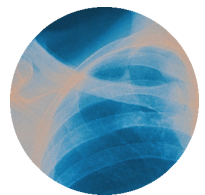




## REPORT

STRUCTURAL AND CIVIL ENGINEERS

SHOTOVER COUNTRY SHA  
THREE WATERS ASSESSMENT  
PREPARED FOR  
QUEENSTOWN LAKES DISTRICT COUNCIL  
114562.00  
21 OCTOBER 2015





## Shotover Country SHA Three Waters Assessment

Prepared For:  
Queenstown Lakes District Council

Date: 21 October 2015  
Project No: 114562.00  
Revision No: 2

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## CONTENT

EXECUTIVE SUMMARY

INTRODUCTION

SCOPE OF WORK

LIMITATIONS

WATER

WASTEWATER

STORMWATER



## INTRODUCTION

Holmes Consulting Group (HCG) has been engaged by the Queenstown Lakes District Council (QLDC) to provide an assessment of the Three Waters infrastructure for a proposed 7.8 hectare development at the western corner of Shotover Country located on vacant farm land between Stalker Road and Old School Road. The site is located on Lot 4 D.P. 473343 and Lot 11 D.P. 386956 and is intended to be developed as a Special Housing Area as set out in the Housing Accords and Special Housing Areas Act 2013.

It is proposed to subdivide the existing land into 95 residential lots. No specific modelling has been undertaken with regards to the wastewater and water supply networks for this development. Instead, the recent reports provided by Tonkin & Taylor (T&T) and Rationale for the neighbouring Shotover Country development have been referred to for the infrastructure assessment. HCG has undertaken an evaluation of the required stormwater infrastructure.

## SCOPE OF WORK

The scope of work for this project included the following:

1. Review existing water modelling reports and infrastructure to assess capacity and network constraints.
2. Review existing wastewater modelling reports and infrastructure to assess capacity and network constraints.
3. Complete a desk study to assess the existing stormwater infrastructure and determine network constraints.
4. Report on our findings and recommendations.

## LIMITATIONS

Findings presented as a part of this project are for the sole use of QLDC in its evaluation of the subject properties. The findings are not intended for use by other parties, and may not contain sufficient information for the purposes of other parties or other uses.

Our assessments are based on a desk study only. Condition assessments of existing infrastructure have not been undertaken and it has been assumed that any deficiencies due to damaged or aged infrastructure will be addressed within existing renewals budgets.

Our professional services are performed using a degree of care and skill normally exercised, under similar circumstances, by reputable consultants practicing in this field at this time. No other warranty, expressed or implied, is made as to the professional advice presented in this report.



## WATER SUPPLY

### *Existing Infrastructure*

The greater Shotover Country Special Zone and part of Lake Hayes Estate is supplied via a bore (72 l/s) and 1000 m<sup>3</sup> reservoir that was installed in 2013. From the storage reservoir a 250 mm falling main supplies Shotover Country via Jones Avenue. The current water supply network terminates at separate 150 mm mains at the head of Stalker Road and Tonis Terrace. These mains are intended to be extended west as subsequent stages of Shotover Country are developed.

### *Proposed Development*

The proposed SHA development consists of 95 dwelling units that would be fed off the Shotover Country / Lake Hayes Estate Water Supply Scheme. Based on the QLDC Land Development and Subdivision Code of Practice this development has an average daily water flow (ADF) demand of 200 m<sup>3</sup>. The applicant has agreed with QLDC that the Peak Day Flow (PDF) can be reduced to 2 x ADF and the Peak Hour Flow (PHF) reduced to 5 x ADF. Based on these figures the proposed development will have a PDF of 400m<sup>3</sup> and PHF of 42m<sup>3</sup> (11.6 l/s).

Under the Fire Fighting Water Supplies Code of Practice (NZS4509:2008) the proposed residential development would have a FW2 fire fighting classification and therefore require a minimum 12.5 l/s flow at two hydrants (25 l/s total).

### *Capacity*

In September 2015 network modelling of the water network was undertaken by Tonkin & Taylor to determine the impacts and required upgrades associated with the addition of the SHA to the greater Shotover Country development. This modelling was based on 700 l/person/day and reduced peaking factors of peak day flow 2 x ADF and peak hour flow of 5 x ADF as agreed with QLDC.



**Table 1: T&T Shotover Country Water Modelling Sep 2015**

Average peak day flow	Equivalent development (Cumulative)	Network arrangement
52 l/s 4450 m <sup>3</sup> /day	900 dwellings, 2000 m <sup>2</sup> commercial use and the proposed primary school within Shotover Country, and the existing 159 dwellings within Lake Hayes Estate scheme.	<ul style="list-style-type: none"> <li>- Bore flow of 72 l/s.</li> <li>- 355 mm PN 16 rising main from borefield to former Lake Hayes Estate reservoir site. 355 mm PN 12 rising main from former Lake Hayes Estate reservoir site to Shotover Country reservoir. 350 mm ID falling main from Shotover reservoir to former Lake Hayes Estate reservoir site.</li> <li>- Storage requirements of 820 m<sup>3</sup> live storage, 180 m<sup>3</sup> firefighting storage and 715 m<sup>3</sup> emergency storage.</li> </ul>
55 l/s 4720 m <sup>3</sup> /day	954 dwellings, primary school and commercial areas (entire Shotover Country) and existing 159 dwellings within Lake Hayes Estate scheme.	<ul style="list-style-type: none"> <li>- Bore flow of 75 l/s <sup>(1)</sup></li> <li>- Storage requirements of 820 m<sup>3</sup> live storage, 180 m<sup>3</sup> firefighting storage and 750 m<sup>3</sup> emergency storage.</li> </ul>

The T & T modelling report concludes-

*'Once the daily average demand flow of 52 l/s, or daily demand volume of 4450 m<sup>3</sup> is exceeded, upgrades and additional bore will be required. If upgrades are not carried out there is the possibility of the reservoir draining into the required firefighting storage.'*

*'Given the flow that a 72 l/s bore can supply is only 54 dwellings less than full development (954 dwellings in full development), it is recommended that flows are monitored as demands may vary from the design peak day demands. Full development may be able to be fed on the 72 l/s bore.'*

*'Alternatively, it is possible that demands will be greater than design demands, hence monitoring of flows will allow for an additional bore to be installed at the required time (average flow on peak day of 52 l/s).'*

The development of the Shotover Country Special Zone has a likely development potential of 859 residential dwelling units. The T&T modelling therefore indicates that the additional 95 SHA dwelling units (954 total) will exceed the current design capacity of the water supply network.

The T&T modelling report has also advised minimum pipe sizes required to extend the existing network in order to provide the required flows and pressures to the development. This modelling has confirmed residual pressures will be above 300 kPa and fire flows greater than 25 l/s as required under QLDC standards.



### *Required Upgrades*

Based on the findings of the T&T report it is confirmed that the proposed SHA may require the addition of a further bore and either emergency storage or direct injection. However, it is noted that these figures are based on 700 l/person/day which may be reduced (or increased) on confirmation of metering results from stage 1 & 2 of Shotover Country.

For security of supply a second bore and standby generator is recommended by T&T. This is an issue for the greater Shotover Country development and cannot be directly attributed to the addition of the SHA.

If a further bore and storage or direct injection is required to meet the demands of the SHA the cost of installing this should be shared between the developer and QLDC as the additional bore has advantage of ensuring security of supply for the scheme as a whole. The additional bore is expected to cost approximately \$115,000 + GST.

To supply the development the existing council water supply network will need to be extended and hydrants installed. The size of the pipes should be as per the Tonkin & Taylor water modelling report September 2015 and installed in accordance with the requirements of the QLDC Land Development and Subdivision Code of Practice. The cost of installing this infrastructure should be met by the developer.

## WASTEWATER

### *Existing Infrastructure*

The Shotover Country wastewater pump station was commissioned in September 2013. The pump station feeds to the Council's 375 mm gravity main on State Highway 6 via a 150 mm rising main. The original design philosophy for the pump station is based on an ADF of 7 l/s and PHF of 16 l/s. The pump station consists of two progressive cavity pumps (Mono Epsilon). Normal operation is by way of a duty/standby setup with alternating starts and a flow of 9-10 l/s triggered by a first float switch. At peak times a second float switch is triggered to increase the duty/standby setup to operate at 16 l/s. The pump station currently has a 60 m<sup>3</sup> emergency storage chamber and a high level alarm. The design allows for future connection of additional emergency storage and a generator if required.

The pump station is fed via a 300 mm gravity main that drains the greater Shotover Country development to the north. The pump station and gravity main are currently servicing approximately 320 dwelling units and are projected to service 859 dwelling units total once the Shotover Country Special Zone is fully developed.





### *Proposed Development*

The proposed SHA development will result in a maximum 95 additional dwelling units.

The applicant for the proposed Shotover Country SHA has assessed wastewater demand from the existing Shotover Country Special Zone and SHA based on QLDC's 2005 amendments to NZS4404:2004. This standard was superseded in June 2015 by QLDC's Land Development and Subdivision Code of Practice. Based on the current standard the existing Shotover Country Special Zone (SCSZ) and proposed Shotover Country Special Housing Area (SC SHA) result in the following wastewater demands-

**Table 2: SCSZ Wastewater Demand (QLDC Code of Practice)**

Facility	Demand Per Person	People	Average Dry Weather Daily Flow (ADF)	Peak Hour Flow (PHF)
859 Residential Dwelling Units	250 l/day	3 per lot	644.25m <sup>3</sup>	37.28 l/s
Primary School	40 l/day	650	26m <sup>3</sup>	1.5 l/s
			<b>670.25m<sup>3</sup></b>	<b>38.78 l/s</b>

**Table 3: SC SHA Wastewater Demand (QLDC Code of Practice)**

Facility	Demand Per Person	People	Average Dry Weather Daily Flow (ADF)	Peak Hour Flow (PHF)
95 Residential Dwelling Units	250 l/day	3 per lot	71.25m <sup>3</sup>	4.12 l/s

Based on Council's current standard the combined development would result in a total ADF of 741.50m<sup>3</sup> and an instantaneous PHF of 42.9 l/s.



### *Capacity*

The existing 300 mm main that feeds the pump station is laid at minimum grade (0.25%). This main has a maximum capacity of 55 l/s (Colebrook White). The existing main has capacity to convey the peak hour instantaneous flow rate of 38.78 l/s from the greater Shotover Country Special Zone.

Based on the peak hour flow the current Shotover Country wastewater pump station peak (16 l/s) provides capacity for 370 dwelling units. As per best practice this provision assumes no emergency storage is used to buffer peak hour flow rates.

The QLDC Land Development and Subdivision Code of Practice section 5.3.11 requires that that pump stations and pressure mains shall be installed in accordance with the standards of the TA. Pump stations vested in QLDC have historically been designed to the QLDC infrastructure Code. Section 2.7.10.6 of the code states-

*'Eight hours of emergency storage is required in every wastewater pump station, at least 2 hours of which must be external to the wet well (i.e. either in the storage chamber, or in the reticulation). Where less than 8 hours of emergency storage is available, standby generation will be required and adequate fuel storage should be supplied for a minimum eight hours run time.'*

With full development potential of the Shotover Country Special Zone (859 units) the current 60 m<sup>3</sup> of emergency storage provides for 2 hours ADF storage and less than half an hour of PHF storage. The current wastewater pump station set up provides insufficient peak hour pumping and emergency standby storage to service the development potential of the Shotover Country Special Zone. Without a generator the pump station is at risk from power outage and does not comply with QLDC standards.

At the time the wastewater pump station was designed the impacts on the greater network were modelled by Rationale Ltd. The impacts at the current peak 16 l/s were considered and accepted by Council. Recent Rationale modelling has confirmed that there is 150 l/s of capacity within the 375 mm main from Stalker Road to the Shotover Treatment Ponds and this exceeds the current flows from the three pump stations that feed into it.

### *Required Upgrades*

The existing 300 mm gravity main that feeds the Shotover Country pump station has 55 l/s of capacity and is sufficient to drain the peak hour instantaneous flow from the fully developed Shotover Country Special Zone and the proposed Shotover Country SHA. The developer will be required to design and install a local pipe network to service the proposed SHA lots. This network would likely be 150 mm or 225 mm mains feeding to the existing 300 mm gravity main upstream of the pump station. This cost will be met by the developer.



The current pump station set up provides insufficient pumping and emergency storage capacity to service the maximum development potential of the Shotover Country Special Zone. The existing pump station is near operational capacity and has neither the required 8 hours of emergency storage nor backup generator. Prior to acceptance of further flows from either the Shotover Country Special Zone or the SHA the pump station will require upgrades in operational capacity, emergency storage and/or a backup generator.

The development of the SHA will require the existing pump station be upgraded to include either 4.12 l/s of additional pumping or 15 m<sup>3</sup> of operational storage to cater for the peak hour flows. The development will also require an additional 23.75 m<sup>3</sup> of emergency standby storage. The required emergency storage volume could be reduced with the provision of a backup generator. The cost of these upgrades will be met by the developer.

Recent Rationale modelling has confirmed any minor increases in pump flow rates will be able to be accommodated within Council's 375 mm main on State Highway 6 and no upgrades will be required.

Any impacts on the Shotover Waste Water Treatment Plant will be addressed through the payment of development contributions.

## STORMWATER

### *Existing Infrastructure*

There is no existing Council owned stormwater infrastructure in the direct vicinity of the proposed SHA.

An existing Council network has been developed to the north to service development of the Shotover Country Special Zone. This network currently terminates at a series of temporary soakage ponds at the toe of the lower terrace slope. In future this infrastructure will be extended south to service subsequent stages of development before finally terminating at an outfall to either the existing wetlands or directly to the Kawarau River.

### *Proposed Development*

The proposed SHA development has a total area of 7.8 ha. This will increase the total catchment area of the Shotover Country Special Zone from 107.4 ha to 115.2 ha (an increase of 7%).

Primary flows from this area will be piped to an outfall at the existing wetland or direct to the Kawarau River. Under rule 12.4.1.1 of the Otago Regional Plan: Water the disposal



of stormwater in this manner is a permitted activity on the basis that provision is made for the interception of any contaminants prior to discharge.

#### *Required Upgrades*

A primary and secondary stormwater network will be required to cater for runoff from the proposed SHA area.

As per QLDC Land Development and Subdivision Code of Practice the primary stormwater system shall be designed to cater for the minimum 1 in 20 year return period storm (5% AEP). To comply with section 12.4.1.1 of the Otago Regional Plan: Water the primary system will require the installation of contamination interceptions prior to disposal to surrounding waterways.

The secondary system shall be in the form of a flows paths capable of conveying the minimum 1 in 100 year return period storm (1% AEP).

The cost of this primary and secondary infrastructure will be met by the developer.

#### SUMMARY OF UPGRADES

A further water bore and storage may be required to meet the demands of the SHA. The cost of installing this would likely be shared between the developer and QLDC as the additional bore and storage has advantage of ensuring security of supply for the Shotover Country / Lake Hayes Estate water scheme as a whole.

The development of the SHA will require the existing pump station be upgraded to include additional pumping or operational storage. The development will also require additional emergency storage and/or a standby generator. The cost of these upgrades will be wholly met by the developer.

There are no other upgrades required to the Council's water supply and wastewater networks to support this SHA development. The required extension to Council's water and wastewater pipe networks and installation of required stormwater infrastructure will be undertaken by the developer.