Appendix 'I'

Infrastructure Assessment

PATERSONPITTSGROUP
Surveying • Planning • Engineering

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

MOLYNEUX LIFESTYLE VILLAGE LTD

REQUEST FOR A CHANGE TO THE OPERATIVE CENTRAL OTAGO DISTRICT PLAN INFRASTRUCTURE REPORT

PROJECT:	Dunstan Road, Alexandra, Request for a Change to the Operative Central Otago District Plan
PRINCIPAL:	Molyneux Lifestyle Village Ltd
OUR REF:	A4814
DATE:	February 2021

DUNEDIN: P.O. Box 5933, Dunedin 9058. **T** 03 477 3245
CHRISTCHURCH: P.O. Box 160094, Christchurch 8441. **T** 03 928 1533
ALEXANDRA: P.O. Box 103, Alexandra 9340. **T** 03 448 8775
CROMWELL: P.O. Box 84, Cromwell 9342. **T** 03 445 1826
QUEENSTOWN: P.O. Box 2645, Queenstown 9349. **T** 03 441 4715
WANAKA: P.O. Box 283, Wanaka 9305. **T** 03 443 0110

PATERSONPITTSGROUP

REVISION / APPROVAL PANEL

Rev:	Date:	Prepared By:	Reviewed By:	Comments:
0	1 Feb 2020	MG	PLD	Initial Draft
1	27.Feb 2020			Final

Prepared by:
Paterson Pitts Limited Partnership
(Alexandra Office)
8 Skird Street
P O Box 103
Alexandra 9340

Telephone: +64 3 448 8775
Email: peter.dymock@pgroup.co.nz
Web: www.ppgroup.co.nz

Job No:	A4814
Date	27 February 2021
Report Prepared For	Molyneux Lifestyle Village Ltd

Table of Contents

1.0 Scope

Paterson Pitts Limited Partnership (PPLP) has been engaged by Molyneux Lifestyle Village Ltd to provide an infrastructure report to support a private plan change request that seeks to re-zone 16ha of land at Dunstan Road, Alexandra from Rural Residential Resource Area to a "large lot" Residential Resource Area.

A total of approximately 60 dwelling units is planned, plus an existing winery is to be retained.

This report covers the availability of the following infrastructure elements.

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

2.0 Executive Summary

2.1 Stormwater

The site is underlain by a considerable depth of glacial out wash gravels, with depths to groundwater varying from 10-15 metres below ground level. Soakage tests have shown these gravels to be highly permeable. No issues are anticipated with the discharge of stormwater from roading, hand stand and roof-run off direct to ground via suitably designed soak pits, as is the norm for all land development within the Clyde – Alexandra area.

2.2 Wastewater

Computer modelling of the Alexandra wastewater reticulation by Mott MacDonald NZ Ltd shows that the site can be adequately serviced from the existing town reticulation. Relocation of the winery waste disposal field will require a discharge resource consent from the Otago Regional Council.

2.3 Water Supply

Computer modelling of the Alexandra water reticulation by Mott MacDonald NZ Ltd shows that the site can be adequately serviced from the existing town reticulation

2.4 Network Utility Services

Chorus New Zealand Ltd have confirmed that a suitable telecommunications (fibre) supply can be made available to the proposed development of the site.

Aurora Energy Ltd have advised that a suitable power supply can be made available to serve the proposed development of the site.

2.5 Road Construction

All roads will be constructed on sand and gravels. Bearing capacity tests on likely road subgrades were within the limits for an acceptable pavement design. No issues are expected with designing and constructing road pavements in compliance with the procedures of "Austroads" and the subdivisional pavement design standards of the Central Otago District Council. Road cross-section designs and geometry are anticipated to be in accordance with "Austroads" and NZS 4404:2010.

3.0 Stormwater

There is no reticulated stormwater system in the area.

Analysis of drill hole logs in the locality show that the site is underlain by a considerable depth of glacial outwash sand and gravel with depth to groundwater between 10-15 metres below the ground surface. A grid of six test pits on the site were done by Paterson Pitts which show near surface topology to be 0.2m of topsoil over outwash sands and gravel, down to the 2.5m depth of all test pits.

Test pit logs are attached in **Appendix (A).**

Soakage tests were carried out on TP's 1, 4 & 5. Infiltration rates of 3000mm/hr (1.37 litres/sec/m^2), 2640mm/hr (1.32 litres/sec/m^2),) & 2520m/hr (1.26 litres/sec/m^2) respectively were recorded. This equates to an average soakage rate of a "Cauldwell" type soak pit of 19 litres/sec.

The NIWA HIRDS program was used to calculate a 2% Annual Exceeding Probability (AEP) short duration rainfall event of 58mm/hr using a 2 deg temperature risk factor to allow for climate change. This means that every 150m of a 10m wide road carriageway will be able to be drained by a single "Caudwell" type soak pit.

This is a very conservative assessment as Council's Engineering Standards require a pair of sumps to drain each 90m length of road and the road carriageway is likely to be 8.5m wide. Soakage tests, infiltration calculations and rainfall intensity calculations are attached in **Appendix (B)**

Direct discharge to ground for stormwater from roading, impermeable surfaces and roof run-off will therefore be possible. The standard roading solution acceptable to Council is a "Cauldwell type" soak pit, one per sump outlet. This method of stormwater disposal is universally used for land development over glacial outwash gravels in Cromwell, Alexandra and Clyde. See Fig 1.

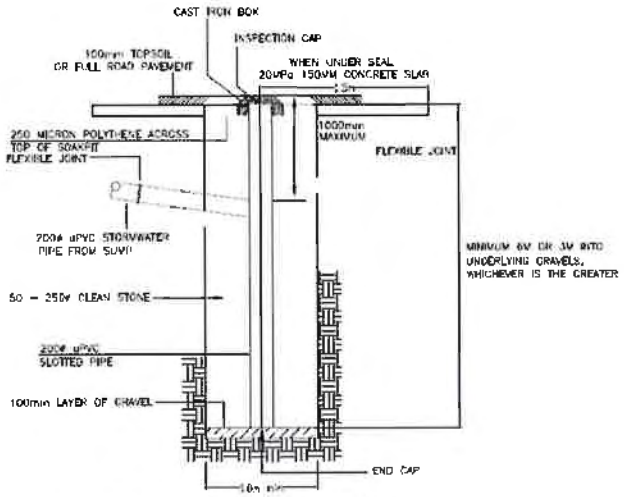


Fig 1

In order to comply with the Regional Water Plan rules, a silt and debris trap is required before discharge of stormwater to a soak pit. This will be provided by a "inverted syphon" type mud tank. See Fig 2.

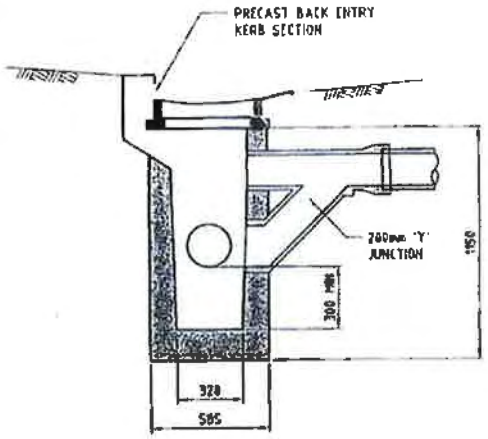


Fig 2

Where road swales are used, these provide a measure of pre-treatment of stormwater before discharge into mud tanks. There is a depth of at least 10m of gravel and sand below each soak pit, which will further filter stormwater before it is eventually discharged to groundwater. The inverted siphon mud tank/Caudwell soak pit system effectively provides for 3 stage treatment of stormwater. The mud tank (which is periodically sucked out by Council) removes silt, trash and gross pollutants, while the Caudwell soak pit (also periodically sucked out by Council) provides secondary treatment by removing finer silt and debris, with the 10m of sand and gravel below the soak pit providing tertiary filtration

For roof-run off, Council has a "rule of thumb" that 1m3 of soak pit is required for every 50m2 of roof area draining into the soak pit.

The site is flat. This means there will be a lack of secondary flow paths. From a stormwater/road design aspect this means that most roads will need to be cut into the surrounding terrain by a least 150-300 mm in order to provide longitudinal road drainage and for dwellings to be able to comply with Building Code requirements (E1/AS1) for minimum floor levels above the road crown. See Fig 3

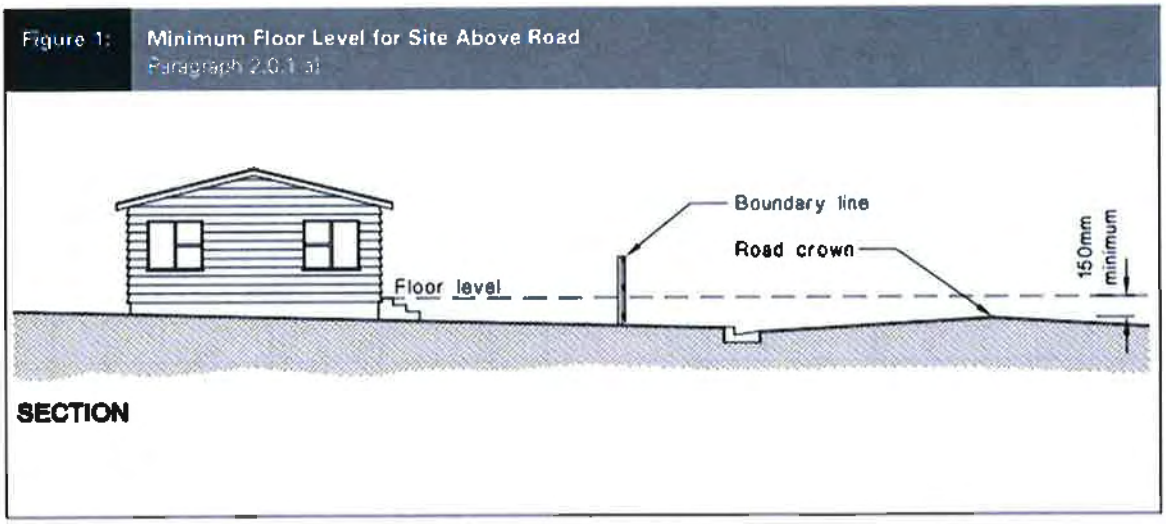


Figure 3

Essentially the roads act as temporary overflow ponding areas in the event of exceptional rain events and/or occasional blockage of mud tanks and soak pits.

Given the very large lot sizes (in excess of 2000m^2), site coverage is expected to be only 20%, at a maximum. No difficulty is therefore anticipated with on-site disposal of stormwater either direct to ground by soak pit or by storage and attenuation and application as garden and lawn irrigation.

4.0 Wastewater

A report by Mott MacDonald has been commissioned by the Central Otago District Council to assess this proposed development. The report is attached at **Appendix 'C'**.

A connection to the new trunk main between Clyde and Alexandra constructed along Dunstan Road/Central Otago Rail Trail corridor is not possible.

The option of connecting the development to the existing Alexandra Wastewater reticulation at a manhole at the end of Henderson Drive (adjacent to 36 Henderson Drive) will not have an adverse effect on the existing system.

The report also modelled a scenario whereby the whole of Dunstan Road from the Alexandra Town Boundary to Waldron Road was rezoned to provide for a maximum of 300 lots. This resulted in a pipe surcharge well down stream of Henderson Drive (a 300mm trunk main at 1 Dunorling Street).

The development will require the relocation of the existing winery waste disposal field, currently located adjacent to Dunstan Road, to within an allotment set aside for the winery which it is understood will continue to process grapes sourced from off-site. This will require a discharge consent from the Otago Regional Council.

5.0 Water Supply

5.1 Irrigation

From the Otago Regional Council's "grow Otago" data base:

- "Dry summer rainfall" is 61-80mm for the Alexandra – Clyde Basin
- "Median potential evapotranspiration" (Jan-Feb) is 206-210mm for the Basin

Irrigation will therefore be essential to establish and maintain grass growth and landscaping within the development. This is particularly so given the very low Plant Available Water (PAW) of the site, due to its light sandy/gravelly soils.

Given the very large lot sizes and the site's proximity to the existing public open space and recreation facilities at Molyneux Park and the Alexandra Golf Course, it is not anticipated that there will be any requirement for public open space to be provided within the development.

There is an on-site bore located within the site, which Molyneux Lifestyle Village Ltd has a water right from the Otago Regional Council for 80m3/day. See RM 2001.148 at **Appendix 'G'**.

Peak irrigation for lawn and garden and domestic water requirements within private allotments of 2000m2 will typically be up to 5,000L/day with a metered supply. The Mott MacDonald modelling scenario allowed 1500L/day/lot with a peak hourly demand of 5.

The "shortfall" in peak irrigation demand is therefore 5000L/lot/day x 60 = 21m^3/day. It is intended that a separate irrigation supply be made available to each lot from the bore. The bore will also be used to supply the winery with processing water.

The bore cannot be used for a domestic water supply because of the risk of contamination from the relocated winery waste water disposal field nearby. There is also no suitable location for a reservoir to furnish a gravity supply at sufficient pressure and a firefighting reserve.

5.2 Domestic and Firefighting

The Mott MacDonald report finds that a DN315 pipeline connection to the existing Council main in Dunstan Road, near 99 Russel Street, will supply the development with a FW2 (standard household with no sprinkler system) standard to SNZ-PAS 4509 with no detrimental effect on the existing Alexandra town reticulation. Connection to the new trunk main between Clyde and Alexandra along Dunstan Road/ Rail Trail corridor is not possible. A DN 315mm pipeline would also service a development of 300 lots along Dunstan Road to a FW2 standard with no detrimental effects on the existing town reticulation.

6.0 Network Utility Services

6.1 Telecommunications

Chorus New Zealand Ltd have confirmed that a suitable Air Blown Fibre (ABF) reticulation can be supplied to the proposed development. See **Appendix 'D'.**

Individual home owners will also have the alternative option of the cellular network and several wi-fi providers for their telecommunications and computer media service

6.2 Electricity

Aurora Energy Ltd have confirmed that a suitable power supply can be made3 available to service development of the site See **Appendix 'E'.** To preserve the semi-rural nature of the development, and the night sky, it is not envisaged that street lighting will be provided.

7.0 Road Construction

No difficulty is expected in designing and constructing suitable road pavements within the site, in compliance with "Austroads" and the subdivision engineering design standards of the Central Otago District Council.

All roads will be formed on silty sand and gravel. Laboratory Soaked California Bearing Ratio (CBR) tests were taken at the likely road subgrade at all test pits. See **Appendix 'F'**. Soaked CBR's varied from 6%-18%, all within the limits for an acceptable pavement design in terms of the "Austroads" standard.

Council's current subdivisional roading engineering design standard is NZ 4404:2004 and its July 2008 amendments thereto. However it is proposed that road designs on any subsequent subdivision and development of the site be in accordance with the updated version of this standard, being NZS 4404:2010. This updated version of the standard provides for a more innovative and flexible approach to road layout designs, in accordance with the contemporary urban design concepts proposed for this development. To quote from the forward to NZS 4404:2010:

"Aims to encourage good urban design and remove road blocks to liveability and economic development in communities.
Road design needs to allow 'context' or 'place' to be given significant emphasis, and to require roads to achieve safe (slower) operating speeds;
Innovative subdivision has been discouraged to some extent under the 2004 version of NZS 4404.
The review committee therefore challenged itself to produce a new Standard that:
Encourages sustainable and modern design;
Provides some certainty for designers and TAs; and
Prevents the outcomes that can arise when the sole focus is cost minimisation, and adherence to minimum standards."

and from the outcome statement

"This Standard provides local authorities, developers, and their professional advisors with standards for design and construction of land development and subdivision infrastructure. NZS 4404:2010 encourages sustainable development and modern design that emphasises liveability and environmental quality. It will also provide as much consistency as possible on land development and subdivision infrastructure while still allowing flexibility for local variations to suit local circumstances."

This is a matter that is best addressed at the subsequent resource consent and detailed engineering design stages, rather than at this initial plan change stage. Given that the large lot size and semi-rural nature of the development, it is anticipated that grassed swales will be used instead of kerb and channel, in compliance with low impact urban and design and development (LIUDD) principals.

Swales provide a "softer" more rural edge to road pavements than kerbs and channel and a measure of pre-treatment of stormwater run-off from road pavements.

8.0 Conclusion

Suitable provision can be made for roading, stormwater, wastewater, irrigation and domestic water supply and network utility services to the proposed development.

Myles Garmonsway
Principal, B.Sc, Dip Mgt, R.P. Surv, MNZIS, CSNZ
Paterson Pitts Limited Partnership (Cromwell)

APPENDIX A

Test Pit Logs

TEST PIT 1

Ground	0.00
Organics / Topsoil	-0.10
Clean sands, soft, medium grained	-1.30
Sandy gravels.	-0.60
Clean sands, Medium to coarse	-1.00
Semi-compact, sandy gravels. <40mm	-2.20

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
745361	392750	4985480	1315439	TP 1

TEST PIT 2

Ground	0.00	
		Organics / topsoil
	-0.20	
		Gravels
	-0.30	
		Firm sandy silts
	-0.90	
		Coarse, clean sands
	-1.40	
		Sandy gravels. Compact <40mm
	-2.50	

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
745511	392918	4985637	1315600	TP 2

TEST PIT 3

Ground	0.00	
		Organics/ topsoil
	-0.10	
		Sandy gravels
	-0.30	
		Clean, fine to medium sands some roots <20mm dia
	-0.90	
		Loose, sandy gravels <30mm
	-1.50	
		Coarse gravels compact <75mm
	-2.00	

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
745267	392845	4985390	1315538	TP 3

TEST PIT 4

Ground 0.00

Organics/ topsoil

-0.10

clean, soft, sands. meduim grained

-0.70

Coarse sands in fine gravels.

Occasional <75mm stones

-2.20

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
745354	392949	4985482	1315638	TP 4

TEST PIT 5

Ground	0.00	
		Organics / topsoil
	-0.15	
		Silty gravels
	-0.40	
		clean sands
	-0.60	
		Sandy gravels
	-0.90	
		Clean sands
	-1.20	
		Sandy gravels
	-1.40	
		Medium gravels <50mm compact
	-2.40	

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
745106	392970	4985235	1315670	TP 5

TEST PIT 6

Ground 0.00

organics / topsoil
-0.10

Silty sands
-0.40

silty gravels
-0.50

Clean sands medium to coarse
-1.00

Sandy gravels
< 30mm
compact
Poor cohesion
-2.30

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
745280	393158	4985416	1315850	TP 6

APPENDIX B

Soakage Tests & Infiltration Calculations

Pit Dimensions			Area		Test Pit	1			A4814							
Length	2.1		2.1						Dunstan Rd							
Width	1															
Time (s)	Depth	dVolume	dTime (s)		Soakage (l/s)		l/s/m²									
0	0	-0.1155	60		-1.9		-0.9									
60	0.055	-0.0945	60		-1.6		-0.8									
120	0.1	-0.105	60		-1.8		-0.8									
180	0.15															
			0							Soaking	Infiltration Rate		3000	mm/hr		
				Average	-1.75		-0.83									
		0.315	180		1.8		0.8	For time period		Total Soakage Rate		(overall)	1.37	l/s/m²		
Note:	5000	l poured in over 21 minutes to get to water depth of				0.64	m			Filling	Infiltration Rate		4974	mm/hr		
	Soakage over 21 min =		3656	litres												
		=	2.901587	(l/s)						Weighted	Soakage Rate		1.03	mm/hr		
		=	1.38	l/s/m²												
													total volume			
	1 in 20 (RCP4.5)									area m2	1548		12.098	m3		
	9.77	mm in 10 minutes		58.6 mm/hr		Q=2.78CiA				runoff	0.8		rate per second			
						A = Q/2.78iC		0.154779	ha	depth	9.77		20.2	l/s		
								1548	m²	seconds	600					
												runoff per m2 per s		0.013	l/s/m2	
Soakpit Base =			0.785398	m2						Soakage Capacity		1549	m2			
Effective soakage @ 2m deep			19.63495	m2	45 deg angle influence					metres of road		154.9	310	two sided		
			20.17868		Soakage Rate	l/s				(10m carriageway / footpath)						

Pit Dimensions			Area		Test Pit	4			A4814								
Length	2.3		2.3						Dunstan Rd								
Width	1																
Time (s)	Depth	dVolume	dTime (s)		Soakage (l/s)		l/s/m²										
0	0	-0.0575	60		-1.0		-0.4										
60	0.025	-0.1265	60		-2.1		-0.9										
120	0.08	-0.1035	60		-1.7		-0.8										
180	0.125	-0.115	60		-1.9		-0.8										
240	0.175	-0.1035	60		-1.7		-0.8				Soaking	Infiltration Rate		2640	mm/hr		
300	0.22			Average	-1.69		-0.73										
		0.506	300		1.7		0.7	For time period			Total Soakage Rate		(overall)	1.32	l/s/m²		
Note:	5000	l poured in over 20 minutes to get to water depth of				0.42	m				Filling	Infiltration Rate		5262	mm/hr		
	Soakage over 20 min =		4034	litres													
		=	3.361667	(l/s)							Weighted	Soakage Rate		0.99	mm/hr		
		=	1.46	l/s/m²													
														total volume			
	1 in 20 (RCP4.5)										area m2	1486		11.618	m3		
	9.77	mm in 10 minutes		58.6 mm/hr		Q=2.78CiA					runoff	0.8		rate per second			
						A = Q/2.78iC		0.148644	ha		depth	9.77		19.4	l/s		
								1486	m²		seconds	600					
													runoff per m² per s		0.013	l/s/m²	
Soakpit Base =			0.785398	m2							Soakage Capacity		1488	m2			
Effective soakage @ 2m deep			19.63495	m2	45 deg angle influence						metres of road		148.8	298	two sided		
			19.37885		Soakage Rate	l/s					(10m carriageway / footpath)						

Pit Dimensions			Area		Test Pit	5			A4814								
Length	2.3		2.3						Dunstan Rd								
Width	1																
Time (s)	Depth	dVolume	dTime (s)		Soakage (l/s)		l/s/m²										
0	0	-0.1265	60		-2.1		-0.9										
60	0.055	-0.115	60		-1.9		-0.8										
120	0.105	-0.0805	60		-1.3		-0.6										
180	0.14	-0.0805	60		-1.3		-0.6										
240	0.175	-0.0805	60		-1.3		-0.6				Soaking	Infiltration Rate			2520	mm/hr	
300	0.21			Average	-1.61		-0.70										
		0.483	300		1.6		0.7	For time period			Total Soakage Rate		(overall)		1.26	l/s/m²	
Note:	5000	l poured in over 21 minutes to get to water depth of				0.5	m				Filling	Infiltration Rate			4783	mm/hr	
	Soakage over 21 min =		3850	litres													
		=	3.055556	(l/s)							Weighted	Soakage Rate			1.00	mm/hr	
		=	1.33	l/s/m²													
														total volume			
	1 in 20 (RCP4.5)										area m2	1513			11.828	m3	
	9.77	mm in 10 minutes		58.6 mm/hr		Q=2.78CiA					runoff	0.8		rate per second			
						A = Q/2.78iC		0.151324	ha		depth	9.77			19.7	l/s	
								1513	m²		seconds	600					
													runoff per m2 per s			0.013	l/s/m2
Soakpit Base =			0.785398	m2							Soakage Capacity		1514	m2			
Effective soakage @ 2m deep			19.63495	m2	45 deg angle influence						metres of road		151.4		303	two sided	
			19.72829		Soakage Rate	l/s					(10m carriageway / footpath)						

APPENDIX C

Water & Wastewater Impact Assessment

MOTT MACDONALD

Technical Memo
Central Otago District Council

Project:	Proposed development query: Molyneux Lifestyle Village in Alexandra		
Our reference:	385321	**Revision:**	B - draft
Prepared by:	Hannah Law & Giulio Pozzuto	**Date:**	19 November 2020
Approved by:	Julie Plessis	**Checked by:**	Tom Lecomte
Subject:	269 Dunstan Road: water supply and wastewater infrastructure assessment		

In October 2020, Mott MacDonald was commissioned by Central Otago District Council (CODC) to assess the system performance of the water supply (WS) and wastewater (WW) networks; specifically, at the location of the proposed Molyneux Lifestyle Village (MLV), in Alexandra. The development consists of a total of 60 residential units, which has been modelled using the Lake Dunstan (Alexandra and Clyde) models.

1 Background

1.1 Background and Disclaimer

The Alexandra WS model was built by Rationale in 2014 and reviewed by Mott MacDonald in 2017. The WS Alexandra model was merged with the Clyde model and renamed Lake Dunstan WS model. Mott MacDonald carried out the model update using the latest GIS data and recalibrated the model in 2019.

The Alexandra WW model was built by Rationale in 2015 and reviewed by Mott MacDonald in 2017. Some critical issues were highlighted, and a model update was carried out by Mott MacDonald in 2018. However, the Alexandra WW model has not been recalibrated.

The information and recommendations presented within this assessment are dependent upon the accuracy and reliability of the existing hydraulic models and the data available to Mott MacDonald at the time of the assessment. This technical note has been prepared to assess the impact of the proposed development WS demands and WW discharge on the existing Alexandra WS and WW networks.

Mott MacDonald has followed the accepted procedure in providing the services but given the residual risk associated with any prediction, Mott MacDonald takes no liability for, and gives no warranty against, the consequences of wastewater overflows in relation to the performance of the service and damage to any property (client's or third party). Any third-party developing detailed design should not rely on assumptions made in this report but should satisfy themselves in that regard.

1.2 Development Location

The document summarises the results of the assessment undertaken for the proposed MLV development at 269 Dunstan Road, which is situated immediately northbound of the Alexandra township. The development will be serviced via the Alexandra WS and WW network schemes, which can both be seen in Figure 1-1 and Figure 1-2, respectively.

Figure 1-1: Proposed development and the Alexandra WS network

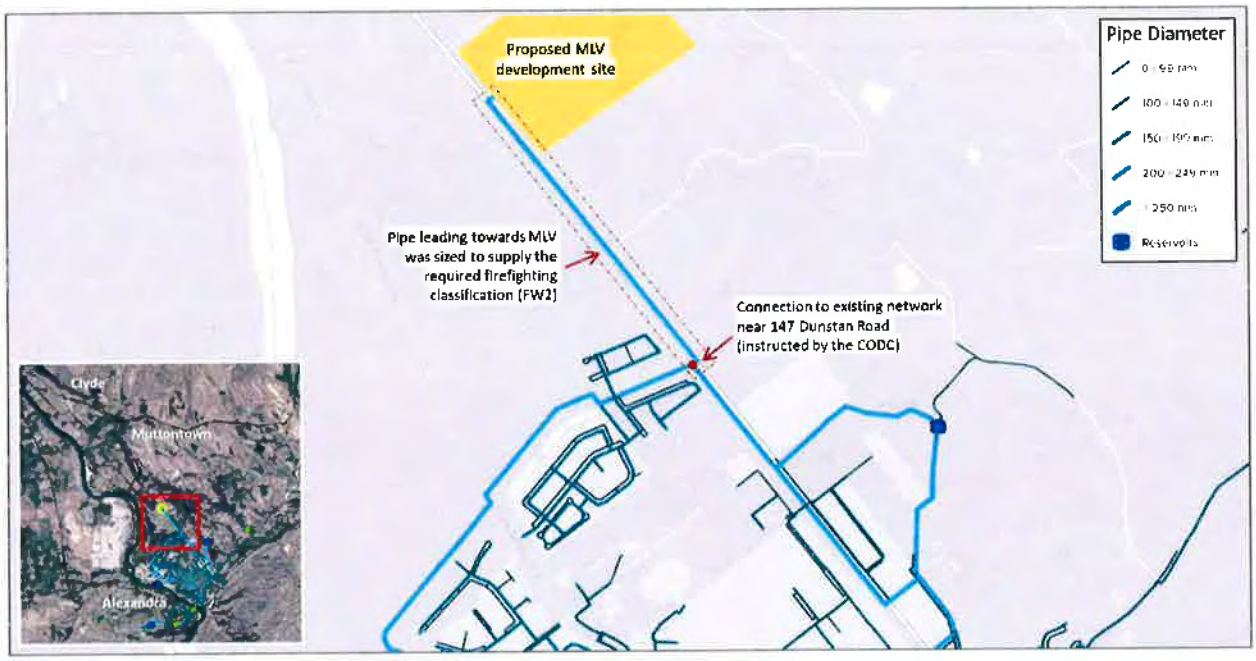
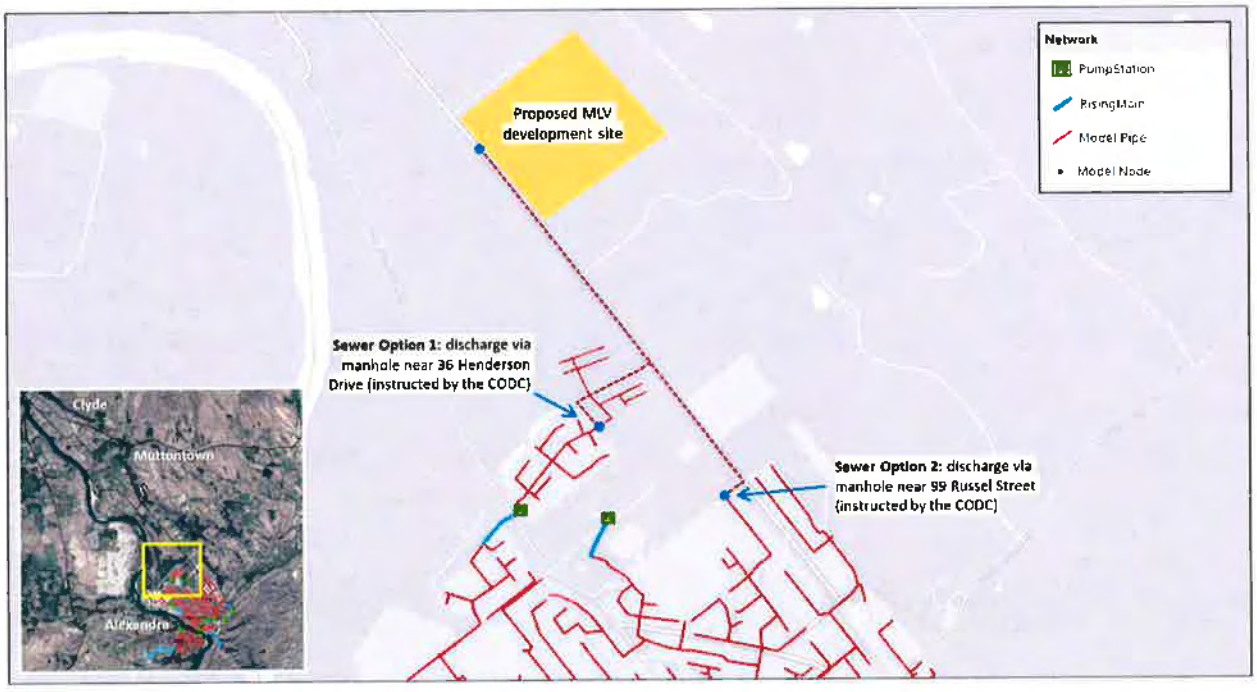


Figure 1-2: Proposed development and the Alexandra WW network



As part of the WS and WW infrastructure assessment, a system performance analysis (SPA) has been undertaken within the two Alexandra networks. The analysis consists in reviewing the network capacities both prior and post-development, determining whether the levels of services (LOS) can be maintained (WS LOS detailed in Section 2.2), and assess the overall impact upon the two networks. However, as they were not finalised, the internal networks within the proposed MLV development were not assessed for both the WS and WW reticulations.

The WS network analysis also involves the firefighting (FF) capability testing. Additionally, the minimum pipe size required along Dunstan Road (Figure 1-1) has also been determined as part of this assessment, in order to adequately supply the proposed development and provide the required FF (25 l/s – FW2).

2 Modelling assumption

2.1 Demand and discharge calculations

As informed by the New Zealand Standards (4404:2010) and the CODC addendum, the WS demand was calculated using the criteria listed below and the results are tabulated in Table 2.1.

- Persons per lot: 3
- Daily consumption: 500 litres/person/day
- Total number of lots: 60
- Residential peak hour factor: 5

Table 2.1: WS demand at the proposed MVL development

	Daily flow (m^3/d)	Instantaneous peak demand (l/s)
Total demand	90	5.21

The WW discharges for the proposed development were calculated in accordance with New Zealand Standard for Land Development and Subdivision Infrastructure (NZS 4404:2010) and the CODC Addendum to NZS 4404:2010 (dated July 2008). The calculated wastewater loads for the development are summarised below in Table 2.2. These demands are based on the following assumptions:

- Persons per lot: 3
- Total number of lots: 60
- Residential peaking factor: 2.5
- Wastewater daily demand: 250 litres/person/day
- Infiltration and inflow peaking factor: 2

Table 2.2: WW discharge at the proposed MVL development

Catchment	Number of lots	Assumed population	Peak Dry Weather Flow (PDWF) (l/s)	Peak Wet Weather Flow (PWWF) (l/s)
Molyneux Lifestyle Village	60	180	1.30	2.60

2.2 LOS and FF requirements

As informed by the New Zealand Standards (4404:2004) and the CODC addendum, the following standards and levels of service have been used for WS network:

- The required operating pressure must fall between 30-80 metres
- The head losses through pipes must be no greater than:
  - 5 m/km in pipes smaller than DN 150 mm
  - 3 m/km in pipes greater than DN 200 mm

- The firefighting water standard for this study is FW2 (no sprinkler system) and all lots must be located within a 90 metres-radius from a hydrant (compliant with SNZ PAS 4509).
  - Importantly, the location of hydrants surrounding the proposed development remains unknown.

2.3 Scenario investigated and confirmed developments

The following two scenarios (including the demand associated with developments on Ngapara Street and Henderson Drive) were considered in the modelling of the WS and WW networks and determined the base scenario for this assessment:

- **WS**: Calibration scenario (including Ngapara Street and Henderson Drive).
- **WW**: Uncalibrated base scenario (including Ngapara Street and Henderson Drive).

Continually, to assess the impact of the proposed MLV development upon the existing Alexandra WW network, the following scenarios were modelled using Mike Urban 2020:

- **Base model (pre-development scenario):**
  - Dry Weather Flow (DWF) scenario
  - 10-Year Average Recurrence Interval (ARI) Wet Weather Flow (WWF) scenario
- **Post-development Option 1 model:**
  - DWF scenario
  - 10-Year ARI WWF scenario
- **Post-development Option 2 model:**
  - DWF scenario
  - 10-Year ARI WWF scenario

2.4 Network setup and connection points

As instructed by the CODC, the following configurations were used for WS and WW:

WS network and connection point

- A watermain will be built along Dustan Road, in order to supply the proposed development;
- The proposed connection point will be situated at 269 Dunstan Road;
- Connection to the network is not possible via the future trunk main between Clyde and Alexandra;
- See Figure 1-1.

WW network and connection point(s)

- Two rising main options have been provided by the council. Both options consist of a new pump station and rising main to enable discharge from the development into the existing Alexandra network.
- The proposed discharge point will be situated at 269 Dunstan Road and will be connected to the network via one of the following two options:
  - **Sewer Option 1**: 36 Henderson Drive
  - **Sewer Option 2**: 99 Russel Street
- Connection to the network is not possible via the future trunk main between Clyde and Alexandra;
- See Figure 1-2.

2.5 Site elevation

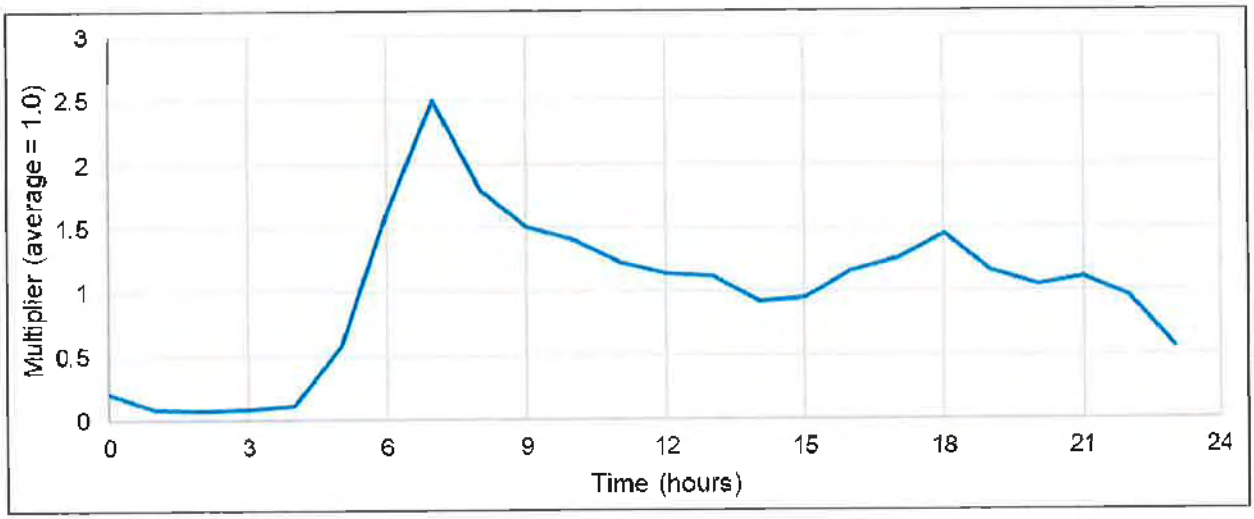
As informed by the 'A4814_PLAN_1A_Modelling' drawing, provided by the CODC; the recorded elevation at the point of connection and discharge is 155.75 mRL and the highest elevation within the development is 156.15 mRL (northern boundary of the proposed MLV development site).

2.6 WW model build assumptions

For the MLV wastewater model, the following assumptions have been made:

- The MLV pump station is assumed to have a fixed pump rate of 5 l/s and have no storage in the wet well.
- A standard residential 24-hour diurnal profile, with a peak factor of 2.5, has been assumed for the proposed MLV wastewater flows. The diurnal profile used for the proposed development is shown in Figure 2-1 below.

Figure 2-1: Residential diurnal profile in Alexandra WW network



3 Modelling results

3.1 WS network modelling

The internal WS network within the MLV development was not assessed as part of this study, as such, the modelled pressure and headloss was assessed at the development's connection point to the WS network. The results have been analysed, to verify whether the required LOS and FF classification can be maintained.

3.1.1 Minimum pipe size required along Dunstan Road

Currently, the network extends as far as 147 Dunstan Road, which is approximately 1.2 km south from the proposed MLV development site. Therefore, a new watermain pipe is required along Dunstan Road (delimited in Figure 1-1), to enable the integration of the development into the Alexandra WS network.

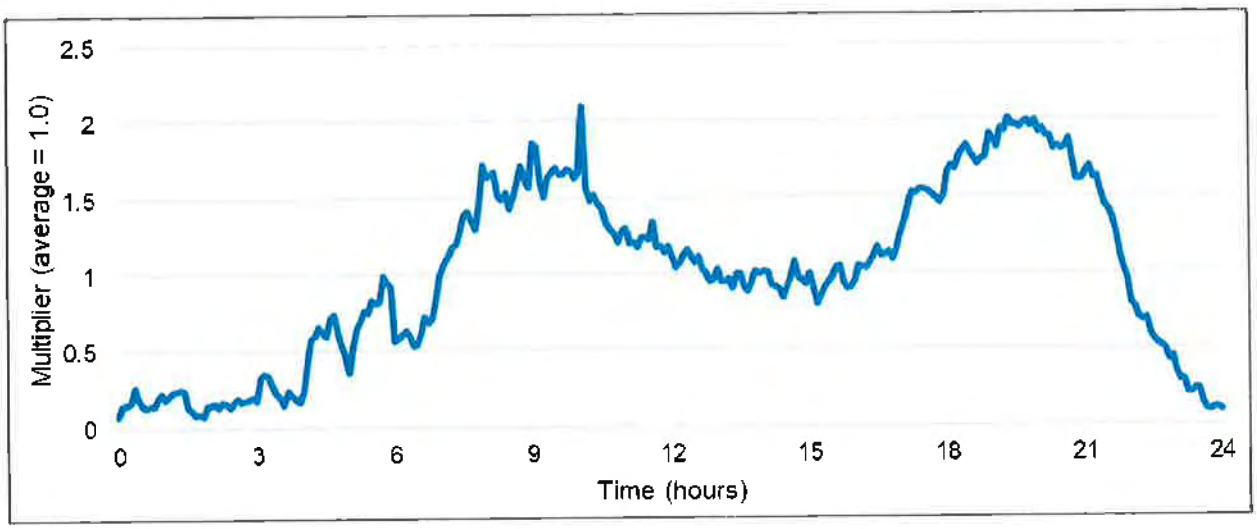
The minimum pipe size required along Dunstan Road, to adequately service the proposed development and provide the required FF classification (25 l/s – FW2), has also been determined using EPAnet (version 2.2). In order to comply with the LOS (stated in Section 2.2), the residual pressure at the node (considered a hydrant in this exercise) cannot drop below 10 metres. A reiterative approach was undertaken in order to determine the minimum pipe size required and the final two iterations (resulting in 10 metres or higher) are shown in Table 3.1, alongside the pipe material, nominal and internal diameters.

3.1.2 Table 3.1: Minimum pipe size required along Dunstan Road

Pipe material	Nominal Diameter (mm)	Internal Diameter (mm)	Minimum pressure when simulating FW2 at 'MolyLV_Node_2' (m)
HDPE (PE100)	280	237.9	11.8
PN 12.5	315	267.6	33.9

Importantly, the reiterative process took into consideration the demand associated with the proposed MLV development, The FF flow was simulated during the diurnal time where the average usage is equal to 60% of the peak demand observed within the Alexandra residential pattern (see Figure 3-1).

Figure 3-1: Residential diurnal profile in Alexandra WS network



Modelling indicated the pipe size DN 280 mm would enable the LOS and FF flow required; however, the modelled residual pressure was only 1.8 metres above the recommended LOS. Network variability and margin of error must be taken into consideration, therefore, the next pipe size available (DN 315 mm) was recommended and is used in the system performance analysis.

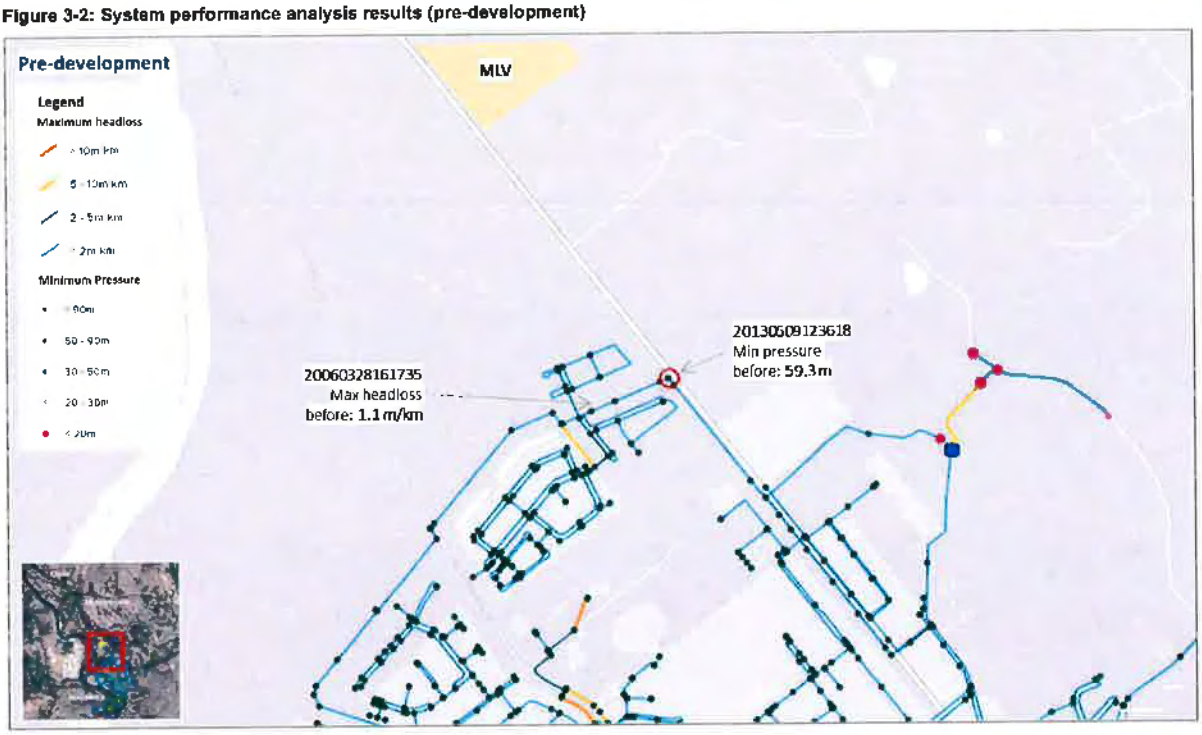
Notably, if a care facility is to be integrated within the MLV development, FW3 (50 l/s) would be required. Thusly, the minimum pipe size that would be required along Dunstan Road would be DN 355 mm (ID 301.6 mm), if constructed as HDPE pipe (PE100 & PN12.5). This sizing was not considered during the SPA, as the CODC specified the FF capability required is FW2. Therefore, it is assumed there will be no care facility.

3.1.3 WS system performance analysis results

The section describes the results of the SPA undertaken for the calibration scenario, before and after the proposed MLV development (including the associated demand) was added to the WS network model. Results have been analysed to verify whether the LOS can be met at the point of connection and at the highest elevation within the development (excluding the internal WS network – remains unknown). The LOS have been assessed assuming the pipe size recommended in Section 3.1.1 (or similar) will be constructed.

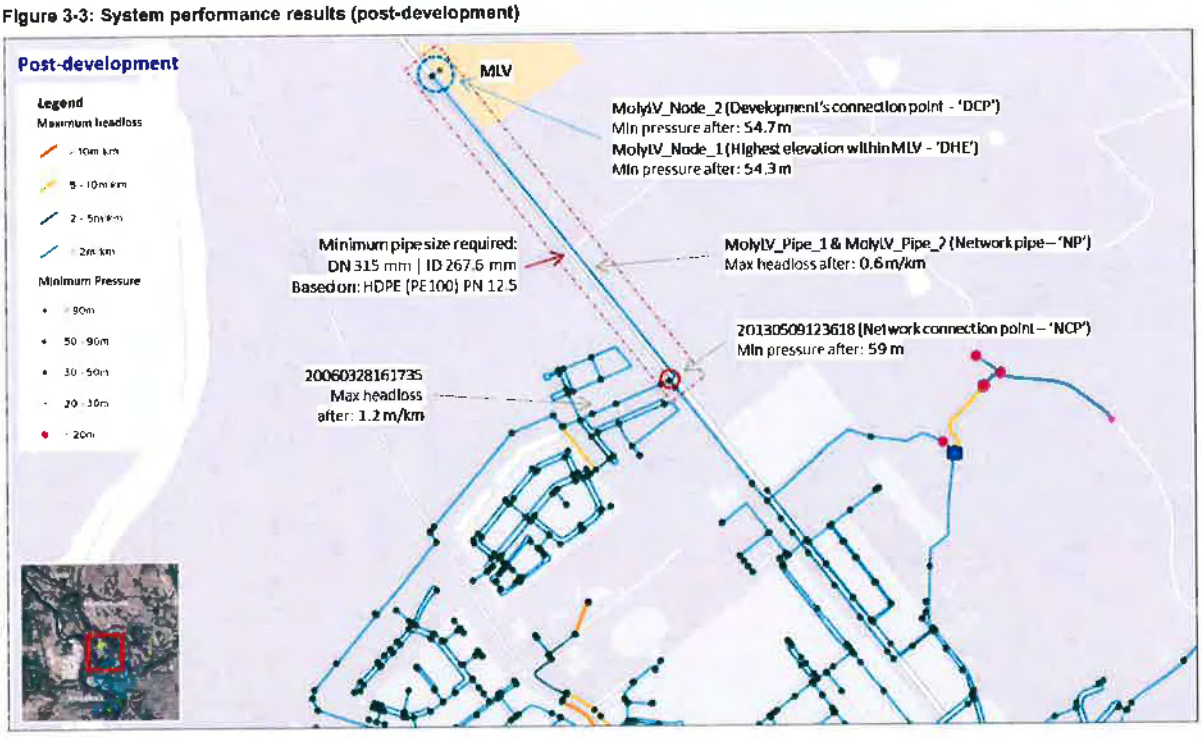
Figure 2-1 and Figure 3-1 illustrate the SPA results before and after the development was added to the WS network, the same information is tabulated in Table 3.2 and Table 3.3.

Figure 3-2: System performance analysis results (pre-development)



Source: Mott MacDonald, 2020

Figure 3-3: System performance results (post-development)



Source: Mott MacDonald, 2020

Table 3.2: Minimum pressure comparison (pre and post development)

Nodes	Minimum pressure at selected nodes (m)		Variance (+/-)
	Pre-development	Post-development	
20130509123618	59.3	59.0	-0.3
MolyLV_Node_1	-	54.3	n/a
MolyLV_Node_2	-	54.7	n/a

Table 3.3: Maximum head losses comparison (pre and post development)

Pipes	Maximum head losses at proximal pipes (m/km)		Variance (+/-)
	Pre-development	Post-development	
20060328161735	1.1	1.2	+0.1
MolyLV_Pipe_1 (NP)	-	0.6	n/a
MolyLV_Pipe_2 (NP)	-	0.6	n/a

Within the area surrounding the connection point, there is a negligible drop in pressure (-0.3 m) and a minor increase in head losses (+0.1 m/km). The maximum head loss is predicted to be 0.6 m/km in the proposed DN 315 mm). At the development connection point and highest elevation location, the pressures are predicted to be 54.7 m and 54.3 m, respectively.

Regarding the LOS stated in Section 2.2, both the operating pressure and maximum permitted head losses comply with the required LOS.

3.1.4 FF capability and hydrant locations

As instructed by the CODC, the required FF capacity for the proposed development is 25 l/s, which is equivalent to FW2 (no sprinkler system).

Assuming a proposed DN 315 mm watermain servicing the development, the predicted pressure drop is 21 m and the residual pressure is predicted at 33.9 m (above the lowest recommended LOS at 10 m). Additionally, the pressure does not drop below null within the remainder of the Alexandra WS network.

Furthermore, the proximity of each proposed lot in relation to the selected (DCP) has been assessed and visualised in Figure 3-4. Evidently, multiple hydrants will need to be integrated within the development's internal WS network, in order to comply with the LOS and FF water standards stated in Section 2.2. This should be taken into consideration by the developer and the CODC during the detailed design stages.

Figure 3-4: DCP proximity from the MLV development

Regarding the LOS stated in Section 2.2, both the predicted FF flow and capability is compliant with the required LOS and FF water standards at the development connection point. However, this should be reassessed once the internal WS network is finalised and the location of hydrants is known.

3.2 WW network modelling

3.2.1 WW system performance analysis criteria

An assessment of the model results was carried out for the Base Model and Post-Development Models to investigate the existing Alexandra wastewater network performance considering:

- Pipe capacity
- Overflow volume

Pipe capacities were evaluated in two ways. Firstly, by comparing the modelled peak flow with the theoretical pipe full capacity (Q_{max}/Q_f) and secondly, by comparing the modelled peak depth with the pipe diameter (H_{max}/Diameter).

Peak flows above the theoretical pipe capacity indicate that the pipe is undersized and cannot convey the peak flows that are required through the network. Pipes where the capacity is exceeded show that $Q_{max}/Q_f > 1$. In cases where pipes have capacity but are surcharged (due to downstream constraints), the model results will show that $Q_{max}/Q_f < 1$ and H_{max}/Diameter > 1.

The system performance was carried out for the model scenario for both the Dry Weather Flow (DWF) and the 10-year Average Recurrence Interval (ARI) Wet Weather Flow (WWF) events. The results of the wastewater system performance analysis are summarised in the sections below.

3.2.2 Dry Weather Flow system performance

The pipe capacity results for the DWF scenarios are summarised in Table 3.4 below. Table 3.4 indicates that

- for Option 1, the additional wastewater flows from the MLV development are not predicted to increase the number of pipes that are under capacity in the existing network during the DWF event.
- for the Option 2, the number of pipes that are under capacity in the existing network are predicted to increase by one for the DWF event, when compared to the pre-development scenario.

The model results indicate that the increase in wastewater discharge from the development is predicted to cause existing pipe 20031203001638 to be under capacity, during the DWF event, when the proposed rising main is connected to the existing wastewater network at 99 Russel Street (Option 2). This 150 mm diameter pipe is located downstream of the proposed Option 2 connection point, as shown on Figure 3-5 below.

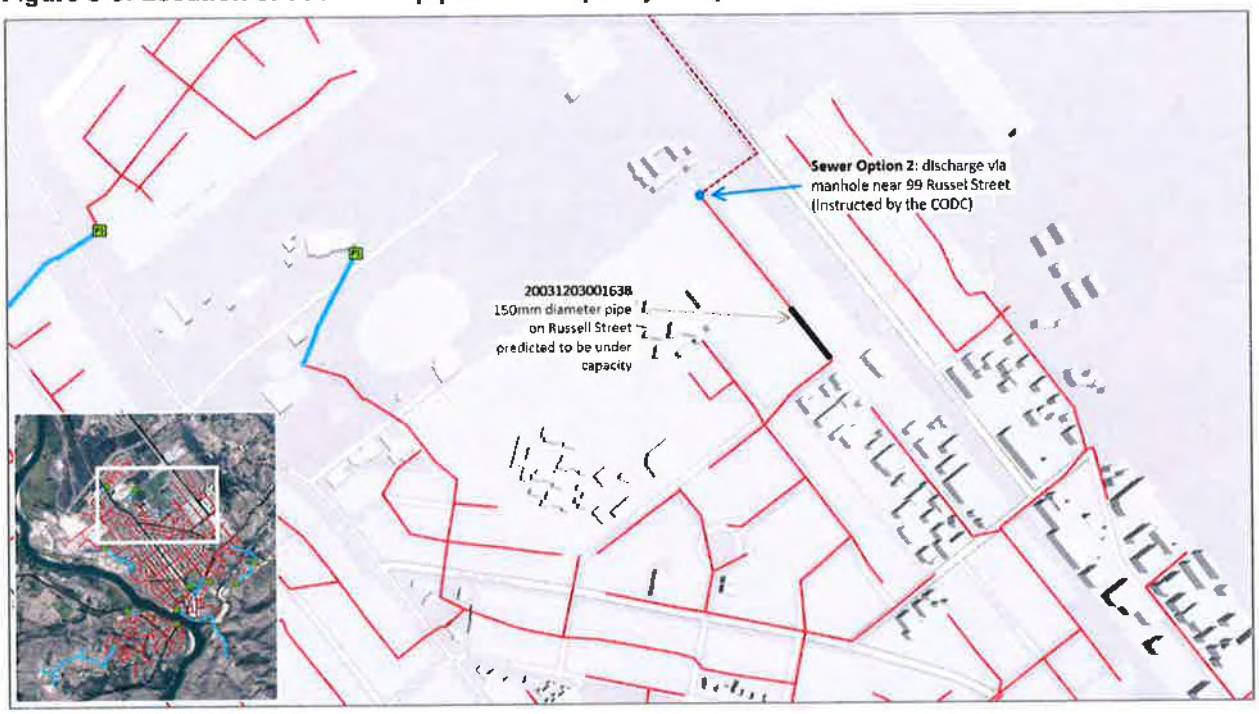
The results do not predict overflows to occur during the DWF event for the base model and the Options 1 and 2 models.

Table 3.4: DWF System Performance – Pipe Capacity Summary

Scenario	Number of Pipes with Capacity Exceeded	Total Length of Pipe with Capacity Exceeded (m)	% of Total	Number of Pipes Surcharged due to Downstream Conditions*	Total Length of Pipe Surcharged due to Downstream Conditions (m)	% of Total
Base Model	8	468	0.9%	60	2,017	7%
Post-Development Option 1 Model	8	653	1%	60	2,017	7%
Post-Development Option 2 Model	9	743	1%	60	2,017	7%

Source: Mott MacDonald
*Number of pipes which have capacity but are surcharged (due to downstream conditions)

Figure 3-5: Location of additional pipe under capacity in Option 2 DWF scenario



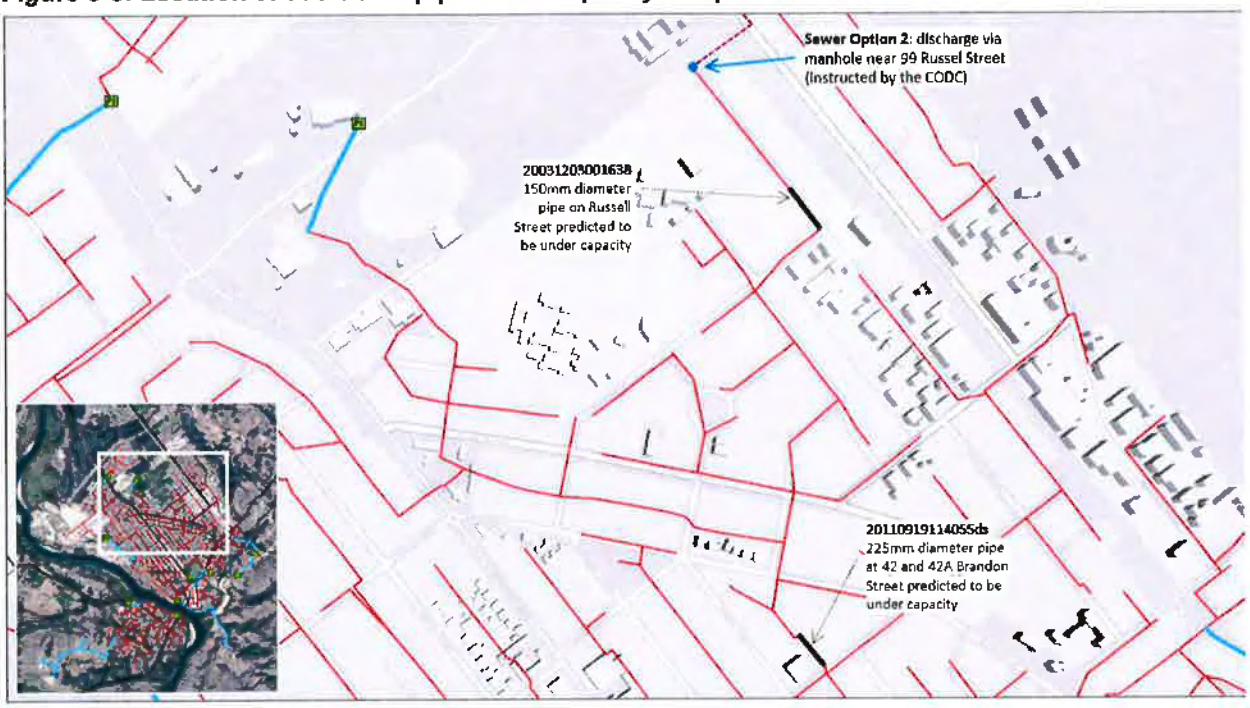
Source: Mott MacDonald, 2020

3.2.3 Wet Weather Flow system performance

The pipe capacity and overflow results for the WWF scenarios are summarised in Table 3.5 and Table 3.6 below. For the WWF event, the additional wastewater flows from the MLV development are not predicted to increase the number of pipes under capacity when the proposed rising main is connected to the existing network outside of 36 Henderson Drive (Option 1).

The model results indicate that the additional flows from the MLV development for the Option 2 WWF scenario are predicted to increase the number of pipes under capacity by two, when compared to the pre-development scenario. The location of these additional pipes that are predicted to be under capacity are shown on Figure 3-6 below. For the WWF event, the model does not predict that the additional flows from MLV development (Option 1 and 2 scenarios) will cause additional overflows to occur.

Figure 3-6: Location of additional pipe under capacity in Option 2 WWF scenario



Source: Mott MacDonald, 2020

Table 3.5: WWF System Performance – Pipe Capacity Summary

Scenario	Number of Pipes with Capacity Exceeded	Total Length of Pipe with Capacity Exceeded (m)	% of Total	Number of Pipes Surcharged due to Downstream Conditions*	Total Length of Pipe Surcharged due to Downstream Conditions (m)	% of Total
Base Model	19	955	2%	129	6,360	15%
Post-Development Option 1 Model	19	955	2%	129	6,276	15%
Post-Development Option 2 Model	21	1,108	2%	130	6,403	15%

Source: Mott MacDonald
*Number of pipes which have capacity but are surcharged (due to downstream conditions)

Table 3.6: WWF System Performance – Overflow Summary

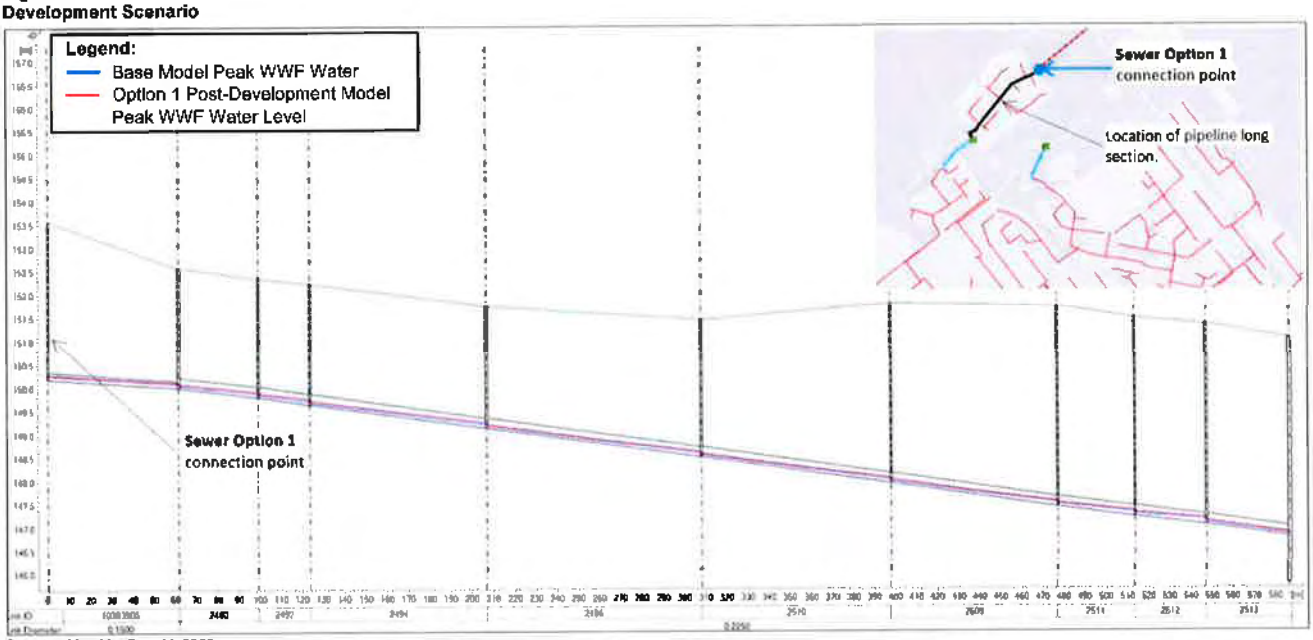
Scenario	Total Number of Overflows	Total Overflow Volume (m^3)*
Base Model	2	23.0
Post-Development Option 1 Model	2	22.9
Post-Development Option 2 Model	2	22.9

Source: Mott MacDonald
*Minor differences in overflow volumes for the model scenarios are negligible and within the modelling tolerance.

The WWF peak water level long section results for the pipeline located downstream of the proposed Option 1 rising main connection point (pipeline 20060329140821 to Molyneux East Pump Station) is shown on Figure 3-7 below. The long section results indicate the proposed development flows are predicted to slightly increase the water levels in this downstream existing pipeline during the WWF event. However, for the post-development scenario, the additional flows from the development are not predicted to cause pipeline to surcharge during the WWF event.

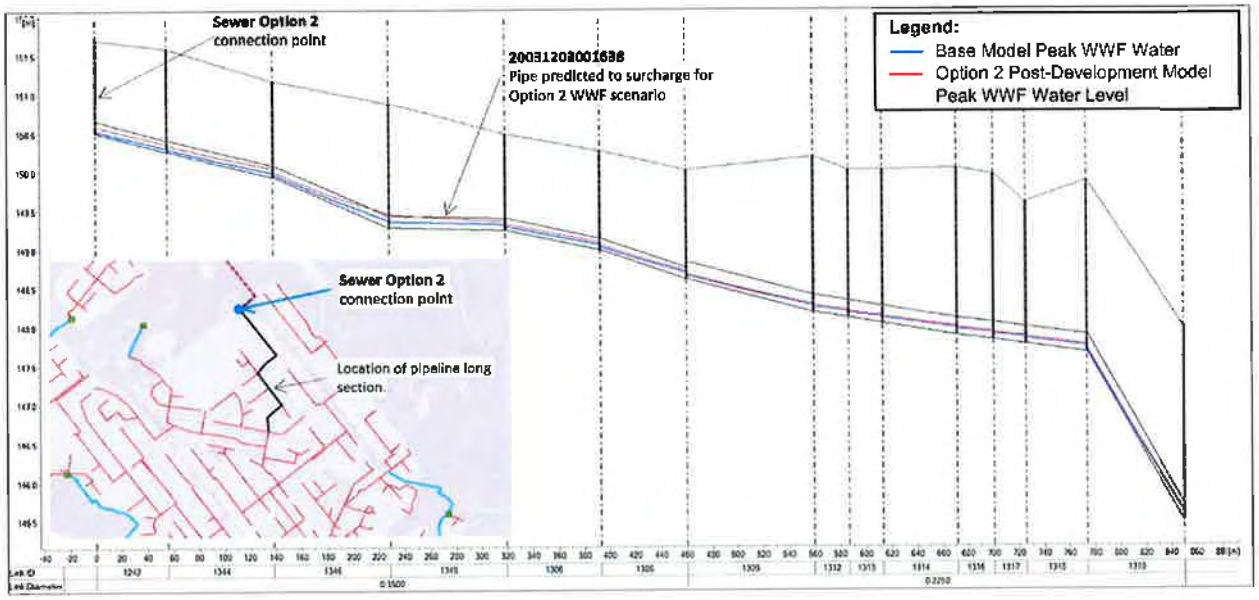
Figure 3-8 below illustrates the WWF peak water level long section results for the pipeline located downstream of the proposed Option 2 rising main connection point (pipeline 20031201222707 to 20031202230318). The results indicate the proposed flows from the MLV development are predicted to increase the water levels in the downstream pipeline 20031201222707 to 20031202230318. The results also predict that the proposed development will cause the upstream end of pipe 20031203001638 to surcharge during the WWF event.

Figure 3-7: WWF Peak Water Level Long Section Result for Pipeline 20060329140821 to Molyneux East Pump Station - Base Model and Option 1 Post Development Scenario



Source: Mott MacDonald, 2020

Figure 3-8: WWF Peak Water Level Long Section Result for Pipeline 20031201222707 to 20031202230318 - Base Model and Option 2 Post Development Scenario

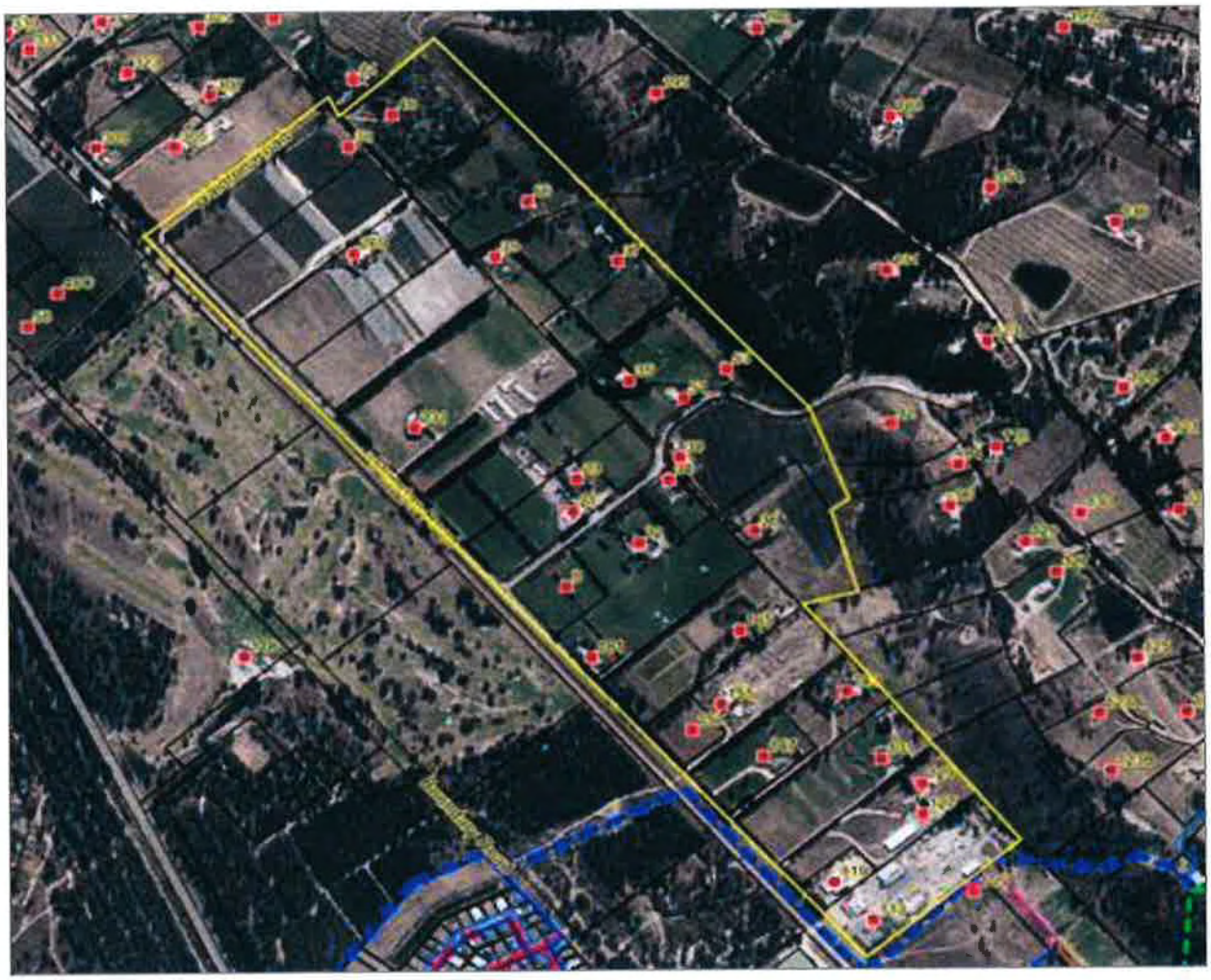


Source: Mott MacDonald, 2020

4 Impact on the network from a plan change

The impact on the WS and WW networks from a plan change between the proposed development and Alexandra town was also assessed. Figure 4-1 below shows the extent of the potential future development considered. As agreed with CODC, the total number of lots assumed in this area was 300, which also includes the 60 lots considered in the above sections of this study.

Figure 4-1: Potential future development extent



4.1 Water Supply

The additional 300 lots (total) have a negligible impact on the pipe network, with a head loss difference of 0.1m/km compared to the pre-development scenario. Minimum pressure at the connection point is predicted to drop from 59.3 m to 57.7 m. This is due to the Northern Reservoir draining to 0.5m during the evening peak demand period (instead of 1.8 m in the pre-development scenario). This is likely related to the model operational set up (bores pumping times may vary depending on the level in the Northern Reservoir). However, it should be noted that the peak day demand corresponds to 450 m^3/day, which corresponds to 23% of the existing Norther Reservoir.

4.2 Wastewater

The impact of the proposed plan change area was assessed using the two options that were proposed for the MLV development (a new pump station and rising main to connect to the downstream existing network at either 36 Henderson Drive or 99 Russel Street). For this assessment, the pump station was assumed to have a fixed pump rate of 15 l/s and have no storage in the wet well.

The wastewater flows from the proposed plan change area were calculated based on an assumed total number of lots of 300 and the assumptions listed in Section 2.1 of this technical memo. The model results for the post-development plan change scenarios are summarised in Table 4.1, Table 4.2 and Table 4.3 below.

The results indicate that for the Option 1, the additional flows from the plan change area are not predicted to increase the number of pipes under capacity for the DWF event. For Option 2, the results predict that the additional flows from the proposed plan change area will cause an additional two pipes to be under capacity when compared to the MLV Development Option 2 model for the DWF event. These additional pipes are located on Russel Street (downstream of the proposed Option 2 connection point to the existing network).

The results do not predict overflows to occur during the DWF event for the base model, the MLV Development Options 1 and 2 models and the Plan Change Options 1 and 2 models.

Table 4.1: Plan Change Impact Assessment - DWF Pipe Capacity Summary

Scenario	Total Number of Proposed Lots	Number of Pipes with Capacity Exceeded	% of Total	Number of Pipes Surcharged due to Downstream Conditions*	% of Total
Base Model	N/A	8	0.9%	60	7%
Post-Development Option 1 Model	60 (MLV Development Only)	8	1%	60	7%
	300 (Plan Change)	8	1%	62	7%
Post-Development Option 2 Model	60 (MLV Development Only)	9	1%	60	7%
	300 (Plan Change)	11	1%	67	8%

Source: Mott MacDonald
*Number of pipes which have capacity but are surcharged (due to downstream conditions)

For the WWF event, the model results indicate that the additional flows from the plan change area are predicted to increase the number of pipes under capacity by one, when compared to the MLV Option 1 model. This additional pipe (asset ID 20031215141651) is a 300mm diameter trunk main which is located downstream of the site at 1 Dunorling Street. The Option 1 results predict that the additional flows from the plan change area will not increase the number of overflows during the WWF event.

The Option 2 plan change WWF results indicate that the additional flows from the site are predicted to increase the number of pipes under capacity by eight, when compared to the MLV Option 2 WWF model. The Option 2 results also predict that the additional flows from the plan change area will cause one additional overflow to occur during the WWF event. The model predicts a WWF overflow volume of 2.1m^3 from this additional overflow location. The pipe capacity issues and overflows that are predicted to occur due to the additional wastewater flows from the plan change area are located downstream of the proposed Option 2 connection point, as shown on Figure 4.2 below.

Table 4.2: Plan Change Impact Assessment - WWF Pipe Capacity Summary

Scenario	Total Number of Proposed Lots	Number of Pipes with Capacity Exceeded	% of Total	Number of Pipes Surcharged due to Downstream Conditions*	% of Total
Base Model	N/A	19	2%	129	15%

Scenario	Total Number of Proposed Lots	Number of Pipes with Capacity Exceeded	% of Total	Number of Pipes Surcharged due to Downstream Conditions*	% of Total
Post-Development Option 1 Model	60 (MLV Development Only)	19	2%	129	15%
	300 (Plan Change)	20	2%	180	21%
Post-Development Option 2 Model	60 (MLV Development Only)	21	2%	130	15%
	300 (Plan Change)	29	3%	140	16%

Source: Mott MacDonald
*Number of pipes which have capacity but are surcharged (due to downstream conditions)

Table 4.3: Plan Change Impact Assessment - WWF Overflow Summary

Scenario	Total Number of Proposed Lots	Total Number of Overflows	Total Overflow Volume (m^3)
Base Model	N/A	2	23.0*
Post-Development Option 1 Model	60 (MLV Development Only)	2	22.9*
	300 (Plan Change)	2	23.1*
Post-Development Option 2 Model	60 (MLV Development Only)	2	22.9*
	300 (Plan Change)	3	25.2

Source: Mott MacDonald
*Minor differences in overflow volumes for the model scenarios are negligible and within the modelling tolerance.

Figure 4.2: Location of additional pipes under capacity and overflows in Option 2 Plan Change WWF scenario

Source: Mott MacDonald, 2020

5 Conclusion and recommendations

5.1 Water supply

The demand from the proposed MLV development (60 lots) has been added to the network under the calibration scenario conditions. The proposed MLV development's internal network was not modelled as part of this study; however, the total demand was modelled proximal to the development connection point at the highest elevation, to determine whether suitable LOS and FF water standards could be maintained.

Additionally, the minimum pipe size required along Dustan Road to service the development and provide FW2 fire flow was determined to be DN 315 mm (Section 3.1.1). Further modelling should be considered once the development's WS detailed design is confirmed, to assess the suitability of hydrants location.

The SPA predicted pressure drops and head losses to be negligible within the remainder of the network, therefore, compliant with the LOS stated in Section 2.2. Based on the results from the WS modelling, the following recommendations can be made:

- The minimum pipe size required to service the development along Dunstan Road is DN 315 mm;
- Multiple hydrants are required within the development's internal WS network to be compliant.

5.2 Wastewater

The Alexandra wastewater network model was updated to incorporate the proposed Molyneux Lifestyle Village development. The modelling carried out for this assessment consisted of three scenarios:

- Base model (pre-development scenario).
- Option 1: connection of the proposed MLV rising main to the existing network outside 36 Henderson Dr.
- Option 2: connection of the proposed MLV rising main to the existing network outside of 99 Russel St.

The model results indicate that for the DWF event, Option 1 is not predicted to increase the number of pipes under capacity and Option 2 is predicted to increase the number of pipes under capacity by one. The results do not predict overflows to occur for the base model and the Options 1 and 2 models during the DWF event.

For the WWF events, the proposed development is not predicted to increase the number of pipes under capacity in the existing Alexandra wastewater network for Option 1. The results predict that two additional pipes will be under capacity for Option 2 during the WWF event. The results did not predict that the proposed development for Options 1 and 2 will cause additional overflows to occur from the existing network during the WWF event.

5.3 Plan Change Impact

The impact on the WS and WW networks from a plan change (total of 300 lots) between the proposed development and Alexandra town was also assessed.

- **WS network**:
  - The predicted impact is negligible, however, it should be noted that the 300 lots' demand (peak day) would represent 23% of the existing Northern Reservoir volume.
- **WW network**:
  - Option 1: the number of pipes under capacity is predicted to increase the by one under WWF, when compared to the proposed 60 lots development
  - Option 2: the number of pipes under capacity is predicted to increase the by two under DWF and eight under WWF. One additional overflow is predicted to occur (2.1m^3).

APPENDIX D

Confirmation of Telecom Supply

Chorus Property Development Team
PO Box 9405
Waikato Mail Centre
Hamilton 3200
Telephone: 0800 782 386
Email: develop@chorus.co.nz

23 December 2020

Chorus Ref #: AL61926
Your Ref #:

Molyneux Lifestyle Village Ltd

Attention: **Peter Dymock**
Dear Sir / Madam

Property Development – AL: 269 Dunstan Road, Alexandra - 62 Lots - Simple Estimate

Thank you for your enquiry regarding the above subdivision.

Chorus is pleased to advise that, as at the date of this letter, we would be able to provide ABF telephone reticulation for this property development. In order to complete this reticulation, we require a contribution from you to Chorus' total costs of reticulating the development. Chorus' costs include the cost of network design, supply of telecommunications specific materials and supervising installation. At the date of this letter, our estimate of the contribution we would require from you is $265,718.70 (including GST).

We note that (i) the contribution required from you towards reticulation of the development, and (ii) our ability to connect the subdivision to the Chorus network, may (in each case) change over time depending on the availability of Chorus network in the relevant area and other matters.

If you decide that you wish to undertake reticulation of this property development, you will need to contact Chorus (see the contact details for Chorus Property Development Team above). We would recommend that you contact us at least 3 months prior to the commencement of construction at the subdivision. At that stage, we will provide you with the following:

- confirmation of the amount of the contribution required from you, which may change from the estimate as set out above;

- a copy of the Contract for the Supply and Installation of Telecommunications Infrastructure, which will govern our relationship with you in relation to reticulation of this property development; and

- a number of other documents which have important information regarding reticulation of the property development, including - for example - Chorus' standard subdivision lay specification.

Yours faithfully

C Maher.

Catherine Maher
Network Services Coordinator

APPENDIX E

Confirmation of Power Supply

AURORA ENERGY LIMITED
PO Box 5140, Dunedin 9058
PH 0800 22 00 05
WEB www.auroraenergy.co.nz

18 December 2020

Peter Dymock
Paterson Pitts Group

Sent via email only: peter.dymock@ppgroup.co.nz

Dear Peter,

ELECTRICITY SUPPLY AVAILABILITY FOR A PROPOSED SIXTY-THREE LOT SUBDIVISION.
269 DUNSTAN ROAD, ALEXANDRA. PT'S LOT'S 12 & 13 DP 3194.

Thank you for your inquiry outlining the above proposed development.

Subject to technical, legal and commercial requirements, Aurora Energy can make a Point of Supply[1] (PoS) available for this development.

Disclaimer

This letter confirms that a PoS **can** be made available. This letter **does not** imply that a PoS is available now, or that Aurora Energy will make a PoS available at its cost.

Next Steps

To arrange an electricity connection to the Aurora Energy network, a connection application will be required. General and technical requirements for electricity connections are contained in Aurora Energy's Network Connection Standard. Connection application forms and the Network Connection Standard are available from www.auroraenergy.co.nz.

Yours sincerely

NA Frear

Niel Frear
CUSTOMER INITIATED WORKS MANAGER

[1] Point of Supply is defined in section 2(3) of the Electricity Act 1993.

APPENDIX F

CBR TESTS

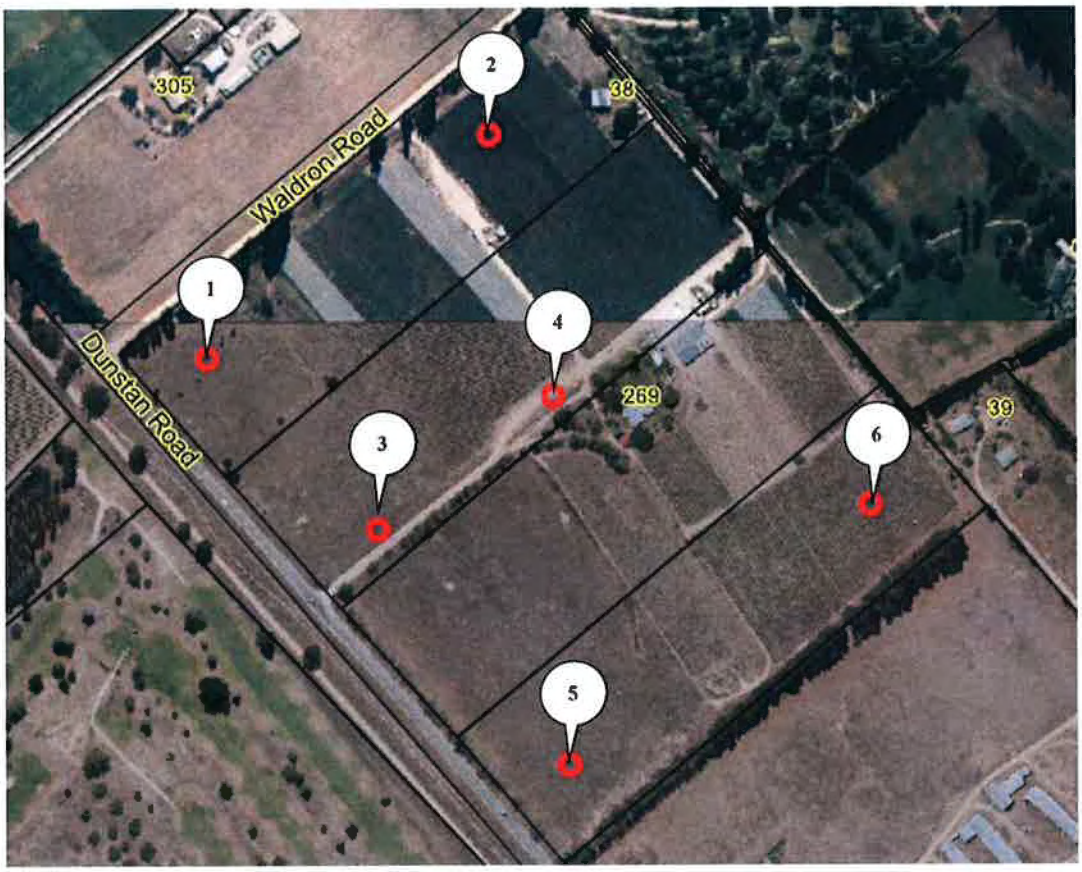
Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/327

Date: 12 February 2021

TEST REPORT - LABORATORY SOAKED CBR'S

Client Details:	**Molyneux Lifestyle Village Ltd, c/-Russell Ibbotson, P.O. Box 120, Alexandra**	**Attention:**	**c/o M. Garmonsway**
Job Description:	**William Hill Investigations**		
Sample Description:	**Subgrade**	**Client Order No:**	**N/A**
Sample Source:	**Insitu – See Below**	**Sample Label No:**	**01281**
Date & Time Sampled:	**4-Feb-21 @ 1.38 to 2.11pm**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Received:**	**4-Feb-21**
Test Method:	**NZS 4407:2015, Test 3.15**		



Notes:

- *This report may not be reproduced except in full.*

Tested By: C. Fisher **Date:** 5 to 10-Feb-21

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

ACCREDITED IANZ TESTING LABORATORY №434

Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: Info@centraltesting.co.nz

Reference No: 21/327

Date: 12 February 2021

TEST REPORT - LABORATORY SOAKED CBR'S

Client Details:	**Molyneux Lifestyle Village Ltd, c/-Russell Ibbotson, P.O. Box 120, Alexandra**	**Attention:**	**c/o M. Garmonsway**
Job Description:	**William Hill Investigations**		
Sample Description:	**Subgrade – See Below**	**Client Order No:**	**N/A**
Sample Source:	**Insitu – See Page 3**	**Sample Label No:**	**01281**
Date & Time Sampled:	**4-Feb-21 @ 1.38 to 2.11pm**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Received:**	**4-Feb-21**
Test Method:	**NZS 4407:2015, Test 3.15**		

LABORATORY SOAKED CBR RESULTS			
Sample Source:	**#4**	**#5**	**#6**
Sample Depth BGL: (mm)	**300 - 600**	**300 - 600**	**300 - 600**
Sample Description:	**SAND with minor / some silt**	**Sandy GRAVEL with trace of silt**	**Silty SAND with trace of gravel**
Condition of Sample:	**Soaked**	**Soaked**	**Soaked**
Surcharge Mass: (kg)	**4.0**	**4.0**	**4.0**
Time Soaked:	**4 days**	**4 days**	**4 days**
Swell: (%)	**0.0**	**0.0**	**0.2**
Water Content as Compacted: (%)	**3.5**	**4.1**	**2.8**
Water Content From Under Plunger: (%)	**19.2**	**9.7**	**11.8**
Dry Density As Compacted: (t/m³)	**1.61**	**1.95**	**1.89**
CBR Value @ 2.5 mm Penetration:	**7**	**16**	**5**
CBR Value @ 5.0 mm Penetration:	**8**	**18**	**6**
Reported CBR Value:	**8**	**18**	**6**
Contract Specification Requirement	**Minimum 7**		

Notes:

- ***The material was received in a natural state.***
- ***The material tested was the fraction passing the 19.0mm test sieve.***
- ***The sample was compacted to NZ Standard Compaction at the water content as received.***
- ***The rate of penetration was 1.00 mm / min.***
- ***Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.***
- ***This report may not be reproduced except in full.***

Tested By: C. Fisher **Date:** 5 to 10-Feb-21

Checked By:

ACCREDITED IANZ TESTING LABORATORY № 434

Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 21/327

Date: 12 February 2021

TEST REPORT - LABORATORY SOAKED CBR'S

Client Details:	Molyneux Lifestyle Village Ltd, c/-Russell Ibbotson, P.O. Box 120, Alexandra	Attention:	c/o M. Garmonsway
Job Description:	William Hill Investigations		
Sample Description:	Subgrade – See Below	Client Order No:	N/A
Sample Source:	Insitu – See Page 3	Sample Label No:	01281
Date & Time Sampled:	4-Feb-21 @ 1.38 to 2.11pm	Sampled By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Received:	4-Feb-21
Test Method:	NZS 4407:2015, Test 3.15		

LABORATORY SOAKED CBR RESULTS			
Sample Source:	#1	#2	#3
Sample Depth BGL: (mm)	300 - 600	300 - 600	300 - 600
Sample Description:	Gravelly SAND with a trace of silt	SAND with some silt and trace of gravel	SAND with minor gravel and trace of silt
Condition of Sample:	Soaked	Soaked	Soaked
Surcharge Mass: (kg)	4.0	4.0	4.0
Time Soaked:	4 days	4 days	4 days
Swell: (%)	0.0	0.0	0.0
Water Content as Compacted: (%)	3.9	2.0	3.4
Water Content From Under Plunger: (%)	12.2	18.6	18.1
Dry Density As Compacted: (t/m^3)	1.85	1.62	1.66
CBR Value @ 2.5 mm Penetration:	15	4.5	8
CBR Value @ 5.0 mm Penetration:	15	6	9
Reported CBR Value:	15	6	9
Contract Specification Requirement	Minimum 7		

Notes:

- *The material was received in a natural state.*
- *The material tested was the fraction passing the 19.0mm test sieve.*
- *The sample was compacted to NZ Standard Compaction at the water content as received.*
- *The rate of penetration was 1.00 mm / min.*
- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
- *This report may not be reproduced except in full.*

Tested By: C. Fisher **Date:** 5 to 10-Feb-21

Checked By:

ACCREDITED IANZ TESTING LABORATORY №434

Test results indicated as not accredited are outside the scope of the laboratory's accreditation

APPENDIX G

RM 2001.148

COUNTERPART

Otago Regional Council

Our Reference: A416450

Consent No: 2001.148

WATER PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: ~~[William Hill Grant]~~ [$^{287}/_{367}$ ~~share~~] Transferred 10 September 2013
Address: [redacted]

Name: ~~[Divine International Limited]~~ [$^{287}/_{367}$ ~~share~~] Transferred 27 April 2017
Address: [redacted]

Name: ~~[William Hill Holdings Limited]~~ [$^{80}/_{367}$ ~~share~~] Transferred 21 January 2014
Address: ~~Offices of Findlay & Co, 9 Cliff Wilson Street, Wanaka~~

Name: ~~[Dunstan Road Water Company Limited $^{80}/_{367}$ share]~~ Transferred 9 June 2017
Address: ~~[Southland Building Society, 51 Don Street, Invercargill]~~

Name: Molyneux Lifestyle Village Limited $^{80}/_{367}$ share
Address: Russell Ibbotson, Chartered Accountant & Business Consultant, 50 Tarbert Street, Alexandra, Alexandra

Name: ~~[Gillian Blanche Grant $^{287}/_{367}$ share]~~ *Transferred 20 Febuary 2019*
Address: [redacted]

Name: *David James Grant $^{287}/_{367}$ share*
Address: [redacted]

to take up to 367 cubic metres per day of groundwater at a rate of up to 4.25 litres per second

for the purpose of irrigation, communal water supply, winery and sale.

For a term expiring 30 June 2036

Location of activity: Alexandra, approximately 260 metres south east of the intersection of Dunstan Road and Waldron Road

Legal description of land adjacent to point of taking: Pt Lot 13 DP 3194

Map reference: NZMS 260: G42: 255-472

Conditions:

1. That the rate of taking water shall not exceed 367 cubic metres per day or 4.25 litres per second.

Telarc. Registered
Quality ISO 9001

COUNTERPART

Otago Regional Council

2. The bore head casing and reticulation shall be suitably constructed and sealed to avoid ingress of floodwater and other foreign matter.

Issued at Dunedin this 27th day of June 2001
Reissued at Dunedin this 28th day of February 2012 to reflect the transfer of $^{80}/_{367th}$ share from William Hill Grant to William Hill Holdings Limited, to update the Legal description of land adjacent to point of taking and to updated the location of activity.
Reissued this 24th day of September 2013 to reflect the transfer of $^{287}/_{367}$ share from William Hill Grant to Divine International Limited
Reissued at Dunedin this 24th day of January 2014 to reflect the transfer $^{80}/_{367}$ share of holder from William Hill Holdings Limited to Dunstan Road Water Company Limited
Reissued at Dunedin this 11th day of May 2017 to reflect the transfer $^{287}/_{367}$ share from Divine International Limited to Gillian Blanche Grant
Reissued at Dunedin this 14th day of June 2017 to reflect the transfer of holder from Dunstan Road Water Company Limited to Molyneux Lifestyle Village Limited
Reissued at Dunedin this 20th day of February 2019 to reflect the transfer of $^{287}/_{367}$ share from Gillian Blanche Grant to David James Grant.

Kylie M. Galbraith
Acting Manager Consents

Telarc. Registered
Quality ISO 9001