

# QUEENSTOWN LAKES DISTRICT COUNCIL

## ORCHARD/RIVERBANK ROAD DEVELOPMENT IMPACT ASSESSMENT

JUNE 2019



HYDRAULIC  
ANALYSIS  
LIMITED

## QUALITY SECTION

### AUTHOR

Name	Title	Organisation	Signature
Rebecca Ellmers	Senior 3-Waters Engineer	Hydraulic Analysis Ltd	

### REVIEWED

Name	Title	Organisation	Signature
Brian Robinson	Director	Hydraulic Analysis Ltd	

### REVISION HISTORY

Revision	Publication Date
Draft	14 June 2019
Final	

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## 1. INTRODUCTION

### 1.1. OBJECTIVE

The objective of this study is to utilise the existing hydraulic model (Wanaka Wastewater Model with HAL updates, 2018) of the Wanaka wastewater network to assess the impact of the proposed Orchard/Riverbank Road development on the wastewater network. The current (2015) population scenario has been used for this assessment.

### 1.2. BACKGROUND

The Orchard/Riverbank Road development site is located at the intersection of Orchard Road and Riverbank Road, to the south-east of Wanaka township. The development proposal seeks to develop 9 existing rural-residential house sites into an expected 400-600 single house lot yield.

There are no existing wastewater utilities on the site. The development proposes to connect to the existing Riverbank Road Pump Station on Riverbank Road, with the nearest upstream transmission infrastructure approximately 450m from the development site.

## 2. SCOPE

The following tasks have been undertaken as part of this assessment:

- Calculation of design flows for the Orchard/Riverbank Road development
- Assessment of the Orchard/Riverbank Road development impact on the existing network for the current (2015) population scenario

Each of these tasks is discussed in more detail in the following sections.

### 3. ORCHARD/RIVERBANK ROAD DESIGN FLOWS

#### 3.1. OVERVIEW

The Orchard/Riverbank Road development proposal seeks to develop 9 existing rural-residential house sites into an expected 400-600 single house lot yield. The location of the proposed development is shown in Figure 3-1 below.



FIGURE 3-1 ORCHARD/RIVERBANK ROAD DEVELOPMENT SITE LOCATION

The development proposes to connect to the existing Riverbank Road Pump Station on Riverbank Road. As shown by an indicative pink dashed connection line in Figure 3-2 below, the nearest transmission infrastructure is approximately 450m from the development site.



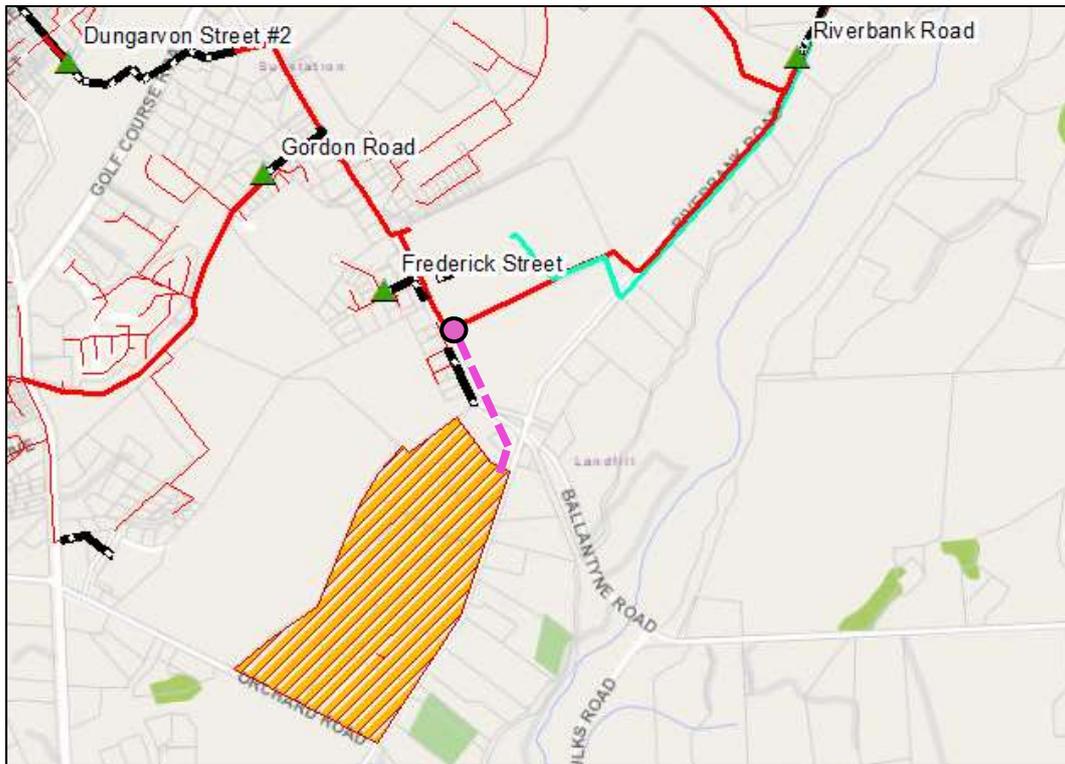


FIGURE 3-2 ORCHARD/RIVERBANK ROAD PROPOSED WASTEWATER NETWORK CONNECTION

### 3.2. DEVELOPMENT DESIGN FLOWS

The possible yield for the proposed development site can be calculated based on the maximum allowable zone density at 400-600 residential single house lots.

Using the QLDC 'Land Development and Subdivision Code of Practice', development flows can be calculated at 250 litres/person/day, with an additional dry weather diurnal peaking factor of 2.5, and wet weather dilution/infiltration factor of 2 (i.e. a peak wet weather flow (PWWF) of 5 x average dry weather flow (ADWF)).

Hence, the development site at 400-600 lots would yield peak wet weather flows between 17.4 l/s and 26.0 l/s. For the purposes of this development assessment, the maximum PWWF of 26 l/s (600 lots) has been used.

Calculations for the Orchard/Riverbank Road development are shown in Table 3-1 below.



TABLE 3-1: ORCHARD/RIVERBANK ROAD DEVELOPMENT DESIGN FLOWS

	400 residential lots	600 residential lots
No. of Lots	400	600
Occupancy	3	3
Population	1200	1800
ADWF (l/p/day)	250	250
ADWF (l/s)	3.47	5.21
DWF Peaking Factor	x2.5	x2.5
PDWF (l/s)	8.68	13.02
WWF Peaking Factor	x2	x2
PWWF (l/s)	17.36 l/s	26.04 l/s

## 4. ORCHARD/RIVERBANK ROAD DEVELOPMENT IMPACT

### 4.1. PRE-DEVELOPMENT SCENARIO

The Wanaka wastewater model (with 2018 HAL updates) was run under the current (2015) population scenario, without the proposed Orchard/Riverbank Road development flows. A monthly seasonal DWF profile has been applied to the updated model to represent increased visitor numbers during peak periods, with a maximum peaking factor of 2x calibrated DWF over the December/January period. The network was assessed against a 5-year ARI design storm to understand the existing performance of the network.

As shown in the Figure 4-1 long section below, the existing 630mm HDPE transmission network flowing to Riverbank Road Pump Station shows no existing capacity constraints, with good capacity available.

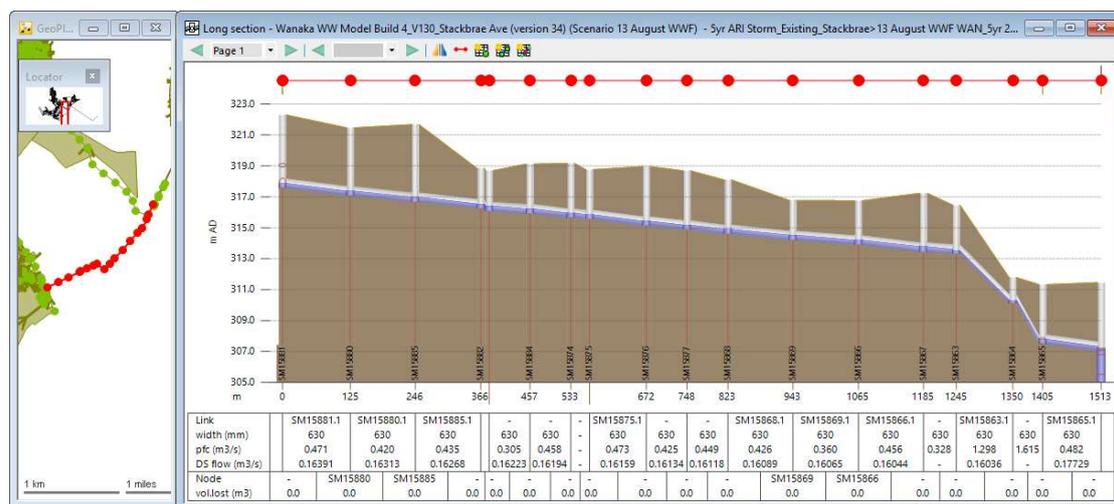


FIGURE 4-1 EXISTING (2015) LONG SECTION – 5 YEAR ARI DESIGN STORM

#### 4.2. REPORTED OVERFLOWS

QLDC’s reported overflow database has been reviewed for evidence of existing capacity issues. The database contains no reported overflow incidents in the network between the proposed development site and the Riverbank Road Pump Station, supporting the model predictions of no existing capacity constraints.

#### 4.3. POST-DEVELOPMENT SCENARIO (CONNECTION TO TRANSMISSION NETWORK)

The Wanaka wastewater model (with 2018 HAL updates) was run under the current (2015) population scenario, with the additional peak wet weather flows of 26 l/s from the proposed Orchard/Riverbank Road development added in. The development was connected directly to the 630mm HDPE transmission network, at Manhole ID:176964 on Ballantyne Road. The development impact was assessed against a 5-year ARI design storm to understand the performance of the network.

As shown in the Figure 4-2 long-section below, the post-development scenario predicts a slight increase in downstream sewer flows in the 5-year ARI design storm within the transmission network, however no evidence of surcharge. It is considered the downstream network is sufficiently sized to accommodate the increased flows from this development.



FIGURE 4-2 ORCHARD/RIVERBANK ROAD (26 L/S FLOWS) TO TRANSMISSION – 5 YEAR ARI DESIGN STORM

The development consultant will need to design and size the required infrastructure connecting the development site to the proposed transmission network connection point. Based on the elevation of the proposed development site, it is likely a pump station will be required to lift flows to the existing network.

#### 4.4. POST-DEVELOPMENT SCENARIO (CONNECTION TO 225MM LOCAL NETWORK)

Directly to the north-east of the development, GIS shows an existing private pump station and rising main discharging to the local network on Ballantyne Road. No data is available regarding the capacity of this pump station. If a direct connection to the transmission network is not feasible, potentially this pump station and associated infrastructure could be upgraded to

receive the additional flows from this development. The Wanaka wastewater model was run with the additional peak wet weather flows of 26 l/s from the proposed Orchard/Riverbank Road development connected to the 225mm UPVC local network, at Manhole ID:223635 on Ballantyne Road. The development impact was assessed against a 5-year ARI design storm to understand the performance of the network.

As shown in the Figure 4-3 long-section below, the post-development scenario shows no evidence of surcharge in the 5-year ARI design storm within the local 225mm network. It is considered the gravity network is sufficiently sized to accommodate the increased flows from this development. However, it is unknown whether this local infrastructure has been earmarked to receive flows from neighbouring potential development sites, this will need to be confirmed by QLDC.



**FIGURE 4-3 ORCHARD/RIVERBANK ROAD (26 L/S FLOWS) TO LOCAL – 5 YEAR ARI DESIGN STORM**

If this option is preferred, the development consultant will need to consider the feasibility of upgrade of the existing private pump station, including the design and sizing of the required infrastructure connecting the development site to the proposed local network connection point.

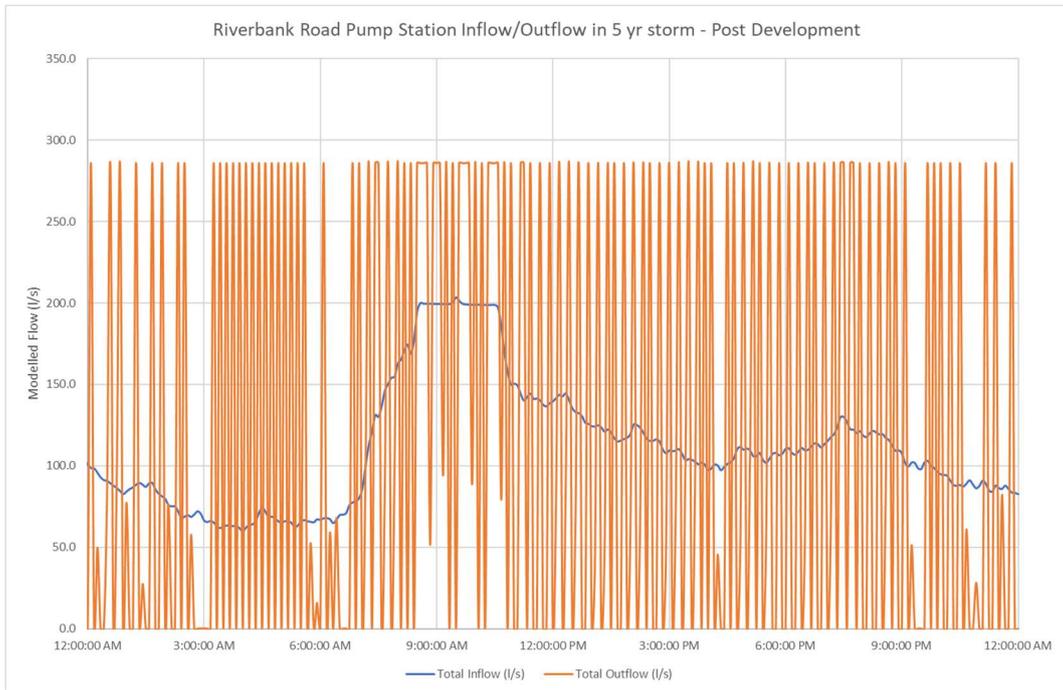
#### 4.5. PUMP STATION ASSESSMENT

The 630mm HDPE transmission network flows north via gravity to the Riverbank Road Pump Station.

The Riverbank Road Pump Station has a maximum capacity of 286 l/s with one pump operating (based on QLDC records). With a modelled peak inflow of 204 l/s in the 5-year ARI design storm for the post-development scenario, the pump station and associated rising main have sufficient capacity to receive the additional Orchard/Riverbank Road development flows.

Modelled inflows and outflows for the post-development scenario are shown in Figure 4-4 below.





**FIGURE 4-4 MODELLED RIVERBANK ROAD PS FLOWS – 5 YEAR ARI DESIGN STORM**



## 5. MODEL ASSUMPTIONS AND LIMITATIONS

The model assumptions should be read in conjunction with the following reports.

- 'Wanaka Wastewater Model Build & Calibration Report' (Beca, August 2016)
- 'Wanaka Wastewater Network Future System Performance Report' (Beca, August 2017)
- 'Wanaka Wastewater Model Review & Update – High & Medium Priority Fixes Memo' (HAL, 2018)

The following limitations apply to the modelling undertaken as part of these studies:

- The model was originally calibrated against flows developed from field data collected in 2015 supplemented by QLDC pump station SCADA data. The 2018 model review undertaken by HAL has determined only a medium degree of confidence in the accuracy of the model. Additional flow gauging and model re-calibration is proposed for 2019.
- The distribution of the modelled population is an approximation based on the 2013 census residential population, factored up for a high population scenario. No allowance has been made for additional growth since 2013, other than known development areas.
- Modelled network asset data for manholes and pipes is generally as provided in the BECA calibration model, and its origin is not clear. Manhole and pipe level data has not been validated against QLDC's GIS, as-builts or survey data as part of this assessment, or as part of the HAL model review/update. Where potential network constraints are identified, it is recommended asset data in these areas is confirmed through manhole survey.
- Pump station model parameters have been determined based on information provided by the QLDC planning team, SCADA data (where available) and pump station manuals, and the accuracy has not been validated as part of these studies.
- Due to limited visibility, this assessment excludes information on any additional recently consented neighbouring developments in the contributing catchment.
- This assessment focuses on the wastewater network downstream of the site, and does not consider sizing of infrastructure within the proposed site to service future development upstream of the site.
- It has been assumed that no existing overarching structure plan has been developed by QLDC for servicing this area.
- The impact of expected flows on the WWTP has not been considered as part of this assessment.

## 6. CONCLUSION

The objective of this study was to utilise the existing hydraulic model of the Wanaka wastewater network to assess the impact of the proposed Orchard/Riverbank Road development.

The model was run under the current (2015) population scenario, with the additional maximum 600 lots yield peak wet weather flows (26 l/s) from the proposed Orchard/Riverbank Road development added in. The development impact was assessed against a 5-year ARI design storm to understand the performance of the downstream network, with two proposed connection options.

The existing 630mm HDPE transmission network flowing to Riverbank Road Pump Station shows no existing capacity constraints, with good capacity available. QLDC's overflow database shows no reported overflows incidents in the network, supporting the model predictions.

The model was run with the additional development flows connected directly to the 630mm HDPE transmission network. The model predicts a slight increase in downstream sewer flows within the transmission network, however no evidence of surcharge. It is considered the downstream network is sufficiently sized to accommodate the increased flows from this development.

GIS shows an existing private pump station and rising main discharging to the local network on Ballantyne Road, which may provide an alternative development connection. The model was run with the additional development flows connected to the 225mm UPVC local network. The model shows no evidence of surcharge and hence it is considered sufficiently sized to accommodate the increased flows from the development. However, it is unknown whether this local infrastructure has been earmarked to receive flows from neighbouring potential development sites, this will need to be confirmed by QLDC.

In both connection scenarios, the development consultant will need to design and size the required infrastructure connecting the development site to the existing network. Based on the elevation of the proposed development site, it is likely a pump station will be required to lift flows to the network connection point.

The Riverbank Road Pump Station has a maximum capacity of 286 l/s with one pump operating (based on QLDC records). With a modelled peak inflow of 204 l/s in the 5-year ARI design storm for the post-development scenario, the pump station and associated rising main have sufficient capacity to receive the additional Orchard/Riverbank Road development flows.

