AUBREY ROAD

Density (people/lot)	3
Water allowance (l/person/day)	700
Number of lots	54
ADF (l/s)	1.31
PDF (l/s)	4.33
PHF (l/s)	8.66

Appendix C: Initial Scenario: Stages 1-4

DRAFT



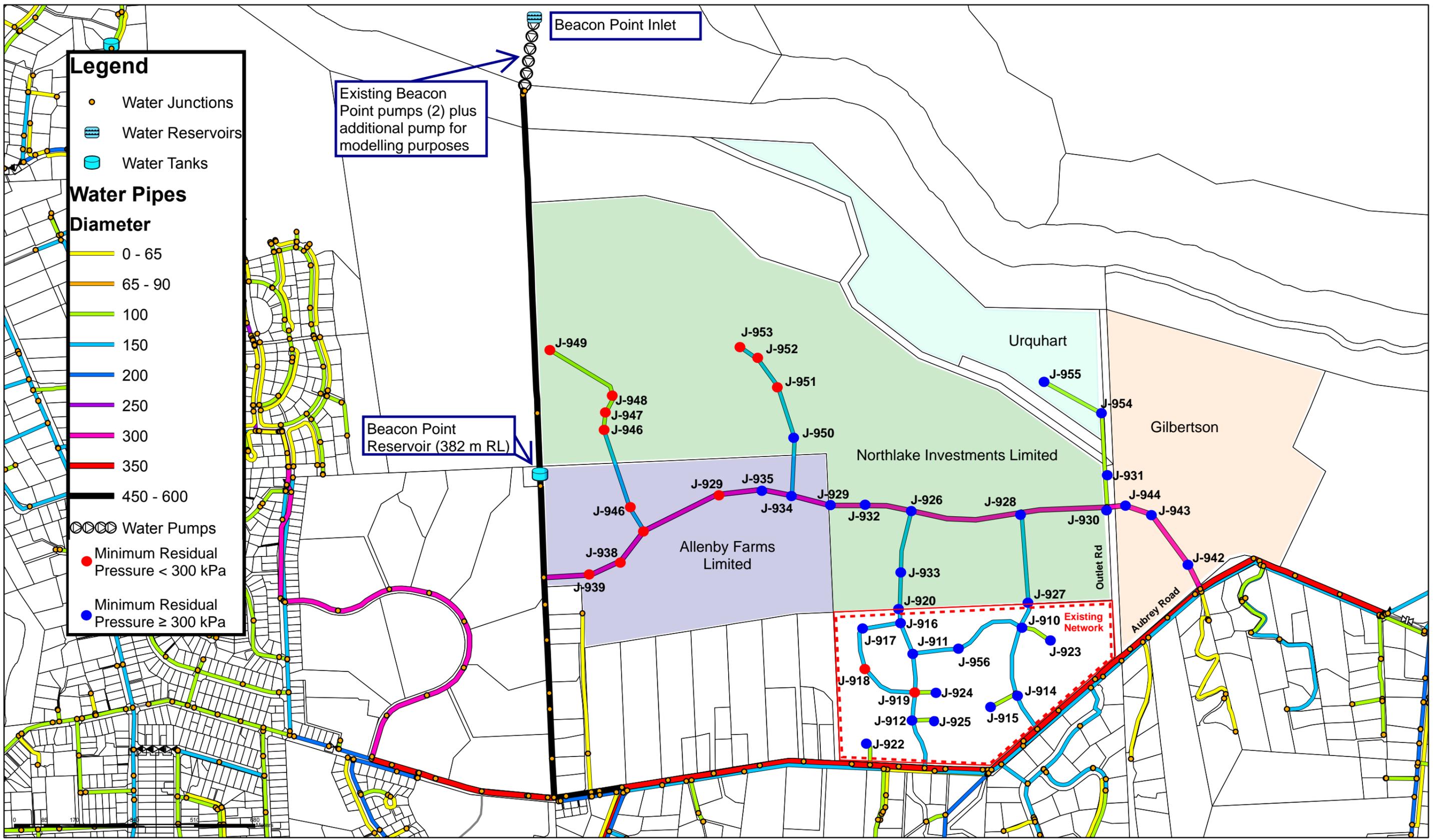
Initial Scenario: Stages 1-4
Water Supply Reticulation



Drawn By:	MLAA
Date:	04/02/2016
Approved:	
Scale:	1:6,500

Appendix D: Ultimate scenario (All Stages)

DRAFT



Ultimate Development
Water Supply Reticulation
- with additional inlet pump



Drawn By:	MLAA
Date:	04/02/2016
Approved:	
Scale:	1:10,000



WATERSHED

3 June 2016

Queenstown Lakes District Council
10 Gorge Road
Queenstown

Dear Mark Baker,

NORTHLAKE DEVELOPMENT STAGES 1-7

As per your request, we have undertaken hydraulic modelling to review the proposed water supply layout provided by Patterson Pitts Group, with respect to achieving the levels of service required by Queenstown Lakes District Council.

DEMAND ASSESSMENT

The demand has been assessed based on the Northlake Stages 1-7 Proposed Water Supply Layout drawing W4481-7 011 Rev3 and the Queenstown Lakes District Council Land Development and Subdivision Code of Practice (2015).

The key design parameters outlined in Code of Practice are as follows:

- Daily consumption of 700 L/p/day
- Number of people per dwelling = 3
- Peak Day Demand (over a 12-month period) = Average Day Demand x PF:
 - (a) PF = 1.5 for populations over 10,000;
 - (b) PF = 2 for populations below 2,000.
- Peak Hourly Demand = Average Hourly Demand (on peak day) x PF (over a 24-hour period):
 - (a) PF = 2 for populations over 10,000;
 - (b) PF = 5 for populations below 2,000.
- Firefighting demands as specified in SNZ PAS 4509

Table 1: Average and Peak Day Demand Calculations

Development Stage	No. of Residential Lots	Population	Average Demand (l/s)	Peak Daily Demand (L/s)
Stage 1	36	108	0.875	1.750
Stage 1 A	10	30	0.243	0.486
Stage 2	37	111	0.899	1.799
Stage 3	33	99	0.802	1.604
Stage 4	45	135	1.094	2.188
Stage 5	25	75	0.608	1.215
Stage 6	20	60	0.486	0.972
Stage 7 ¹	30	90	0.729	1.458
Total	236	708	5.736	11.472

¹ Stage 7 is the Village Centre and the information provided by the developer assesses the demand as equivalent to 30 Residential Lots.



WATERSHED

Based on the recent calibration of the hydraulic model during peak demand, the per capita demand for the Beacon Point area was determined as 0.048 L/property/day. This equates to a peak day demand of 1382L/p/day or using the average to peak day factor of 2, 692 L/p/day. This agrees well with the code of practice assumption of 700L/p/day.

The firefighting classification for the village center is assumed to be FW3 50L/s.

Peak Hour Demand

The peak hour factor for the Beacon Point area based on the calibrated hydraulic model is 1.437, the domestic equivalent peak hour factor is 2.3. The suggested design peak hour factor is 5 for population less than 2000. Given the demand assessed in the model matches well with the design assumption, it is reasonable to assume that a similar peak hour factor would apply. For the purposes of assessing the Northlake subdivision, the domestic equivalent profile has been used applying a peak hour factor of 2.3.

LEVELS OF SERVICE

The levels of service agreed upon with QLDC for the current system performance assessment as part of the model development and calibration project are outlined below:

- The minimum service pressure is 200-300kpa
- The maximum service pressures is 700-800kpa

These levels of service along with the requirements of the Fire Fighting Water Supplies Code of Practice form the basis for the system performance analysis.

Queenstown Lakes District Council does not prescribe any level of service criteria relating to pipe head loss, generally speaking pipe head loss per unit length for new pipes should ideally be < 2 m/km, or 2- 5 m/km for normal operation.

MODEL RESULTS

For current peak day demand, pressures within the new sub-division are above 300kPa. The firefighting classification of 50L/s is easily achieved. The proposed pipes have head loss per unit length under 2 m/km or only slightly over.

The only area of concern are existing properties at higher elevation on Glenaray Crescent. These properties have been identified in the current system performance assessment as receiving minimum pressure between 200 – 300 kPa. Pressure to these customers could be reduced by a further 150kPa, however the model results indicate they do remain above 250kPa. The lower pressures are a factor of elevation (~357m) with respect to the Beacon Point Reservoir (TWL HGL 388.1m), where the maximum static pressure would be 31m. There are no significant high head loss pipes contributing to the lower pressures, however the proposed future 250mm connection will ensure minimal head loss.



SUMMARY

The hydraulic model is a representation of the physical water supply system and as noted in the model development and calibration report it has limitation to its accuracy. The demands and peaking factors used to assess the development are based on assumptions and the actual finally water demands may vary.

The modelling results indicate the proposed new development can be supplied through the proposed reticulation layout and meet the desired levels of service indicted by Queenstown Lakes District Council. Provided Queenstown Lakes District Councils are comfortable with the level of service provide to the properties on Glenaray Road, the proposed water supply design should be accepted.

We trust this report meet your requirements. Please contact Charlotte Broadbent on 021766475 charlotte.broadbent@wse.co.nz if you wish to discuss any aspects of this report further.

Regards,

Charlotte Broadbent

Director / Senior Civil Engineer



WATERSHED

31 August 2017

Queenstown Lakes District Council
10 Gorge Road
Queenstown

Dear Mark Baker,

NORTHLAKE DEVELOPMENT STAGES 1-14

As per your request, we have undertaken hydraulic modelling to review the proposed water supply layout provided by Patterson Pitts Group, with respect to achieving the levels of service required by Queenstown Lakes District Council.

This analysis also included an assessment as to whether Stages 1 to 14 of the development could be supplied without the proposed 250mm connection through to the Beacon Point Reservoir outlet main.

DEMAND ASSESSMENT

The demand has been assessed based on the Northlake Stages 1-14 Proposed Water Supply Layout drawing W4481-7 076 Sheet No. 600 Revision No. 3 and the Queenstown Lakes District Council Land Development and Subdivision Code of Practice (2015).

The key design parameters outlined in Code of Practice are as follows:

- Daily consumption of 700 L/p/day
- Number of people per dwelling = 3
- Peak Day Demand (over a 12-month period) = Average Day Demand x PF:
 - (a) PF = 1.5 for populations over 10,000;
 - (b) PF = 2 for populations below 2,000.
- Peak Hourly Demand = Average Hourly Demand (on peak day) x PF (over a 24-hour period):
 - (a) PF = 2 for populations over 10,000;
 - (b) PF = 5 for populations below 2,000.
- Firefighting demands as specified in SNZ PAS 4509

The firefighting classification for the village center is assumed to be FW3 50L/s. The remaining development is residential lots and will be assessed as FW2 25L/s.

Table 1 overleaf shows the demand calculation for each of the Stages 1 to 14 of the development.



WATERSHED

Table 1: Average and Peak Day Demand Calculations

Development Stage	No. of Residential Lots	Population	Average Demand (l/s)	Peak Daily Demand (L/s)
Stage 1	36	108	0.875	1.750
Stage 1 A	10	30	0.243	0.486
Stage 2	37	111	0.899	1.799
Stage 3	33	99	0.802	1.604
Stage 4	45	135	1.094	2.188
Stage 5	25	75	0.608	1.215
Stage 6	20	60	0.486	0.972
Village Centre ¹	30	90	0.729	1.458
Stage 7	5	15	0.122	0.243
Stage 8	75	225	1.823	3.646
Stage 9	19	57	0.462	0.924
Stage 10	24	72	0.583	1.167
Stage 11	5	15	0.122	0.243
Stage 12	42	126	1.021	2.042
Stage 13	237	711	5.760	11.521
Stage 14	39	117	0.948	1.896
Total	682	2046	16.58	33.15

¹ The Village Centre and the information provided by the developer assesses the demand as equivalent to 30 Residential Lots.

Peak Hour Demand

The peak hour factor for the Beacon Point area based on the calibrated hydraulic model is 1.437, the domestic equivalent peak hour factor is 2.3. The suggested design peak hour factor is 5 for population less than 2000, or 2 for populations greater than 10,000 resulting in a prorated factor just under 5. Given the demand assessed in the model matches well with the design assumption, it is reasonable to assume that a similar peak hour factor would apply. For the purposes of assessing the Northlake subdivision, the domestic equivalent profile has been used applying a peak hour factor of 2.3.

LEVELS OF SERVICE

The levels of service agreed upon with QLDC for the current system performance assessment as part of the model development and calibration project are outlined below:

- The minimum service pressure is 200-300kpa
- The maximum service pressures is 700-800kpa

These levels of service along with the requirements of the Fire Fighting Water Supplies Code of Practice form the basis for the system performance analysis.

Queenstown Lakes District Council does not prescribe any level of service criteria relating to pipe head loss, generally speaking pipe head loss per unit length for new pipes should ideally be < 2 m/km, or 2- 5 m/km for normal operation.



MODEL RESULTS WITHOUT 250MM CONNECTION

For current peak day demand, pressures within Stage 1 to 14 new sub-division are generally above 300kPa, with the exception of the Node 23 in Stage 8 which falls slightly below, at 295kPa. This would be within the margins of error of the hydraulic model.

Without the 250mm connection from Beacon Point the subdivision is supplied from the proposed new main on Outlook Road and connections through Northburn Road and Mount Linton Avenue. Under this scenario, the maximum head loss per unit length for the mains on these streets ranges from 3.5m/km on Outlook Road to 4.2 m/km on Mount Linton Avenue and to 5.4 m/km on Northburn Road.

The firefighting classifications of 25L/s and 50L/s for the village center is easily achieved.

As noted in the previous assessment of stage 1-7 undertaken in 2016, the area of concern are existing properties at higher elevation on Glenarary Crescent and into Northburn Road. Properties on Glenarary Crescent have been identified in the current system performance assessment as receiving minimum pressure between 200 – 300 kPa. Under this scenario pressure to these customers could be reduced further, with the lowest pressure approximately 225kPa. Generally, the low pressures in this area are a factor of elevation (~357m) with respect to the Beacon Point Reservoir (TWL HGL 388.1m), where the maximum static pressure would be 31m. However, with the additional demand of stages 8 through to 14 creating slightly more head loss the minimum pressures are degraded further (previously still above 250kPa with Stages 1-7).

MODEL RESULTS WITH 250MM CONNECTION

For current peak day demand, pressures within Stage 1 to 14 new sub-division are above 300kPa. The proposed pipes have head loss per unit length under 2 m/km or only slightly above.

The firefighting classifications of 25L/s and 50L/s for the village center is easily achieved.

The proposed pipes have head loss per unit length under 2 m/km or only slightly over with the exception of the first section of the 250mm feed from Beacon Point. This section may initially have higher head loss at 3.5m/km depending on when the Beacon Point Reservoir outlet main is duplicated, as it provides a feed through to Aubrey Road.

Pressures for the higher elevation properties on Glenarary Crescent remain similar to those assessed in the current peak day system performance and are above 250kPa.



NETWORK OBSERVATIONS

Some of the proposed network diameters have changed since the previous assessment of Stages 1-7 undertaken in 2016. Of note is the watermain on Outlook Road which is now a 250mm diameter (previously 150mm) which will ultimately link through the development to Beacon Point Reservoir outlet main. This upgrade is essential to supplying stages 1-14 without the 250mm connection through to Beacon Point Reservoir.

It is also noted that a small area of Stage 14 is above the 350m contour. Consideration should be given to any proposed earthworks and to the proposed zone boundary between the Upper and Lower pressure zones to ensure these sites have sufficient pressures.

In terms of the wider water supply scheme proposed on drawing W4481-7 076 Sheet No. 600 Revision No. 3, it is recommended the pump station is dedicated to supplying only the Upper Pressure Zone. Options for the supply to the Upper Pressure Zone are currently being considered by QLDC and may include a high level reservoir rather than pumping direct online.

The proposed 250mm watermain should remain a gravity watermain through the Upper Pressure Zone to the Lower Pressure Zone. This limits the size of the pump station and ongoing energy costs of pumping excess water only for it to be pressure reduced into the lower zone. It may also be difficult to control the flow through the proposed pressure reducing valve as the Lower Pressure Zone is just part of the much larger Beacon Point Zone, this would then have implications for the design of the pump station, particularly if pumping is direct online.

SUMMARY

The hydraulic model is a representation of the physical water supply system and as noted in the model development and calibration report it has limitation to its accuracy. The demands and peaking factors used to assess the development are based on assumptions and the actual finally water demands may vary.

The modelling results indicate that stages 1-14 can be supplied through the proposed reticulation layout on drawing W4481-7 076 Sheet No. 600 and meet the desired levels of service indicted by Queenstown Lakes District Council. Provided Queenstown Lakes District Councils are comfortable with the level of service provided to the properties on Glenaray Road, and the small area within Stage 14 above the 350m contour is addressed, the proposed water supply design can be accepted.



WATERSHED

We trust this report meet your requirements. Please contact Charlotte Broadbent on 021766475 charlotte.broadbent@wse.co.nz if you wish to discuss any aspects of this report further.

Regards,

Charlotte Broadbent

Director / Senior Civil Engineer



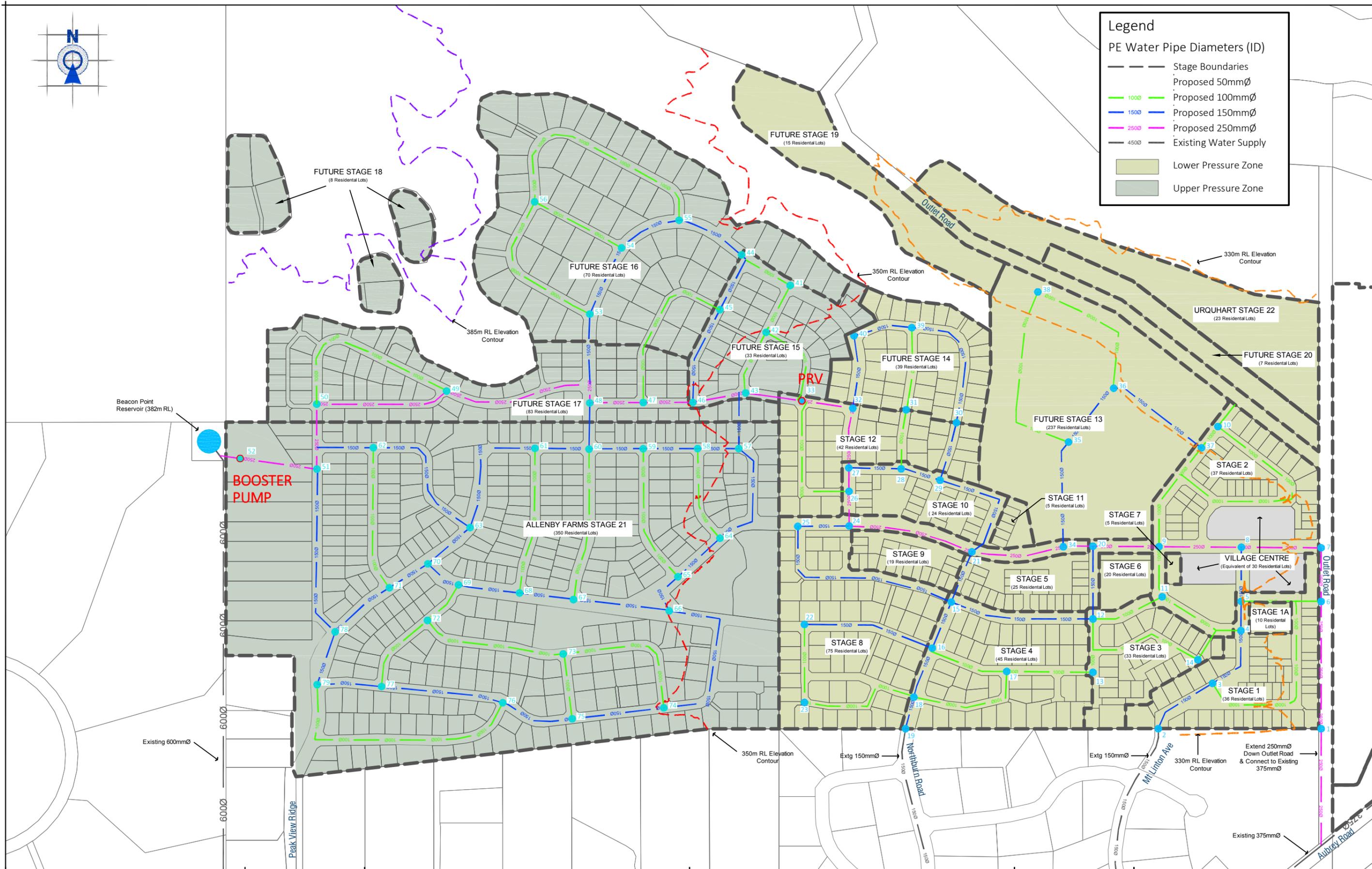
Legend

PE Water Pipe Diameters (ID)

- Stage Boundaries
- Proposed 50mmØ
- Proposed 100mmØ
- Proposed 150mmØ
- Proposed 250mmØ
- Existing Water Supply

Lower Pressure Zone

Upper Pressure Zone



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0800 PPGROUP

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

Client & Location:

NORTHLAKE
wanaka

Purpose & Drawing Title:

**Lower & Upper Pressure Zones
Overview of Stages 1 - 22
Proposed Water Supply Layout**

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Approved by:	AGT				DO NOT SCALE
Job No:	W4481-7	Sheet No:	600	Revision No:	3
Drawing No:	076			Date Created:	21/08/2017

14 January 2016

Rob Darby
Queenstown Lakes District Council
Private Bag 50072
Queenstown
9348

Dear Rob,

Re: Proposed Development – North Lake, Wanaka

As per your email of 6 January 2016, we have assessed the impact of the proposed wastewater loads on the QLDC network. More specifically, the capacity of the existing 300 mm and 375 mm diameter trunk mains from Outlet Road along Aubrey Road with the additional discharge of wastewater from the proposed North Lake development and of maximum probable development within the catchment to Albert Town #2 Pump Station.

Two desktop assessments were completed using alternative load assumptions. The first using the load assumptions of the recently update subdivision code of practice (June 2015). The results of which indicated there was not sufficient capacity in the existing 300 mm or 375 mm diameter trunk mains. The second using the previously used load assumptions from the Land Development and Subdivision Infrastructure New Zealand Standard (2010) and lower unit occupancy rates which indicated there is sufficient capacity in the existing 300 mm diameter trunk main.

As a result of these findings, it has been agreed with QLDC to undertake hydraulic modelling to check the capacity of the mains with the North Lake load added to determine how these results compare to the completed desktop assessment.

This is outlined in the map below.

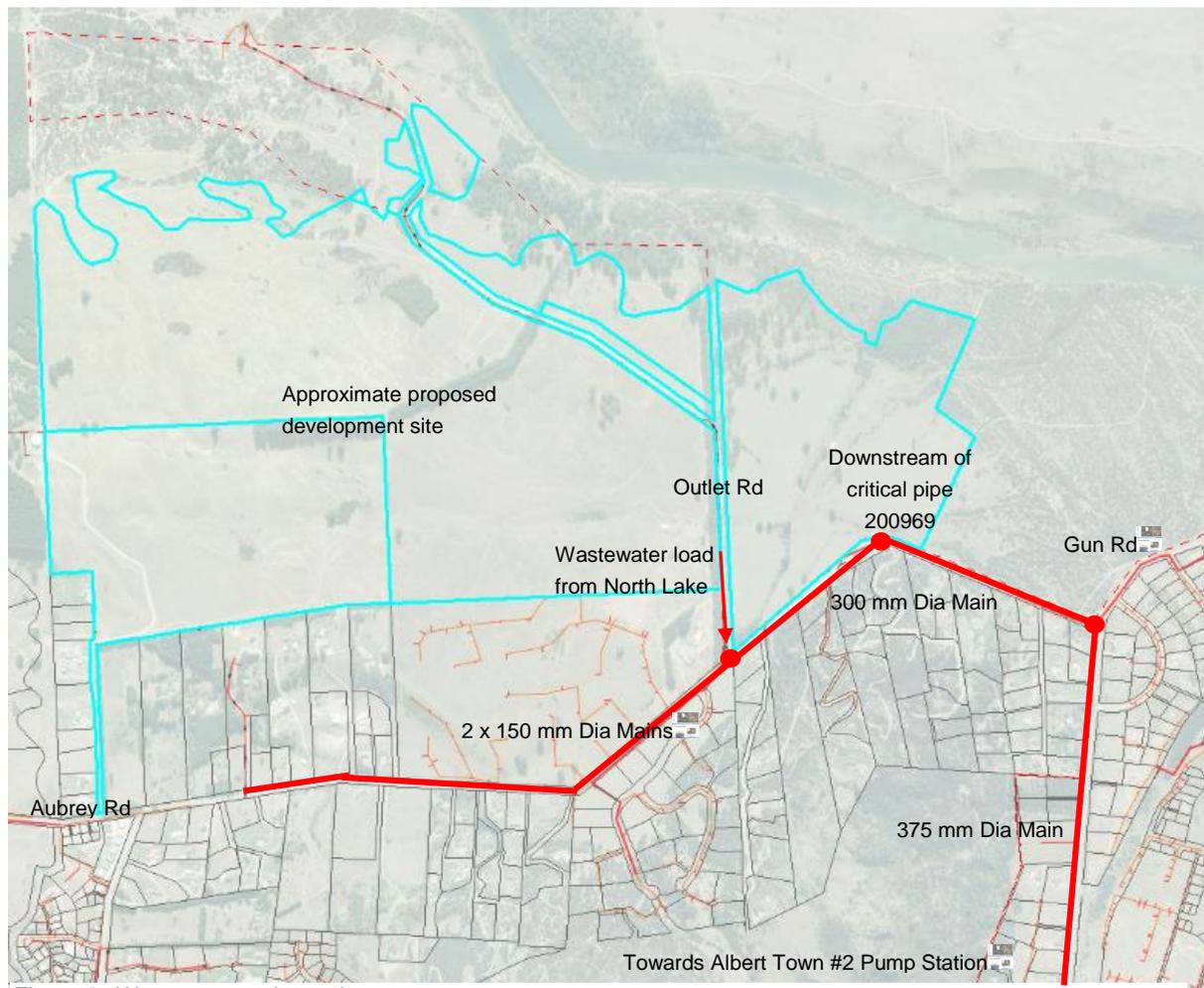


Figure 2- Wastewater schematic

Approach

It was decided a desktop study would sufficient to assess the capacity in the Aubrey Rd trunk main. The desktop assessment has been completed using two alternatives with different load factors to calculate the capacity within the trunk main. These two alternatives significantly change the outcome.

Alternative	Description	Load Type	People per unit	Load/Person / Day (l/d)	Dry diurnal peak	Infiltration factor
A	From: QLDC Land Development and Subdivision Code of Practise, June 2015.	Residential	3	250	2.5	2
B	Based on: Land Development and Subdivision Infrastructure, NZS4404:2010	Residential	2.4	220	2.5	2

Alternative B includes 2.4 people per unit which is based on the 2015 Wanaka population projections, usual resident population/occupied houses (NZS4404:2010 states 2.5-3.5 p/d) and 220 l/person/day from NZS4404:2010 (states 180-250 l/p/d).

Both of these inputs have been assessed because:

1. The QLDC Land Development and Subdivision Code of Practise, June 2015 is specifically for subdivisions within the district but also is a good current basis for the assessment of existing infrastructure.
2. Alternative B inputs were used in previous assessments and the people per unit is based on local conditions. And:
3. This is a trunk main which produces a more smoothed flow compared to mains within a subdivision. The amount of smoothing hasn't been quantified but is assumed to be equivalent to a slightly reduced load per person.

We have conducted this investigation based on the completed development and surrounding catchment potentially containing the following loads:

Load at Outlet Road	Total Units	PWWF (l/s), QLDC amendment	PWWF (l/s), NZS4404
Potential North Lake development (Special Zone)	1,434	62.2	48.2
Outlet Rd Pump Station, measured flow		4.4	4.4
Existing dwellings upstream of Outlet Rd	167	7.2	5.0
Maximum probable development upstream of Outlet Rd	83	3.6	2.3
Total	1,684	77.5	55.9

Additional load at critical pipe 200969	Total Units	PWWF (l/s), QLDC amendment	PWWF (l/s), NZS4404
Existing dwellings upstream of pipe 200969	22	1.0	0.7
Maximum probable development upstream of Gunn Rd	22	1.0	0.7
Total	44	2.0	1.4

Additional load at Gunn Rd	Total Units	PWWF (l/s), QLDC amendment	PWWF (l/s), NZS4404
Maximum probable development upstream of Gunn Rd	16	0.7	0.5
Peak flow from possible future Rata/Aubrey PS rising main		39	39
Total	16	39.7	39.5

The following assumptions were used:

- The loads for North Lake are based on the special zone (potential lots + 15%) provided by the developer. This hasn't included any specific loads from the swimming pool, and commercial activities, including a business park, child care, café etc. as shown on the site plan. This should be included in the calculations if the loads are assessed to be greater than the underlying residential load. This is especially important for the swimming pool which has the potential to dump large flows into the network.
- The dry diurnal peak and infiltration factor have been added together to calculate the peak wet weather flow.

- The maximum probable development is based on the District Plan zone, rural residential which identify a minimum lot size of 4,000m² along Aubrey Road.
- Existing dwellings are a count of existing properties that are within the trunk main catchment, they may not be connected to the network currently but they have the potential as new mains have been constructed to service them.
- The design of the internal reticulation has not been assessed. The total load for the North Lake development has been placed on the existing 300 mm diameter main on corner of Aubrey Rd and Outlet Rd. Additional loads from the existing catchment have been added at this point, the critical main and at the corner of Aubrey and Gunn Road.

Results

Two different results were produced,

1. Alternative A, QLDC Land Development and Subdivision Code of Practise, June 2015, results confirm there is **not** sufficient capacity in the downstream 300mm or 375 mm trunk main (approx. 2.7 km of main, and maximum 6 m cover).
2. Alternative B, using the historic inputs, results indicate that the connection of the proposed development and of the maximum probable development in the existing catchment will not cause any additional capacity constraints.

Detailed results are attached to this letter.

Discussion

As a result of these findings, it has been agreed with QLDC to undertake hydraulic modelling of the load assumptions to determine how these results compare to the completed desktop assessment.

The issue of which of the three results is acceptable to QLDC will need to be agreed.

Summary

In summary, two methods of assessing the capacity were completed and these had significantly different results. One indicating there was sufficient capacity and the method based of the current QLDC Land Development and Subdivision Code of Practise showing there was not sufficient capacity in the 300 mm and 375 mm diameter trunk mains.

Due to the potential changes in demand occurring in this area, and the resulting capacity upgrades that may be necessary it is recommended that the validity of this letter should be checked any time in the future it is used.

Yours sincerely,



Nichola Greaves
Infrastructure Advisor
Rationale Limited

Encl. Results - Aubrey Rd – Constructed Capacities, Alternative A.pdf
Results - Aubrey Rd – Constructed Capacities, Alternative B.pdf

1 February 2016

Rob Darby
Queenstown Lakes District Council
Private Bag 50072
Queenstown
9348

Dear Rob,

Re: Proposed Development – North Lake, Wanaka

As per your email of 6 January 2016, we have assessed the impact of the proposed wastewater loads on the QLDC network. More specifically, the capacity of the existing 300 mm and 375 mm diameter trunk mains from Outlet Road along Aubrey Road to Hawea - Albert Town #2 Pump Station, with the additional load of wastewater from the proposed North Lake development and with maximum probable development within the catchment.

Two desktop assessments were completed using alternative load assumptions. The first using the load assumptions of the recently updated subdivision code of practice (June 2015). The results of which indicated there was not sufficient capacity in the existing 300 mm or 375 mm diameter trunk mains. The second using the previously used load assumptions from the Land Development and Subdivision Infrastructure New Zealand Standard (2010) and lower unit occupancy rates which indicated there is sufficient capacity in the existing trunk mains. As a result of these findings, it has been agreed with QLDC to undertake hydraulic modelling to determine the capacity available. The details of the desktop assessment can be found in the letter dated 14/1/16.

Based on the model results, the proposed wastewater loads exceed the capacity of the 300mm main at the two manholes directly downstream of Outlet Road. The results indicate that there is insufficient capacity in approximately 1.1 km of the 300 mm diameter trunk main but the wastewater only spills at the areas of low ground level once the main has backed up. The model can be refined further to assess whether improving the accuracy will create more capacity and at what stage of the development the capacity in the 300 mm trunk main is exceeded.

This modelling analysis is based on the Wanaka dynamic wastewater model (2011), calibrated to flow data from December 2010 and January 2011. This model is now considered to require an update and a flow survey is currently underway to enable a recalibration of the model. The flow survey, model update and recalibration will significantly improve confidence in the model.

The development site and wastewater network is outlined in the map below.



Figure 1- Wastewater schematic

Modelled Scenario

We have conducted this investigation based on the completed development and surrounding catchment potentially containing the following loads. The tables below show the number of dwellings and additional rainfall catchment area that has been added to the model. Rainfall dependent inflow and infiltration parameters in line with the Wanaka average have been used.

Load at Outlet Road	Total Units	Rainfall Catchment Area (Ha)
Potential North Lake development (Special Zone)	1,434	140
Existing dwellings upstream of Outlet Rd	167	95
Maximum probable development upstream of Outlet Rd	83	n/a
Total	1,684	135

In addition, Outlet Rd Pump Station, measured flow, 4.4 l/s.

Additional load at critical pipe 200969	Total Units
Existing dwellings upstream of Gunn Rd	22
Maximum probable development upstream of Gunn Rd	22
Total	44

Additional load at Gunn Road	Total Units
Maximum probable development downstream of Gunn Rd	16
Total	16

The following assumptions were used:

- The loads for North Lake are based on the special zone (potential lots + 15%) provided by the developer. This hasn't included any specific loads from the swimming pool, and commercial activities, including a business park, child care, café etc. as shown on the site plan. This should be included in the calculations if the loads are assessed to be greater than the underlying residential load. This is especially important for the swimming pool which has the potential to dump large flows into the network.
- The maximum probable development is based on the District Plan zone, rural residential which identify a minimum lot size of 4,000m² along Aubrey Road. No allowance has been made for the potential zone changes identified in the Wanaka Structure Plan.
- Existing dwellings are a count of existing properties that are within the trunk main catchment, they may not be connected to the network currently but they have the potential as new mains have been constructed to service them.
- The design of the internal reticulation has not been assessed. The total load for the North Lake development has been placed on the existing 300 mm diameter main on the corner of Aubrey Rd and Outlet Rd. Additional loads from the existing catchment have been added upstream of this point, the critical main and the corner of Aubrey and Gunn Road as shown on the Figure 1.
- The additional 39 l/s peak flow from the possible future Rata Street/Aubrey Road pump station has not been included in the model. This is a significant additional load but is not yet included in the modelled network.
- Hawea – Albert Town #2 Pump Station has not been checked for capacity. Currently the start level is above the Aubrey Road trunk main invert level and wastewater backs up in the pipe before the pump runs. This may be acceptable currently, but adjustment is recommended in the future. It is understood there is provision for an additional pump at this pump station and currently the pumps are ramped back because the Project Pure screens can't accept additional flow. The pump station is modelled based on a single duty pump capacity of 215 l/s.
- The 375 mm trunk main is based on the as-built recently provided and has been added to the model.

The model has been run to the following standard:

- 2011 peak day population sanitary loadings and diurnal patterns.
- Residential load, 660 l/d/dwelling, approximate peaking factor of 2.7
- 20 year return, 12 Hr duration storm.

All relevant sections of the network have been checked for capacity using the following criteria:

- No overflows allowed at any network element.
- Theoretical capacity based on flow and pipe details.

Results

Modelling of the network from the proposed development through the downstream network to Albert Town - Hawea #2 Pump Station indicates that in areas the existing network does not have sufficient capacity to manage the addition of this development, based on the above assumptions.

The model results show:

- The two manholes on the 300 mm trunk main directly downstream of Outlet Road overflow.
- The wastewater backs up above the pipe soffit level in the manholes but does not overflow at ground level in 19 of the 34 manholes downstream of Outlet Road.
- Flow backs up but does not overflow from the 375 mm trunk main because of the operation of the Hawea – Albert Town #2 Pump Station.

The results indicate that there is insufficient capacity in the approximately 1.1 km of 300 mm diameter trunk main but the wastewater only spills at the areas of low ground level once the main has backed up.

The downstream portion of the 375 mm trunk main also has insufficient capacity because the existing pumps at Hawea - Albert Town #2 pump station can't keep up with the flow. There is capacity to add an additional pump to the pump station and increase the flow of the existing pumps.

Detailed results are attached to this letter.

Discussion

The total wastewater load from the development has been placed on the corner of Outlet Road and Aubrey Road because the development's internal reticulation has not been modelled. It is a possibility that if the internal reticulation was modelled there would be some smoothing of the flow within the development creating less of a peak load on the downstream network. It is unclear whether this would result in sufficient capacity in the downstream network.

The modelled operation of the Hawea – Albert Town #2 Pump Station creates a backup of flow in the 375 mm trunk main, affecting the capacity of the pipe. The pump station could be remodelled with additional pumps and optimised operation to investigate if this improves the 375 mm trunk main flow.

As detailed in the assumptions the additional 39 l/s peak flow from the possible future Rata Street / Aubrey Road pump station has not been included in the model. This is a significant additional load and could also be added to the model to ensure all potential future plans are included. As a basic check a peak flow of 39l/s was added with a diurnal pattern on the corner of Gunn Rd where this rising main is planned to discharge. The results indicate insufficient capacity with the majority of the manholes spilling.

As a comparison the model was also run with solely the network flow and no rainfall event. Results show sufficient capacity through the trunk main.

Summary

Based on the model, the proposed wastewater loads exceed the capacity of the 300mm main at the two manholes directly downstream of Outlet Road. The model can be refined further to assess whether improving the accuracy will create more capacity and at what stage of the development the capacity in the 300 mm trunk main is exceeded.

Options to provide sufficient capacity have not been investigated.

It should be noted that the wastewater model is an attempt to simulate a physical system using hydraulic equations and various assumptions, hence they bear some uncertainty. QLDC's GIS data and localised asbuilt data was used to develop the models and we can offer no guarantee on the accuracy of this information. The diurnal patterns, sanitary loads, diurnal patterns and infiltration and inflow rates are an approximation of the patterns in the townships that have been agreed with QLDC.

Due to the potential changes in demand occurring in this area, the validity of this letter should be checked any time in the future it is used.

Yours sincerely,



Nichola Greaves

Infrastructure Advisor
Rationale Limited

Encl.

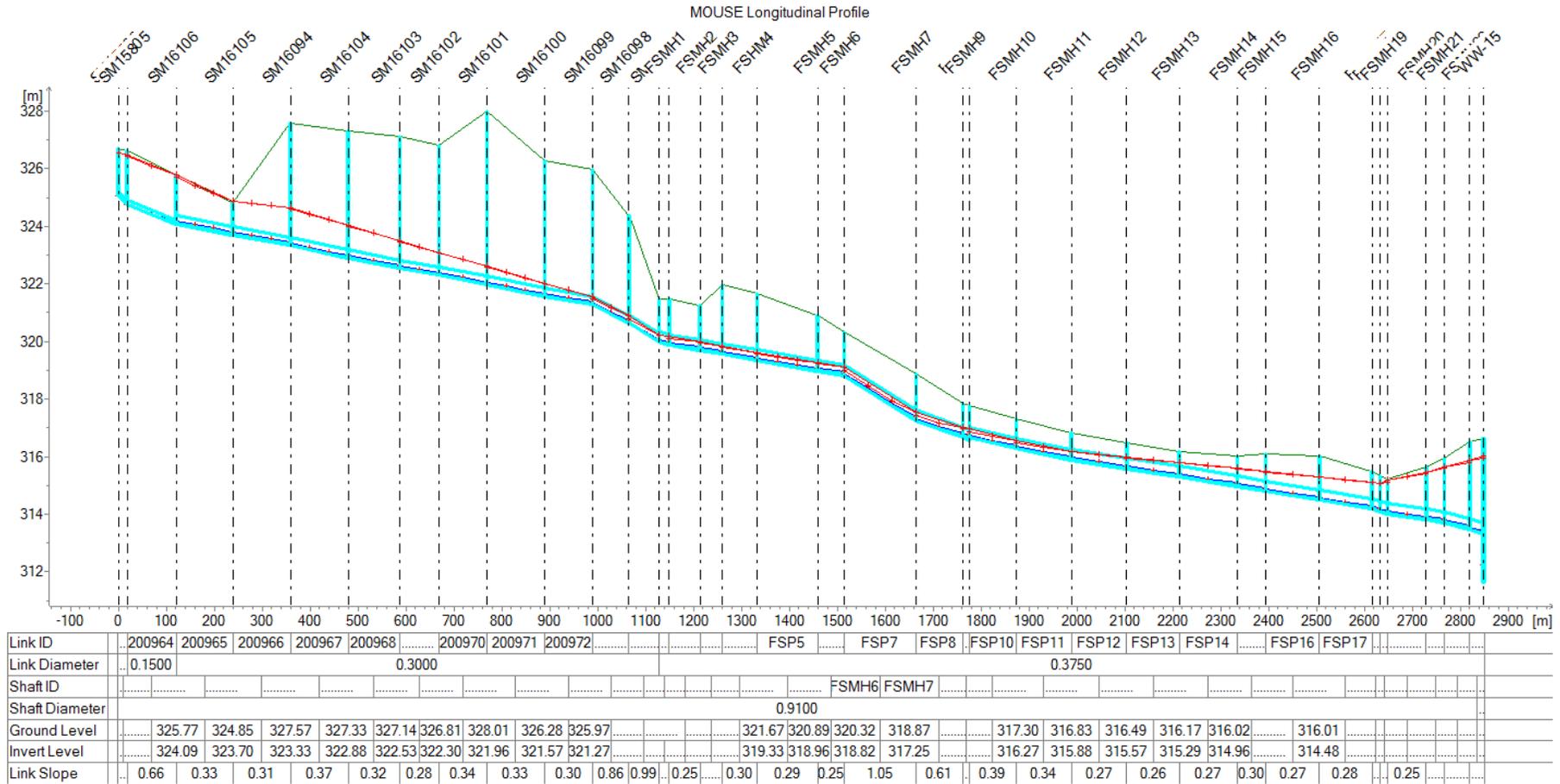
Results - Wanaka Wastewater Longitudinal Profile, North Lake and MPD. - Maximum Flow Depth

Results - Wanaka Wastewater Longitudinal Profile, North Lake, MPD and 39 l/s - Maximum Flow Depth

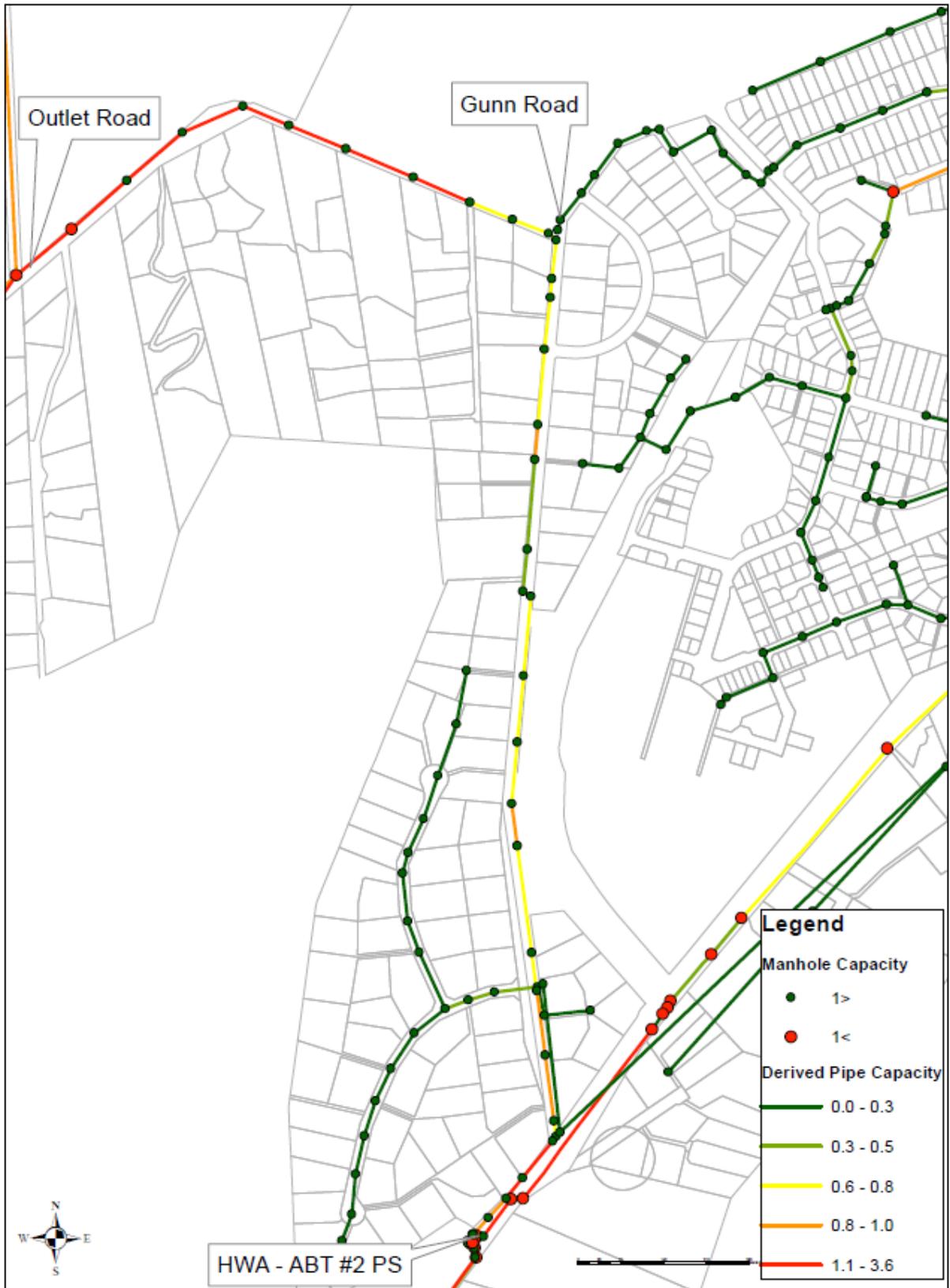
Results - Wanaka Wastewater Longitudinal Profile, North Lake, MPD - network only - Maximum Flow Depth

Results - Wanaka WW Capacity Results, Base.pdf

Wanaka Wastewater Longitudinal Profile, North Lake and MPD. - Maximum Flow Depth



1/01/2011



Wanaka Wastewater North Lake Development, Results

Alex Todd

From: Mark Baker <Mark.Baker@qldc.govt.nz>
Sent: Wednesday, 13 September 2017 12:06 p.m.
To: Mike Botting; Charlotte Broadbent
Cc: Alex Todd; Ulrich Glasner; Nichola Greaves - External
Subject: RE: Northlake Sub-Division - Water Supply

Mike,

Yes, we are happy with using the slightly reduced peaking factors as it is based on measured data and is being used to define a trunk main, although I noted that if we were to use the 6.6 peaking factor then you would not be able to service those stages without the connection through to the reservoir – so there is a relatively small amount of headroom in the LOS until the trunk main is completed.

I have also caught up with Sarah Johnstone (covering for Nichola) and Charlotte in the last couple of days regarding your further request for modelling of 19, 20 & 22 and have a couple of comments:

- I do not see that the modelling of further stages adds much value for North Lake, the current modelling indicates we are already eroding the LOS to some of the existing North Lake residents and while we do have a little headroom compared to our draft LOS document (not the COP) I would think that a further modelling report will state that we simply erode into that LOS further.
- Given that the current modelling results indicate that 682 lots can be serviced without the 250 mm trunk main being linked back to the reservoir. I would assume that demand of 682 is potentially 5 years or more before it is fully realised, and I would think Northlake would require the trunk main to be completed through to the reservoir before that due to other (non-capacity) triggers, e.g. resilience or operational requirements. So we perhaps we could come to an agreement that up to 682 lots sited below the 350 m contour with approved internal reticulation, built to the Subdivision Code of Practice, can be serviced without further modelling?

I am happy to discuss this further if required.

Cheers,
Mark

From: Mike Botting [mailto:Mike.Botting@ppgroup.co.nz]
Sent: Friday, 8 September 2017 9:47 AM
To: Charlotte Broadbent <charlotte.broadbent@wse.co.nz>
Cc: Mark Baker <Mark.Baker@qldc.govt.nz>; Alex Todd <Alex.Todd@ppgroup.co.nz>
Subject: RE: Northlake Sub-Division - Water Supply

I'm happy with your explanation. If Council accepts the factors used than that's fine. The code does say up to 6.6 so what you have used fits within the standard.

Mike Botting

Principal
Registered Professional Surveyor
M 027 505 0664
T 03 443 0110

PATERSONPITTSGROUP

From: Charlotte Broadbent [<mailto:charlotte.broadbent@wse.co.nz>]
Sent: Friday, 8 September 2017 9:00 a.m.
To: Mike Botting <Mike.Botting@ppgroup.co.nz>
Cc: 'Mark Baker' <Mark.Baker@qldc.govt.nz>
Subject: RE: Northlake Sub-Division - Water Supply

Hi Mike,

My focus is on clause 6.3.5.3 Peak flows. The peaking factors I have used is average to peak day of 2, peak hour 2.3... so actually 4.6.

The approach has been discussed with QDLC and is one agreed that I use when working for them to assess developments. The 2.3 is based on a standard profile and is slightly greater than the peak hour factor we have seen from logging, so considers actual data. Technically yes they could hold you to using 6.6 from design perspective.

Mark do you want me to re-run using 6.6? It will be enough of a difference to draw pressure down at Glenaray Crescent requiring the 250mm through from Beacon Point.

Regards,
Charlotte

From: Mike Botting [<mailto:Mike.Botting@ppgroup.co.nz>]
Sent: Thursday, September 7, 2017 5:23 PM
To: Charlotte Broadbent <charlotte.broadbent@wse.co.nz>
Subject: RE: Northlake Sub-Division - Water Supply

Hi Charlotte

Just one more query, this time about the peaking factor of 2.3 that you have used. In Council's LDSCOP it specifies that a peaking factor of 6.6 (rest of District) should be used. Why the large difference? I take it Council has approved the lower peaking factor?

Would be good to confirm the above as we are finalising an infrastructure report tomorrow.

Regards

Mike Botting

Principal

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Mike Botting
Sent: Wednesday, 6 September 2017 10:12 a.m.
To: 'Charlotte Broadbent' <charlotte.broadbent@wse.co.nz>
Subject: RE: Northlake Sub-Division - Water Supply

Hi Charlotte

I have discussed the report with Northlake. What we would like is to have the report amended to also include Stages 19, 20 and 22. Given that these sit within the lower pressure zone and are small stages adding only another 45 Lots (see attached plan) it makes sense to cover these off as well.

Therefore can you include the water nodes 58 and 59 please. Let me know what minor variation cost this involves.

Regards

Mike Botting

Principal

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Charlotte Broadbent [<mailto:charlotte.broadbent@wse.co.nz>]

Sent: Friday, 1 September 2017 9:38 a.m.

To: Mike Botting <Mike.Botting@ppgroup.co.nz>

Cc: 'Mark Baker' <Mark.Baker@qldc.govt.nz>

Subject: RE: Northlake Sub-Division - Water Supply

Hi Mike,

Based on the contours I have there is a high point between nodes 39 and 40, rises back up here above 350m, (352m) it's not really a major but prudent for me to comment. (i.e. if the dwelling proposed is situated on the site at 352m and is 2-3 stories high).

Pressure results attached. The elevations I used in the model are extrapolated from the contours I have.

Regards,
Charlotte

From: Mike Botting [<mailto:Mike.Botting@ppgroup.co.nz>]

Sent: Friday, September 1, 2017 8:59 AM

To: Charlotte Broadbent <charlotte.broadbent@wse.co.nz>

Subject: RE: Northlake Sub-Division - Water Supply

Hi Charlotte

Thanks for the report. Just one minor thing to amend. Note that I changed the layout for Stage 14 so that it was made smaller and is now all below the 350 contour. Therefore could you remove paragraph 2 from the section on Network Observations on page 4. You could still include consideration about the final configuration of the zone boundary between the two zones.

Also would it be possible to get the pressures included in the report for each node?

Regards

Mike Botting

Principal

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Charlotte Broadbent [<mailto:charlotte.broadbent@wse.co.nz>]

Sent: Thursday, 31 August 2017 2:51 p.m.

To: Mike Botting <Mike.Botting@ppgroup.co.nz>

Cc: 'Mark Baker' <Mark.Baker@qldc.govt.nz>

Subject: RE: Northlake Sub-Division - Water Supply

Hi Mike,

Report attached. I've addressed it to Mark Baker at this stage, let me know if you would like this changed, and feel free to call me tomorrow if you have any questions.

Regards,
Charlotte

From: Mike Botting [<mailto:Mike.Botting@ppgroup.co.nz>]

Sent: Friday, August 25, 2017 9:11 AM

To: 'Charlotte Broadbent' <charlotte.broadbent@wse.co.nz>

Subject: FW: Northlake Sub-Division - Water Supply

Hi Charlotte

Signed confirmation form attached, please proceed with the modelling.

I agree with you about the upper pressure zone that it needs further discussion with Council. At least we have a starting point for discussion and can then see what will be acceptable to Council and go from there. I trust the concept gives you a sufficient idea of what is proposed across the whole site.

Any questions give me a call or email.

Regards

Mike Bottinga

Principal

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Marc Bretherton [<mailto:marc.bretherton@wintonpartners.co.nz>]

Sent: Friday, 25 August 2017 8:57 a.m.

To: Mike Botting <Mike.Botting@ppgroup.co.nz>

Subject: RE: Northlake Sub-Division - Water Supply

Attached.

WINTON PARTNERS

Marc Bretherton

New Zealand

Level 1, Brownston House, Wanaka 9305
PO Box 818, Wanaka 9305
telephone **0276 969 550**

Level 2, 33 Shortland St Auckland 1010
PO Box 105526 Auckland 1143
facsimile +64 9 3777 011

Australia

Level 2, 95 Pitt St Sydney NSW 2000 Australia
telephone +61 2 8229 0400
facsimile +61 2 8229 0422

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From: Mike Botting [<mailto:Mike.Botting@ppgroup.co.nz>]
Sent: Thursday, 24 August 2017 11:26 a.m.
To: Marc Bretherton <marc.bretherton@wintonpartners.co.nz>
Subject: FW: Northlake Sub-Division - Water Supply

Hi Marc

This is ridiculous, but Watershed need you to sign an instruction confirmation form. Sorry but I understood that everything was authorised by the email the other day.

Can you sign the attached and return it to me ASAP.

Thanks

Mike Botting

Principal

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Charlotte Broadbent [<mailto:charlotte.broadbent@wse.co.nz>]
Sent: Thursday, 24 August 2017 11:22 a.m.
To: Mike Botting <Mike.Botting@ppgroup.co.nz>
Cc: 'Rob Darby' <Rob.Darby@qldc.govt.nz>; 'Nichola Greaves' <Nichola.Greaves@qldc.govt.nz>; 'Mark Baker' <Mark.Baker@qldc.govt.nz>
Subject: RE: Northlake Sub-Division - Water Supply

Hi Mike,

Please find attached a short form agreement to assess the proposed Northlake development Stages 1 – 14. While commissioned by Northlake Investments Limited, it should be noted that Watershed is undertaking this work on behalf of Queenstown Lake District Council (QLDC). Although this study is anticipated to result in a beneficial outcome for both parties, Watershed will highlight any potential conflict of interest that may arise during this project.

Please note I have only priced for items/scenarios 1 & 2 as discussed with you in our phone call. Item 3 falls into the wider planning of how this area will be supplied of which there are several options, and I will discuss this further with QDLC.

Regards,

Charlotte

From: Mike Botting [<mailto:Mike.Botting@ppgroup.co.nz>]
Sent: Tuesday, August 22, 2017 2:55 PM
To: 'Charlotte Broadbent' <charlotte.broadbent@wse.co.nz>
Cc: Rob Darby <Rob.Darby@qldc.govt.nz>; Nichola Greaves <Nichola.Greaves@qldc.govt.nz>
Subject: FW: Northlake Sub-Division - Water Supply

Hi Charlotte

Please proceed with the modelling. You can email me the invoice. For the billing name please use Northlake Investments Limited: Attention Marc Bretherton

Attached are some updated plans which show

1. The overall concept layout split into two pressure zones (Upper and Lower).
2. The lower pressure zone layout up to the end of Stage 14.

For the upper pressure zone we have hinged this off the central 250 diameter pipe with a booster near the reservoir at node 52 and a PRV at Node 33. We currently only have one connection between the two zones. We could add more PRVs at nodes 22 and 25 if required.

Also attached are two spreadsheets with updated water node heights and also a breakdown of the number of dwellings in each stage. Note that Stage 14 has been made smaller so as to be below 350 level and we have tweaked the other stages 15 to 22. Allenby was split into stages but we have now just shown this as one stage called Stage 21.

For Stage 18 which involves 8 larger semi-rural lots we could install individual tanks and boosters on these lots to save trying to boost the pressure up to supply to a height of 30m above 385m. Therefore just assume that these lots will have onsite firefighting tanks and their own individual boosters.

Also attached is a cad plan of the site so that you can see exactly what is proposed.

There are 3 scenarios that we need modelled.

1. Stages 1 – 14. Question we need answered is can these all be fed from the 3 connections from North Burn Road, Mt Linton Ave and Outlet Road
2. If Stages 1 – 14 need the 250 diameter line then model this without the booster or PRV. This could be an interim solution.
3. Overall network with the two pressure zones. Boosted supply for Stages 15 to 18 and Stage 21 (Allenby)

Any questions give me call on 027 505 0664 or email.

Regards

Mike Botting

Principal

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Marc Bretherton [<mailto:marc.bretherton@wintonpartners.co.nz>]
Sent: Monday, 21 August 2017 4:22 p.m.
To: Mike Botting <Mike.Botting@ppgroup.co.nz>
Subject: RE: Northlake Sub-Division - Water Supply

Yes, pls proceed.

WINTON PARTNERS

Marc Bretherton

New Zealand

*Level 1, Brownston House, Wanaka 9305
PO Box 818, Wanaka 9305
telephone 0276 969 550*

*Level 2, 33 Shortland St Auckland 1010
PO Box 105526 Auckland 1143
facsimile +64 9 3777 011*

Australia

*Level 2, 95 Pitt St Sydney NSW 2000 Australia
telephone +61 2 8229 0400
facsimile +61 2 8229 0422*

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From: Mike Botting [<mailto:Mike.Botting@ppgroup.co.nz>]
Sent: Monday, 21 August 2017 3:55 p.m.
To: Marc Bretherton <marc.bretherton@wintonpartners.co.nz>
Subject: FW: Northlake Sub-Division - Water Supply

Quote below, need your approval please to proceed.

Mike Botting

Principal
Registered Professional Surveyor
M 027 505 0664
T 03 443 0110

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From: Charlotte Broadbent [<mailto:charlotte.broadbent@wse.co.nz>]
Sent: Monday, 21 August 2017 3:51 p.m.
To: Mike Botting <Mike.Botting@ppgroup.co.nz>; 'Nichola Greaves' <Nichola.Greaves@qldc.govt.nz>
Cc: 'Mark Baker' <Mark.Baker@qldc.govt.nz>
Subject: RE: Northlake Sub-Division - Water Supply

Hi Mike / Nichola / Sarah,

Can a projected shapefile (or equivalent) of the proposed road layout be provided?

Northlake Stages 1-14 Development Query

Scenario 1 – without 250mm connection

- Create proposed network in model
- Demand calculations
- Assign demands

- Scenario set-up
- Assess hydraulics (pressures and pipe head loss)
- Assess fire flow

Scenario 2 – with 250mm connection

- Scenario set-up
- Assess hydraulics (pressures and pipe head loss)
- Assess fire flow

An initial look at the data indicates Stage 14 is at an elevation where it cannot be supplied directly from Beacon Point reservoir. This will be commented upon, but no options considered for servicing.

Scenario 1 \$990+GST
Scenario 2 \$450+GST
PM & Reporting \$990+GST

Total \$2430+GST

Regards,
Charlotte

From: Mike Botting [<mailto:Mike.Botting@ppgroup.co.nz>]
Sent: Friday, August 18, 2017 9:30 AM
To: Nichola Greaves <Nichola.Greaves@qldc.govt.nz>; 'Charlotte Broadbent' <charlotte.broadbent@wse.co.nz>
Cc: Mark Baker <Mark.Baker@qldc.govt.nz>; Marc Bretherton <marc.bretherton@wintonpartners.co.nz>
Subject: RE: Northlake Sub-Division - Water Supply

Thanks Nichola

I talked with Charlotte and she is away sick but will come back to me next week with cost and will be able to get onto it straight away later next week.

Regards

Mike Botting

Principal

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Nichola Greaves [<mailto:Nichola.Greaves@qldc.govt.nz>]
Sent: Wednesday, 16 August 2017 5:34 p.m.
To: 'Charlotte Broadbent' <charlotte.broadbent@wse.co.nz>
Cc: Mike Botting <Mike.Botting@ppgroup.co.nz>; Mark Baker <Mark.Baker@qldc.govt.nz>
Subject: FW: Northlake Sub-Division - Water Supply

Hi Charlotte

Could you please provide a quote for carrying out the modelling discussed below. To avoid hold ups from our end please liaise directly with Mike Botting but keep us in the loop.

Cheers

Sarah Johnstone

From: Mike Botting [<mailto:Mike.Botting@ppgroup.co.nz>]

Sent: Tuesday, 8 August 2017 2:55 PM

To: Nichola Greaves

Cc: Ulrich Glasner; Mark Baker; Simon Leary; Marc Bretherton (marc.bretherton@wintonpartners.co.nz); Alistair Snow; Rob Darby

Subject: RE: Northlake Sub-Division - Water Supply

Hi Nichola

Find attached plan showing proposed water reticulation up to Stage 14 at Northlake. This plan shows the majority of the lower site including the 250 diameter connection through to the water reservoir. Also attached is a summary of the heights at each water node.

Can you get two scenarios modelled please for the network shown.

Scenario 1 – reticulation without the 250mm connection to the reservoir. Under this scenario Stages 1 – 14 are fed for water from Northburn Road, Mt Linton Drive, & Outlet Road via 150 diameter and 250 diameter connections as shown.

Scenario 2 – reticulation with the 250mm connection to the reservoir. Connection as above but with the 250 diameter trunkmain connected through to the reservoir.

Can you confirm a timeframe for when the modelling report will be completed by.

Note that the position of the 250 trunkmain through the site connecting up to the reservoir is now proposed to be within Northlake land for the most of its route apart from where it needs to dog leg back into the upper part of Allenby and connect to the reservoir.

Give me a call on 027 505 0664 if you have any queries.

Regards

Mike Botting

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Mike Botting

Sent: Monday, 7 August 2017 8:49 p.m.

To: 'Rob Darby' <Rob.Darby@qldc.govt.nz>; Marc Bretherton (marc.bretherton@wintonpartners.co.nz) <marc.bretherton@wintonpartners.co.nz>; Alistair Snow <Alistair.Snow@qldc.govt.nz>

Cc: Nichola Greaves <Nichola.Greaves@qldc.govt.nz>; Ulrich Glasner <Ulrich.Glasner@qldc.govt.nz>; Mark Baker <Mark.Baker@qldc.govt.nz>; Simon Leary <Simon.Leary@qldc.govt.nz>

Subject: RE: Northlake Sub-Division - Water Supply

Hi Rob

No issue from me. Was good meeting and very comprehensive discussion. Your knowledge of our Wanaka infrastructure is great to call on.

Our next step will likely be to get some more modelling carried out to check about how far we can service the site from the 3 current connections. I will coordinate this modelling with Nichola this week.

Regards

Mike Botting

Registered Professional Surveyor

M 027 505 0664

T 03 443 0110

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From: Rob Darby [<mailto:Rob.Darby@qldc.govt.nz>]

Sent: Wednesday, 2 August 2017 5:19 p.m.

To: Marc Bretherton (marc.bretherton@wintonpartners.co.nz) <marc.bretherton@wintonpartners.co.nz>; Mike Botting <Mike.Botting@ppgroup.co.nz>; Alistair Snow <Alistair.Snow@qldc.govt.nz>

Cc: Nichola Greaves <Nichola.Greaves@qldc.govt.nz>; Ulrich Glasner <Ulrich.Glasner@qldc.govt.nz>; Mark Baker <Mark.Baker@qldc.govt.nz>; Simon Leary <Simon.Leary@qldc.govt.nz>

Subject: Northlake Sub-Division - Water Supply

Hi Marc and Mike,

Thank you for meeting earlier today.

As requested Alistair Snow's contact details below, and copied in.

Alistair.Snow@qldc.govt.nz

027 706 6903

Brief summary to today's meeting, please advise any corrections, additions, or contentious points that may require amendment:-

1. Northlake currently have engineering approval for water supply up to and including stage 9. However, they are progressing with future stages ASAP.
2. Northlake do not want to be held up in the delivery of their sub-division through all stages.
3. Northlake are waiting on modelling from Council for the wider Wanaka network and how this affects their development.
4. Northlake will likely require additional water supply connectivity / capacity for future stages below 350m RL.
5. Northlake will require water supply for the 350m RL to 370m RL by December 2018, staged or otherwise.
6. Infrastructure internal to the Northlake sub-division could potentially service the entire PC45 (including Allenby Farms land) area for water, being:-
 - a. The 'Northlake Falling Main' from the existing Beacon Point Reservoir to currently approved Stages via Northlake or Allenby Farms land. Requires connection to existing falling main out of the Beacon Point reservoir, this connection point is the subject of a separate Council project. A budget of \$220K is likely to be approved by Council on 16th August for works to provide this connection point. Delivery of this connection point to be coordinated with Northlake/Allenby Farms.
 - b. Interim boosting from the Northlake Falling Main into stages above the 350m RL level. The interim booster could move with development, or become a lift pump to a permanent rising/falling main and associated tank farm/ reservoir if/when required.
 - c. Permanent lift pump, rising/falling main and associated tank farm/reservoir established drawing from treated water from existing Beacon Point reservoir.
7. Council is considering a second Beacon Point reservoir and new treatment facility. The most favoured location for these new facilities is between the high spot on the existing rising main (410m RL) and the existing Beacon Point reservoir (388m RL).
8. Council's time frame for delivering this infrastructure is 3-5 years, i.e. 2021-2023.

9. The budgets for these proposed Council projects are being formulated but have yet to be approved in the LTP.
10. Northlake is open to discussion on the siting of Council's proposed second Beacon Point reservoir and treatment facility within Northlake land, most likely at the highest point 410m RL, but could be close to the existing reservoir and within Northlake land.
11. Heavy vehicle access to the 410m RL site may require upgrades and extensions to the Northlake roading network.
12. The other most likely location option is beside the existing reservoir. Allenby Farms own the land to the east of the existing reservoir and John May the land to west. Council will pursue separate discussions with these land owners.
13. Should the reservoir and treatment plant option at 410m RL come to fruition, it should be able to service the entire PC45 area between 350m RL and 370m RL by gravity, i.e. same as the tank farm/reservoir contemplated in 2 (c) above. In this case presumably:-
 - a. The existing reservoir would be filled via a LCV.
 - b. The 'Northlake Falling Main' could be re-connected to the upper reservoir immediately before the LCV and supply the PC45 area between 350m RL and 370m RL by gravity.
 - c. A PRV would be require on the 'Northlake Falling Main' at 350m RL, and at all other interconnecting pipe work between the two pressure zones.
 - d. Alternatively, the 'Northlake Falling Main' remains connected to the outlet of the existing reservoir and the upper pressure zone is serviced from above the LCV with separate pipe work.
14. Should the reservoir and treatment plant beside the existing reservoir come to fruition, the PC45 area will require a permanent lift pump, rising/falling main and associated tank farm/reservoir, as described in 2 (c) above.

Please advise any corrections, additions, or contentious points that may require amendment?

Regards,

Rob Darby | Project Manager | Infrastructure
Queenstown Lakes District Council
DD: +64 3 450 1725 | P: +64 3 443 0024 | M: +64 27 220 1185
E: rob.darby@qldc.govt.nz



NEW ZEALAND FIRE SERVICE-SOUTHERN REGION**HYDRANT & MAINS TESTING DATA SHEET**

Flow Gauge Readings to be between 25 & 100 kPa
Hydrants used for pressure readings included as 'Inspect and flush'

**STATION
No****3785****Wanaka
4 July 2017**

Street No	Location of Hydrant	Date	S.P kPa	R.P kPa	Ring Size	Press	Flow	Main Capacity
	Northlake Subdivision							
	Lot 69 DP510104 Mt Linton Ave Hydrant ID: WH89944		550	425	D4	50	23.9	88.56
	Lot 6 DP510104 Glendene Crescent Hydrant ID: No ID (update GIS)		525	425	D5	50	39.8	91.5
	Lot 1000 DP510104 Glendene Crescent Hydrant ID: WH89942		525	425	D5	50	39.8	91.5
	Lot 17 DP510104 Glendene Crescent Hydrant ID: WH89945		525	450	D5	50	39.8	103.5
	Lot 74 DP510104 Mt Linton Ave Hydrant ID: WH89943		525	450	D5	50	39.8	103.5
	15 Outlet Rd Hydrant ID: WH89947		500	500	D5	60	43.5	>300

Defects: