Project Number: 3-C1860.01

Contract 2226A - Seadown Water Supply Scheme Review 2020

Stage 3 Report

10 December 2020

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Document Details:

Date: 10 December 2020
Reference: 3-C1860.01
Status: Final

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Document History and Status

Revision	Date	Author	Reviewed by	Approved by	Status
00	5 June 2020	E Boivin	G Cooper	G Cooper	Draft
01	20 October 2020	E Boivin	D Johnson	G Cooper	Final
02	10 December 2020	E Boivin	D Johnson	G Cooper	Final

Revision Details

Revision	Details
00	Stage 2 Outcomes to Inform Workshop
01	Draft Stage 3 Report
02	Final Stage 3 Report incorporating feedback from Timaru DC and outcomes of presentations

1 Background

In October 2019 WSP were commissioned by Timaru District Council (TDC) to undertake an issues and options investigation for the Seadown water supply. The purpose of the project is to identify the options and associated costs for the future management of the Seadown water supply from a source to point of supply perspective. Compliance with Drinking Water Standards New Zealand has not been considered as part of this study.

The recently calibrated Seadown model has been used in the assessment as it provides a current and accurate representation of the water supply operation and can be used to investigate issues and options at a 'master planning' level with a high level of confidence.

The objectives of this report are to present the outputs from the various stages:

- Stage 1 Data Collection and Model Update,
- Stage 2 Options Development - including multi criteria analysis to select preferred options, and,
- Stage 3 Rough Order Costing Identification for the preferred options - the report presents high-level rough order capital and whole of life costs, generally based on TDC unit rates and operational costs.

2 Seadown Water Supply Network Overview

2.1 Description of Network Operation

The Seadown water supply scheme provides water for domestic and stock use for several farms and lifestyle blocks in the area between Timaru, Temuka and Pleasant Point. The water supply serves approximately 5,226 hectares (not including roads).

It was originally an open race scheme that was converted to a piped scheme in 1974 by Levels County Council. At that time it was Timaru's only way of getting additional water from the Opihi River.

The water is supplied to unrestricted tanks or troughs that are directly connected to the scheme on original connections. Since the early 1990's new connections are to restricted tanks that feed private troughs. No new trough connections have been allowed since this time. Timaru airport and Ravensdown are the only two metered customers.

2.1.1 Network Operation Overview

The Seadown water supply is predominantly an on-demand system although on-site storage is required for domestic use. Seadown water supply network supplies a total of 968 customer connections: 612 trough connections, 223 unrestricted tanks and 133 restricted tanks. Restricted domestic consumers receive a restricted daily allowance of 1,000 L/unit. Unrestricted domestic and agricultural (stockwater) consumers receive an unrestricted connection.

The water supply network comprises of approximately 175 km of predominantly PVC mains installed between 1972 and 2018, and AC pipe.

During the Seadown model calibration in 2019 the Seadown water supply was split into multiple demand zones (see Figure 2-1). All the zones are from a reservoir and pump station with a single well source on Mill Road.

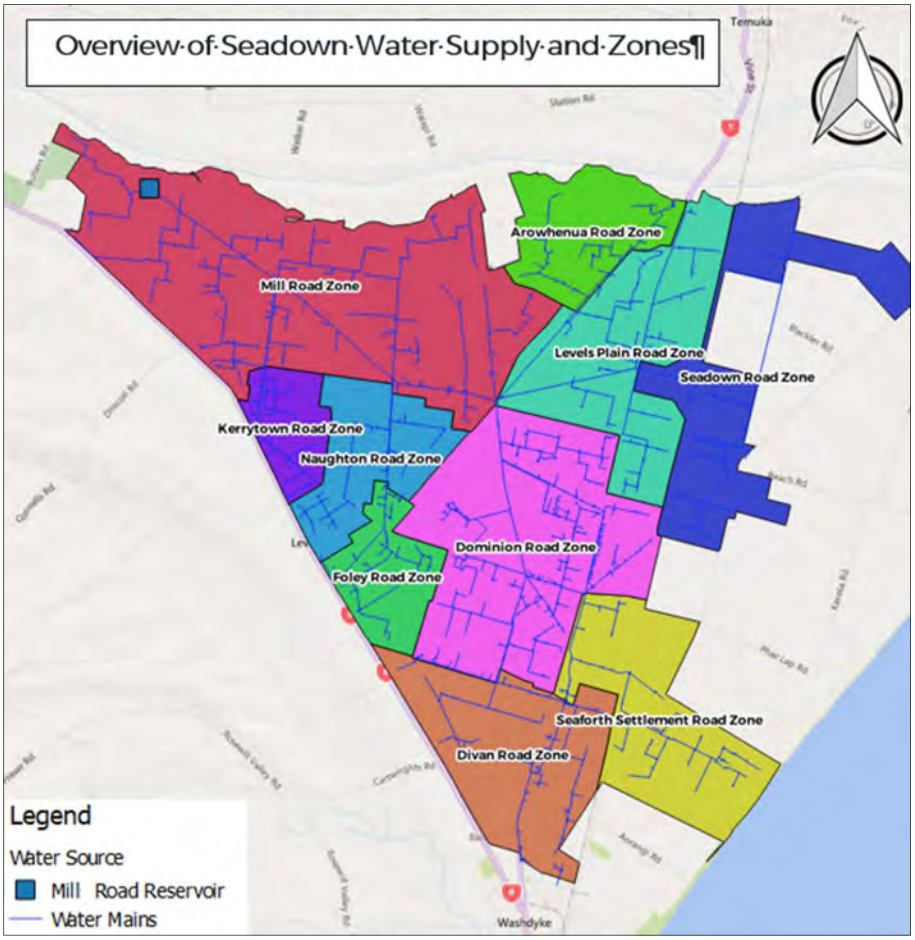


Figure 2-1 : Seadown Water Supply Overview

2.1.2 Assets Overview

2.1.2.1 Headworks Details

The source for the Seadown water supply is a bore supply at the Seadown (Mill Road) reservoir site. Water is pumped from the bore to an aerator above the reservoir. The water then gets chlorinated in the reservoir followed by ultraviolet (UV) light treatment. The UV kills bacteria and protozoa, and the chlorine treatment prevents contamination in the pipes. From the reservoir (*Table 2-1*), water is pumped to supply the Seadown network from one of the two surface pumps operated on variable speed drives. A variable speed pump is available on site on stand-by (not modelled).

Table 2-1 : Reservoir Details

Reservoir	Approximate Depth (m)	Volume (m^3)	TWL (mAD)	BWL (mAD)
Mill Road Reservoir	3.15	514	56.5	49.8

2.1.2.2 Pump Station

Generally, only a single pump operates at a time. Both pumps operate on a variable speed drive to maintain a constant outlet pressure 30 m at night and 33 m during the day. The duty and backup pumps are rotated periodically.

2.1.3 Reticulation Overview

Pipes below 75 mm are mainly PVC, with 85% of PVC pipes laid in 1974. Pipes of 100 mm diameter and above are mainly AC laid in 1974.

Figure 2-2 and Figure 2-3 detail the breakdown of pipework (all mains) within the reticulation by material and the year installed. This does not include private pipework and laterals.

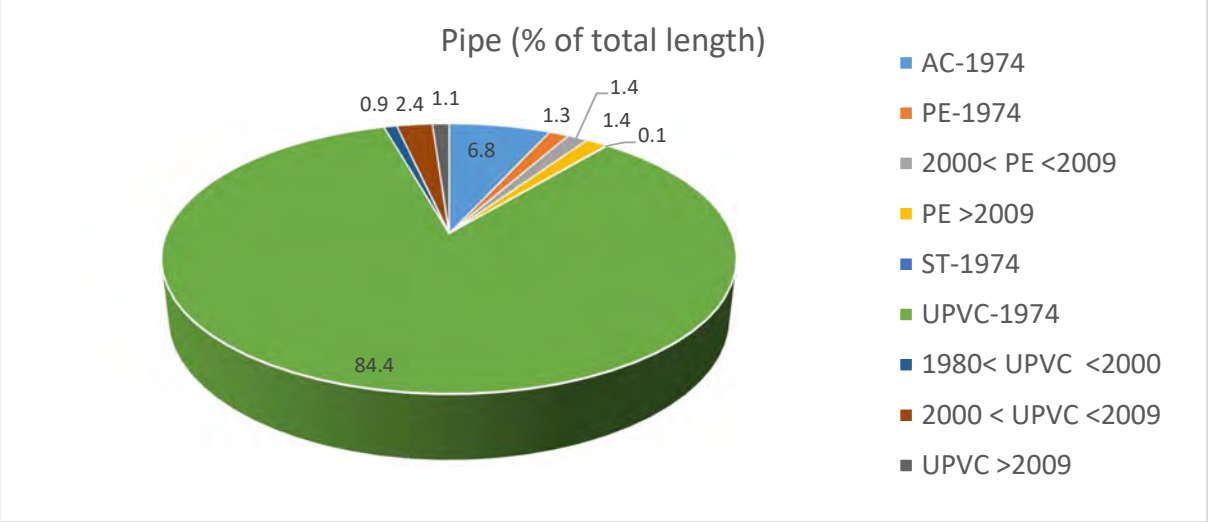


Figure 2-2 : Breakdown of Seadown Pipework – Material and Year Installed

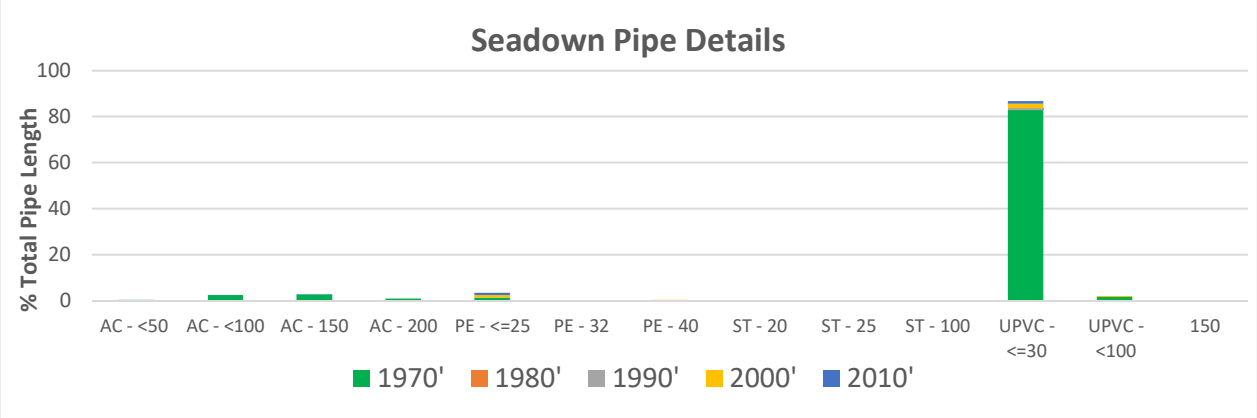


Figure 2-3 : Seadown Pipe Details

2.2 Seadown Model Update and Growth Model

The Seadown Water Supply Network Model (model) was developed and calibrated in 2019. TDC undertook a trough and tank survey in 2020 of all troughs (directly connected to network) and tanks located within the Seadown distribution network. The model was updated using the recently completed tank and trough survey. Appendix E summarises the estimated consumption per customer.

The Seadown model has been used as a key tool to identify the main network performance issues and scenarios assessment, with the following applications:

- Being able to understand the impact of changing unrestricted connections to troughs and tanks to restricted connections.

- Assessing the impact of additional growth in the Seadown water supply in terms of network performance and demand. A growth of 10 % has been assumed for domestic tank connections within the Seadown water supply over 30 years (2050). It was assumed that growth will comprise additional lifestyle lots supplied by restricted tanks at 1 unit per lot (1,000 L/unit/day).

Appendix B provides a detailed description of the model update and growth model (consumption calculations and key assumptions).

2.3 Plan Change 7

A review of ECan's Land and Water Regional Plan (LWRP) and Proposed Plan Change 7 (PC7) has been undertaken to understand the potential impact of PC7 on proposed solutions for the Seadown water supply. Appendix A provides a detailed report on the assessment of PC7 implications.

Because of PC7, no new community water supply takes can be applied for within the Opihi Freshwater Management Unit.
If TDC wish to increase the water allocation (instantaneous rate or quantity) for the Seadown Water Supply Scheme the following aspects will need to be considered:

- Demand Management Plan, and
- Nitrate Management.

3 Level of Service

3.1 Seadown Consent levels and Peak Day Model Representation

There are currently two consents associated with the Seadown water supply:

CRC101875 – Timaru District Council Water Unit. This consent has not been considered in this assessment as TDC have advised that it is only used as an emergency supply and is not always available.

CRC010349 – Seadown Water Supply Scheme restricts the supply to Seadown to:

- Maximum of 21 L/s
- 149,743 m^3 for 122 consecutive days

In the last five years the volume of water consumed has not exceeded the 122 consecutive days limit of 149,743 m^3, though there is one period in the summer of 2017-2018 where it came close to being exceeded.

The model simulated flows were compared to historical flow data to evaluate the previous demand assumptions.

The Growth Seadown Peak Day Demand Model supplies a flow close to the maximum consented 21 L/s for the assumed 10% growth over 30 years planning horizon. It should be noted that the daily volume of 1,340 m^3 (equivalent to 163,480 m^3 for 122 consecutive days) will exceed the consented limit of 149,743 m^3 for 122 consecutive days.

Appendix B provides details of the flow comparison, assumptions and limitations.

In terms of the peak day flow simulated by the model, overall a good flow representation was obtained in most of the zones when simulated flow at meters was compared to historical flows. Two zones (Foley Road and Seaforth Settlement Zones) did not replicate the same patterns and indicated that the assumed consumption for domestic customers and troughs could be higher than the consumption applied for the rest of the Seadown network. Those limitations have not been represented in the model but have been considered as part of the options assessment.

3.2 Network Simulated Pressure

The standby pump at Seadown pump station has been set to assist the duty pump during the assessment of the network performance for the peak day models.

Figure 3-1 shows that during high demand periods there is a significant impact on the capacity of the network. The future peak day model shows similar network capacity issues previously identified for the working model system performance. At times there is little to no flow of water to a large number of connections (affected by low level of service). This suggests that the network is undersized for high flows / peak demand.

An assessment has been undertaken which identified that for the future peak day demand 127 domestic connections (97 restricted tank and 134 unrestricted tanks) and 422 troughs are predicted to have pressure of less than 20 m for a duration of 30 minutes or more.

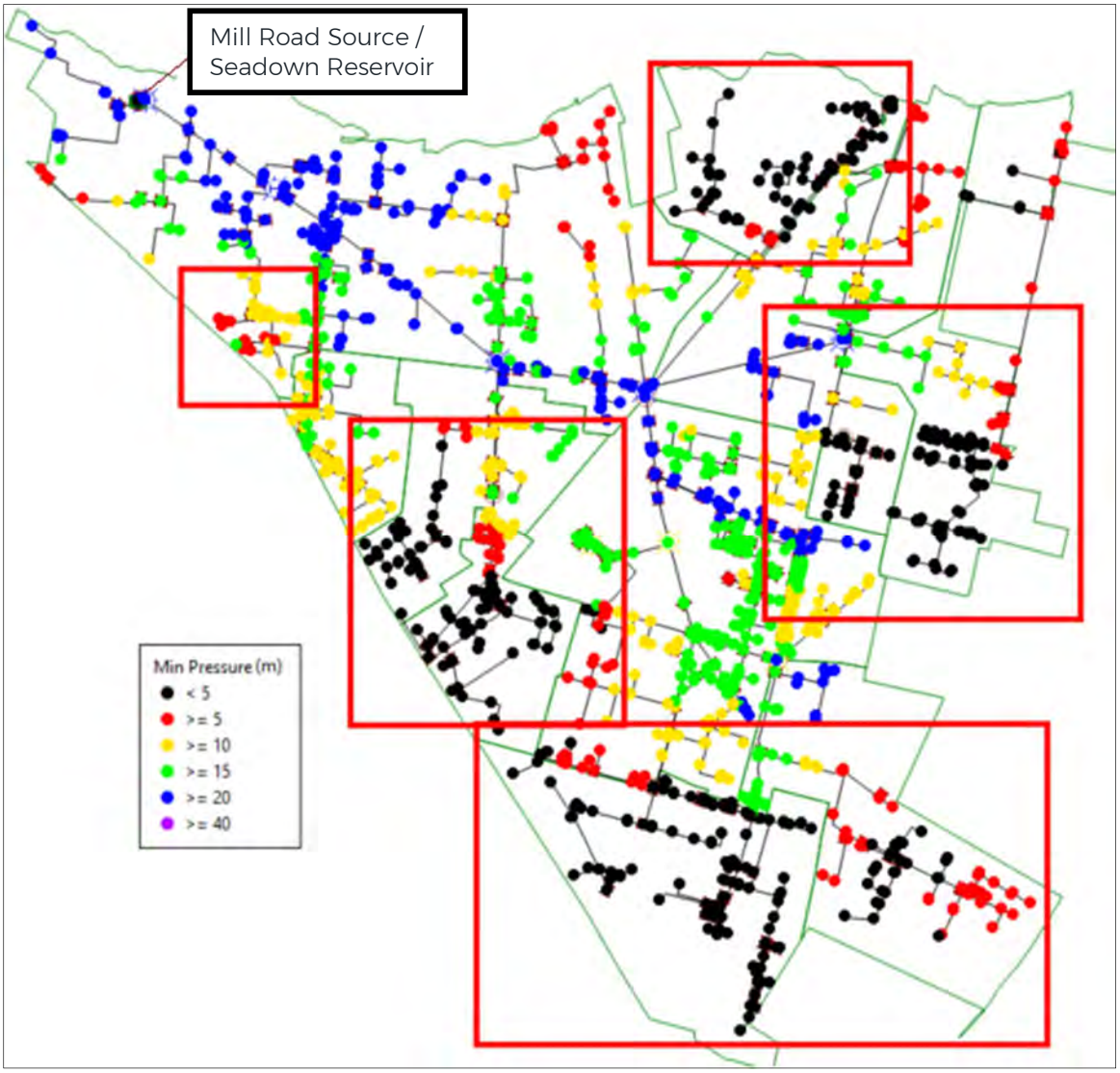


Figure 3-1 : Future Peak Day Demand - Minimum Pressures

It is important to note that the low pressure observed does not consider the duration of low pressure.

3.3 Network Simulated Pipe Headloss

High headloss is an indication of undersized pipes or poor condition assets that cannot supply high flows to meet peak demand. In general, headloss in the Seadown water supply remains within acceptable levels.

However, several kilometres of mains are affected by high headloss during peak demand. The pipes with high headlosses have been flagged in Figure 3-2 (red rectangles) and are mainly located in the Foley Road, Arowhenua Road and Divan Road Zones. These are likely to be contributing to the pressure level of service issues predicted in these areas due to undersized pipes.

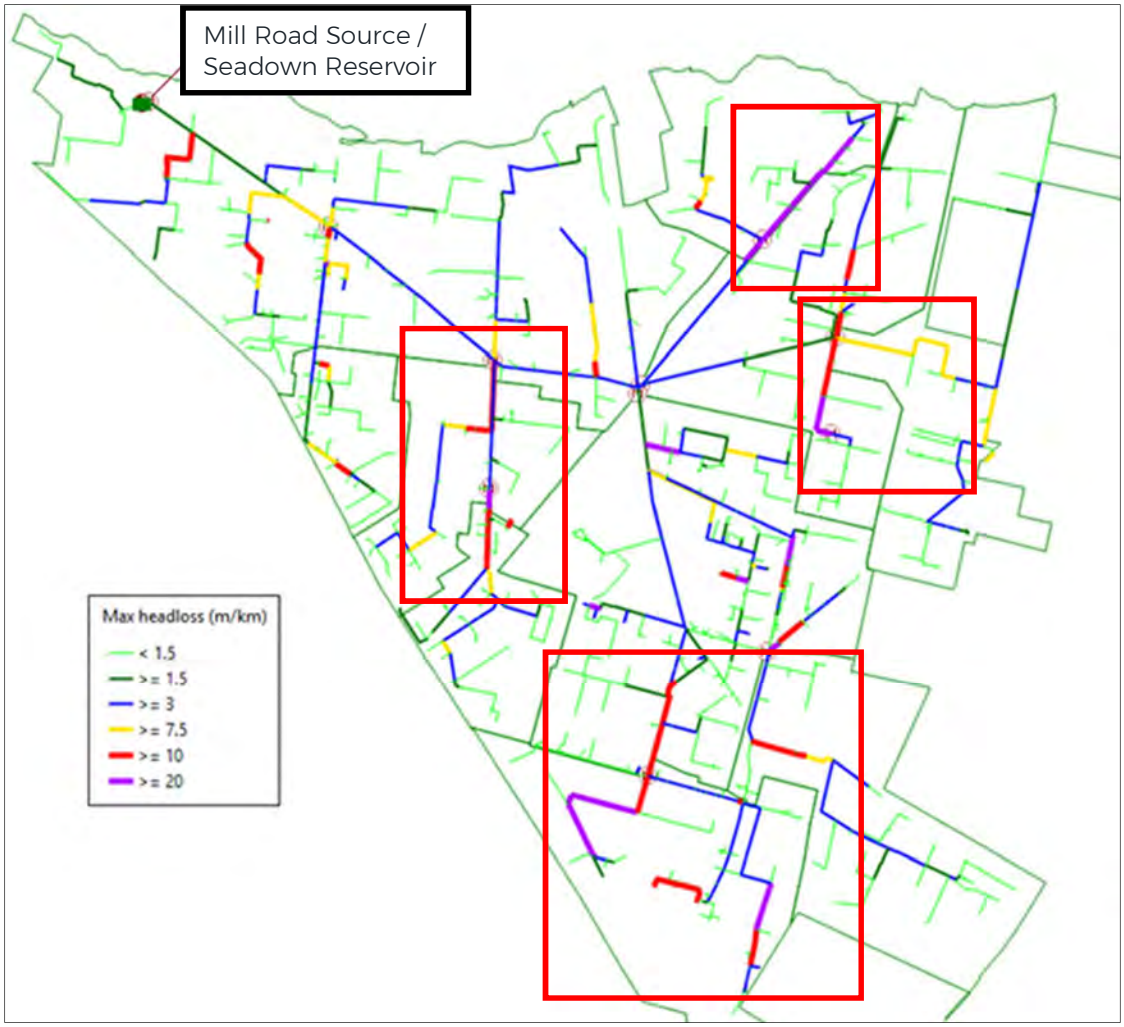


Figure 3-2 : Future Peak Day Head Loss in Network

3.4 Reservoir Residence Time

The storage capacity of the Seadown reservoir in the model has been assessed as part of the system performance. Table 3-1 summarises the output. The equivalent number of hours supply provided by the reservoir in the event of a loss of supply to the network was calculated based on the average daily volume (not considering peak demand periods) and the total flow out of the reservoir for the future growth peak model.

This assessment shows that the reservoir has just over nine hours of storage for a future peak day demand. However additional storage is provided within the network at customer tanks for the domestic supply.

Table 3-1 : Reservoir Residence Time

Asset	Reservoir capacity (m^3)	Calibration Day	Peak Day Average (m^3/d)	Peak Day Storage Capacity (hours)	30 years - Future Peak Day Average (m^3/d)	30 years - Future Peak Day Storage Capacity (hours)
Seadown Reservoir	520	10/02/2019	1,180	10.6	1,340	9.3

In 2016 WSP carried out a structural condition assessment of the Seadown Reservoir (no seismic assessment was carried out). The reservoir was assessed to have a remaining life of approximately 20 years.

3.5 Pipe Network Useful Life

A high-level assessment of the desktop Useful Life (U.L.) has been undertaken for the Seadown pipe network. The desktop U.L. of the pipes is only a high level conservative guide and assumes that the appropriate pressure class has been specified and that the pipelines have been manufactured/installed correctly. Where physical condition assessments have been undertaken, the results for that piped asset supersede the U.L. Table 3-2 provides an indication of the desktop U.L of the reticulation network in terms of age, diameter and material.

Table 3-2 : Pipe Desktop Useful Life by Material, Diameter and Age

Material	Year Inst.	DN Range	Desktop Useful Life (U.L)	Comments
AC	1974	DN 75	40	Typically for <DN 100, 50 years U.L. is used, but utilising the National AC Pressure Pipe Manual charts, 40 yrs is acceptable for a Class CD pipe. 50 yrs. is only exceeded with Class EF (Post 1977 manufactured pipe).
AC	1974	DN 100, DN 150	50	-
PE-HD	1974	DN 15, DN 20	50	Pre 1986 PE typically is a poor-quality material than modern PE.
PE 100	2007 & 2015	DN 20	100	Post 1996, PE HD was replaced with PE 100 (i.e. it is not PE HD), which is a better-quality PE resin and manufacturing QA improved.
PE 80	2007	DN 40	100	Post 1988 PE-MD is actually PE 80 resin.
PVC-U	1974	≤DN 80	50	Pre 1996, PVC-U was produced with lower quality resins and often little to no factory QA. Small DNs can be especially vulnerable.

U.L is a good base line, but piped assets should not be replaced just because they have reached the end of the theoretical U.L. Other factors need to be considered in the renewal planning such as condition assessment, criticality, performance, failure history, resilience, redundancy in the network etc. but U.L. is a starting point to develop a desktop condition grade.

It should be noted that TDC has previously completed internally a useful-life-based desktop condition assessment, and various physical pipe condition assessments, but the data has not been used as part of this study / report. TDC can review and update the U.L based on their internal assessment.

4 Issues and Options

4.1 Key Issues

The following is a summary of the key issues and observations for the Seadown water supply:

- The model predicts high headloss in the Foley Road, Arowhenua, Mill Road (off Kerrytown Road), Levels Plain Road, Seaforth Settlement Road and Divan Road zones during peak day demand.
- The pressures in these areas also drop below the 20 m minimum pressure level of service, which indicates that the pipe network supplying these areas is undersized.
- There is high demand in the Foley Road zone, leading to the local network being undersized.
- Some areas have been estimated to have high real losses (unaccounted for water), though this is difficult to evaluate accurately due to the nature of the water network. These estimates are around 40% and 70% of the total consumption.
- Very spiky demand profile due to unrestricted consumption and non-compliant connections, which is likely to be causing pressure level of service issues.
- Aging infrastructure which could lead to interruption of supply.
- The maximum peak flow is at times above consent level maximum of 21 L/s. The demand has not exceeded the 122 consecutive days consent level over the past five years.
- In terms of supplying future growth, the estimated maximum peak day demand will be close to the maximum consented flow of 21 L/s.
- In terms of supplying future growth, the estimated peak day demand of 1,340 m^3/day (equivalent to 163,480 m^3 for 122 days) is higher than the equivalent consented volume of 1,227 m^3/day (149,743 m^3 for 122 consecutive days). A prolonged period of high usage could result in demand exceeding the consented volume. Demand management and / or additional storage would help mitigate the impact of high demand in the system.
- The Seadown Reservoir provides nine hours of storage against a future peak day average demand of 1,340 m^3/day. However additional storage is provided within the network at customer tanks and may be deemed sufficient for a rural water supply.
- The daily volume & current rate of take utilise 25% of the 100 L/s take.

4.2 Options Overview

The drivers for the Seadown water supply scheme options have been based on providing and / or improving:

1. Safe water
2. Adequate quantity / efficient use of water
3. Reliable supply of water (continuity of supply)
4. Resilient supply of water (extreme event)
5. Environmental sustainability

Three scenarios were assessed:

- Scenario 1: To target the existing network performance issues.
- Scenario 2: To develop a solution to further improve the Seadown water supply network performance by forming a ring main.
- Scenario 3: To provide a single restricted supply to all connections.

The solutions aim to mitigate the current issues identified on the Seadown water supply network. The solutions involve:

- Infrastructure upgrades.
- Demand management through restricting the supply to currently unrestricted tanks and troughs and / or connecting the troughs to tanks. For example:
    - Restricting the supply to currently unrestricted tanks where these are perceived to have a domestic consumption component to 1 unit (1,000 L/unit/day). Providing for any additional units may require further reticulation upgrades.
    - Connecting the supply to troughs via restricted tanks, thereby smoothing out the peak instantaneous flows currently observed and managing the volume of water obtained at the troughs.
- Improve the resilience of the network – consideration of additional storage and further improving the pipe network (e.g. ring main).
- Managing unaccounted for water.

Appendix C summarises the range of chosen options identified against the drivers for improving the Seadown water supply. These are further presented as Scenario 1, Scenario 2, and Scenario 3 (Figure 4-1, Figure 4-2 and Figure 4-3 respectively).

4.3 Scenario 1

Scenario 1 targets the existing network performance issues. Two options were assessed for this scenario (Option 1A & Option 1B) to highlight the full network requirements to achieve the drivers for this assessment.

Option 1A assumes additional treated storage is located close to the current Seadown reservoir. Option 1B proposed a new treated reservoir be located within the local Seadown network. Option 1B has not been modelled as this option was eliminated following the Multi-Criteria Analysis (MCA) (refer Section 4.6) due to the additional pipe upgrades, treatment and pumping required.

All the schemes making Option 1A have been highlighted in Figure 4-1.

For Option 1A 40 troughs would need to be supplied from tanks and restrictions to 31 unrestricted tanks would need to be installed. Note that this option does not consider that the current consumption of the troughs located in the Foley Road zone seems to be higher than 65 L/ha/day applied in the future model. Most of the Foley Road troughs will need to be restricted if investigation suggests that the Foley Road trough consumptions are higher than 65 L/ha/day or additional pipe upgrades will be required to supply the higher demand in this zone.

Additional treated water reservoir storage is proposed to help manage demand within the resource consents limits. For the purpose of this assessment we have assumed two days of average day demand storage (about 2,640 m^3). While this assessment has not considered drinking water compliance, the impact of adding further storage in terms of the current treatment process (UV and chlorination) will need to be considered.

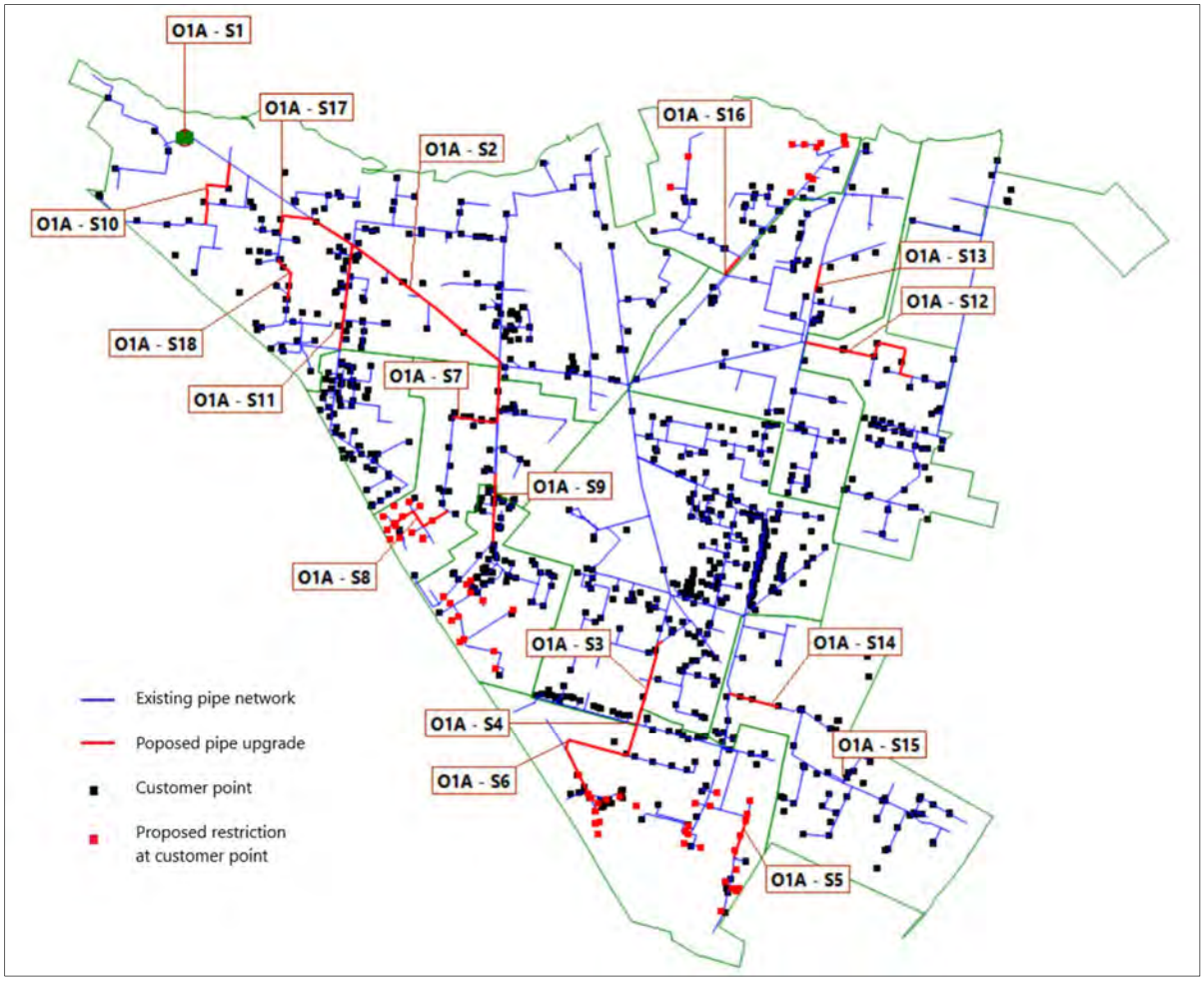


Figure 4-1 : Scenario 1 - Option 1A Description

4.4 Scenario 2

Scenario 2 looks at providing further resilience to the Seadown water supply network, whilst also improving performance by forming a ring main.

The ring main improves the pressures within the network with a minimal need of local pipe upgrades. However, it does not resolve the issues with the existing aging infrastructure which will still need to be programmed for renewal.

Demand management through tank restrictions and trough connection to tanks is not required in many zones in terms of addressing level of service issues but will be required to maintain demand within the resource consents limits.

Similar to Scenario 1, additional treated water reservoir storage was proposed to help manage demand within the resource consents limits. For the purpose of this assessment we have assumed two days of average day demand storage (about 2,640 m^3). Two options were reviewed for this scenario (Option 2A & Option 2B) looking at different locations for the new treated storage reservoir. Option 2B has not been modelled as this option was eliminated following the Multi-Criteria Analysis (MCA) (refer Section 4.6) due to the additional pipe upgrades, treatment and pumping required.

All the schemes making Option 2A have been highlighted in Figure 4-2.

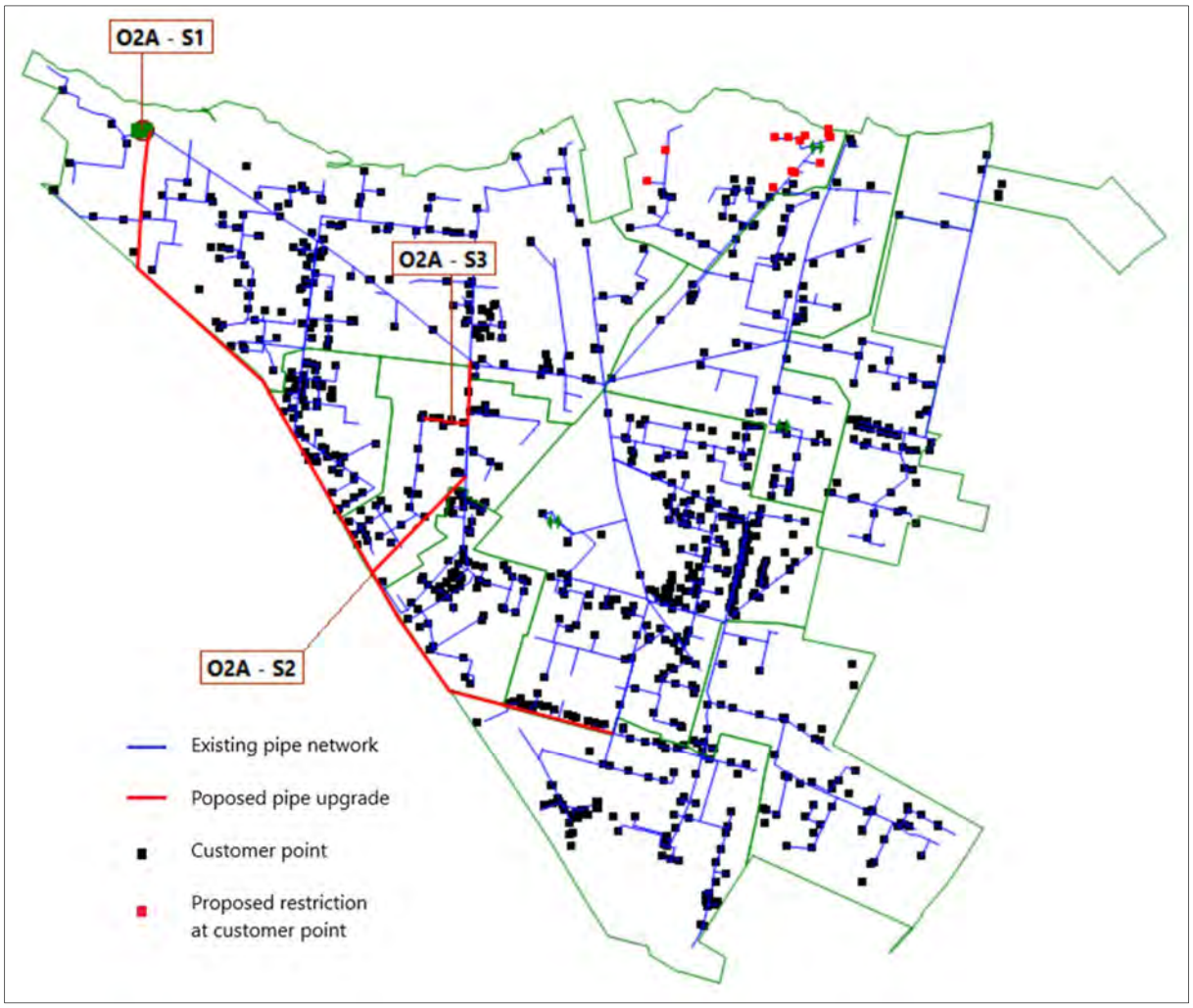


Figure 4-2 : Scenario 2 Description

4.5 Scenario 3

Scenario 3 is the restricting of all unrestricted tanks and connecting all troughs to tanks.

Two options were considered and carried forward to the MCA analysis (Option 3A and Option 3B).

Option 3A considers full restrictions of all troughs supplied via tanks. Troughs with the same owner will be supplied from a common tank. An additional one day of treated water storage at Mill Road (1,300 m^3) was assumed to help buffer peaks in demand and manage consumption within the resource consent limits.

Option 3B proposes that all troughs are supplied via tanks through an unrestricted supply. An additional two days of treated water storage at Mill Road (2,640 m^3) was proposed to help buffer peaks in demand and manage consumption within the resource consents limits).

All the schemes making Option 3A have been highlighted in Figure 4-3.

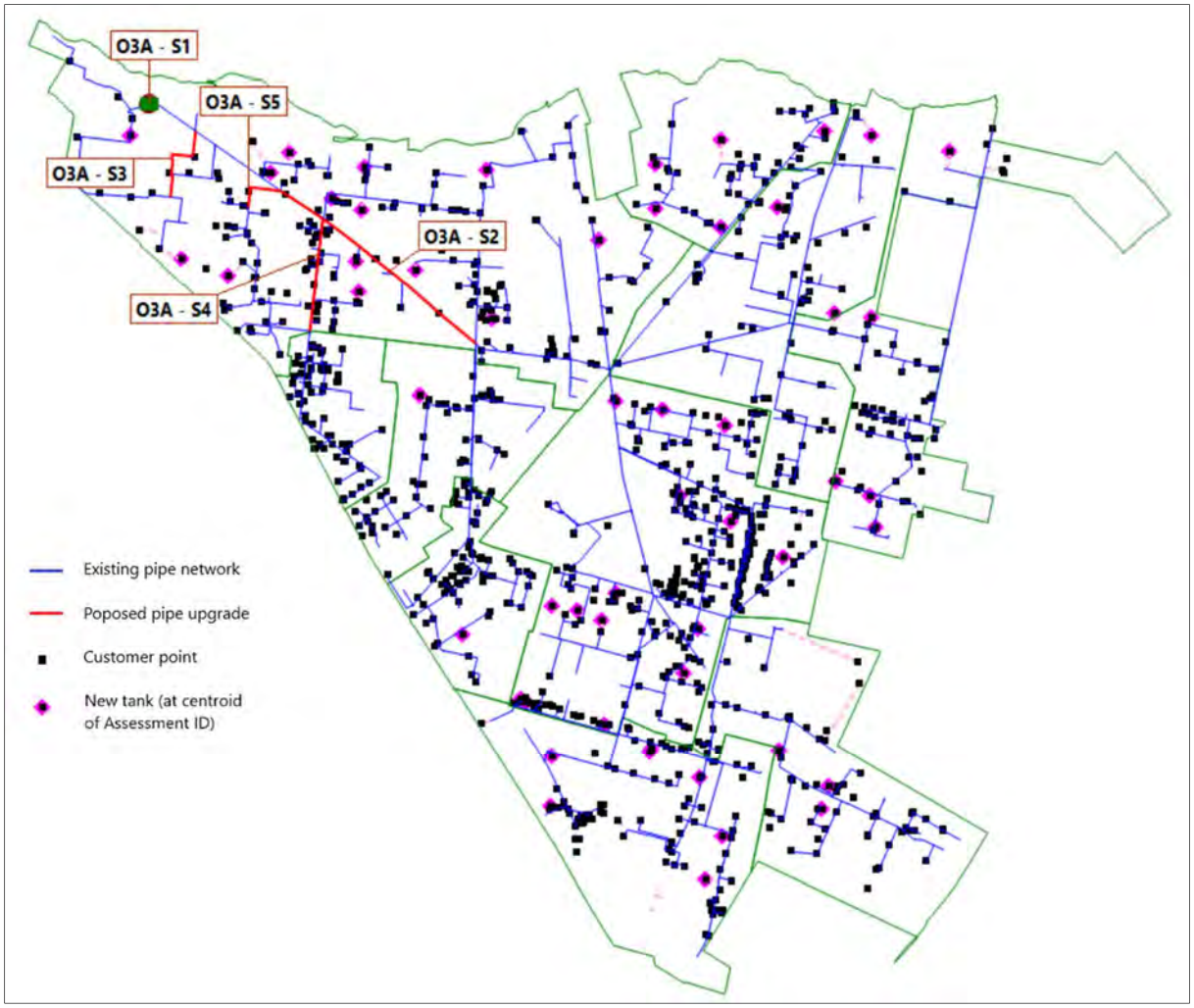


Figure 4-3 : Scenario 3 – Option 3A Description

Table 4-1 presents the scenario peak flow and average peak day volume in comparison to the consent maximum peak flow of 21 L/s and the 149,743 m^3 for 122 consecutive days (average of 1.23 ML/d).

Table 4-1 : Scenario Peak Flow and Peak Day Flow

Scenario	Peak Flow (L/s)	Peak Day Flow (m^3/day)
Scenario 1	20.7	1.34
Scenario 2	20.7	1.34
Scenario 3	15.5	1.27

4.6 Multicriteria Analysis Output

Due to the range of options identified for the three scenarios, a MCA process was used to provide a consistent (comparable) and understand the benefits of each option against the drivers and the option impact (improvement) on the network.

WSP undertook and initial first pass MCA assessment and provided the results to TDC for consideration. TDC used the results to undertake a separate MCA assessment internally, with the results presented below in Table 4-2.

The MCA process resulted in Option 3A having the best score in terms of reducing contamination pathways, improving demand management (full restrictions at troughs and tanks) and improving the network resilience via the individual storage tanks.

Options 1B, 2B and 3B were assessed to increase the overall environmental impact due to the need for additional storage, pumping and water treatment (i.e. would have higher operational and maintenance costs).

For Options 2A and 2B the 10.6 km ring main would have a high carbon footprint and further mains renewals / upgrades would still need to be carried out .

Following the MCA, TDC confirmed that Option 1A and Option 3A be taken forward for cost assessment.

Table 4-2 : TDC MCA Results

TDC SEADOWN SCENARIO EVALUATION			Score					
Drivers	**Impact (refer 'Drivers and Impact' worksheet for context)**	**Weighting**	**SCENARIO 1a**	**SCENARIO 1b**	**SCENARIO 2a**	**SCENARIO 2b**	**SCENARIO 3a**	**SCENARIO 3b**
Driver 1 - Option provides safe water	**Impact 1**: Risk of supply interruption and contamination pathway(s) from new / existing infrastructure	30.0%	-5	-5	-5	-5	10	10
			0	0	0	0	10	5
Driver 2 - Option provides an adequate quantity of water	**Impact 2**: Risk of restrictions and / or demand exceeding supply	25.0%	0	0	0	0	10	5
Driver 3 - Option provides a reliable supply of water	**Impact 3**: Proportion of aged assets and efficiency of supply	20.0%	10	10	5	5	10	10
Driver 4 - Option provides a resilient supply of water	**Impact 4**: Overall risk to critical assets and source	15.0%	0	5	5	10	5	5
Driver 5 - Option is environmentally sustainable	**Impact 5**: Environmental impact resulting from upgrades, operation and maintenance activities	10.0%	0	0	-5	-5	5	5
			0	-5	0	-5	5	0
TDC Total Weighted Score		*100%*	**0.5**	**1.3**	**-0.3**	**0.5**	**8.8**	**7.5**
		ranking	4	3	6	5	1	2

5 Key Assumptions

5.1 General

Several important assumptions have been required to carry out the analysis in this issues and options assessment, and to develop whole of life cost estimates for upgrades associated with the two options. The key assumptions adopted are detailed below.

5.2 Demand and Modelling Assumptions

The following assumptions have been applied for the demand and modelling inputs on this investigation.

- Restricted domestic – household supply only to a customer tank with a restrictor:
  - Restricted tanks given a maximum daily consumption of 1,000 L/unit/day with a flat domestic profile (peak factor of 1).
- Unrestricted domestic and stockwater – household and stockwater supply from unrestricted connection:
  - The Seadown Mill Road demand profile (peak factor of 3) from the model calibration update was used for all future scenarios on unrestricted tank connections.
  - Unrestricted tanks were given a consumption of 1,000 L/prop/day.
- Stockwater:
  - Several stockwater connections to troughs are made directly from the Seadown network, and not through a customer tank. The trough consumptions were based on 65 L/ha/day. The estimated consumptions depend on the number of hectares attributed to the parcel ID and the number of troughs present within the same parcel boundary. Appendix D summarises the number of connections and number of hectares per parcel boundary.
  - Two different trough profiles were assumed (refer Appendix B). A flatter trough profile was used when the troughs were being supplied from a tank (to reduce the impact of the quick increase in demand when the troughs are being refilled).
  - The Foley Road zone did not replicate the same patterns and indicated that the assumed consumption for troughs could be higher than the consumption applied for the rest of the Seadown network. Note that the consumption was not increased in this part of the model. More detailed investigation on the trough requirements and demand in this zone will need to be undertaken to confirm the consumptions and therefore pipe sizes required.
- Private troughs supplied from tanks have not been recorded and therefore were not represented in the model.
- Growth:
  - Based on TDC's Water AMP 2018-2028 it was discussed and agreed to apply a growth of 10 % to domestic tank connections to reflect forecasted household increase in the District.
  - Additional demand was added for two development sites along Divan Road and in the Timaru Airport zone. It was assumed that growth will comprise additional lifestyle lots supplied by restricted tanks at 1 unit per lot (1,000 L/unit/day).
  - No additional industrial demand was applied in the model.
- Unaccounted for water:

- Estimated unaccounted for water rate was based on the domestic demand, shape and size of zone flow, and engineering judgement. Unaccounted for water rate was estimated from the modelling at around 0.3 m^3/km/day.
- Unaccounted for water rate was assumed to remain at current levels.

- The demand assessment completed for the Seadown water supply network showed high night flow mainly in Arowhenua Road and Seadown Road Zones. Further investigation will be required, and no allowance has been made in the cost estimates for managing unaccounted for water.
- An unknown unrestricted user was identified in the Seaforth Settlement Road Zone (creating large headloss during the day). Further investigation will be required, and no allowance has been made in the costs estimates for any demand management required for this large user.
- As a rural water supply, it was assumed no fire fighting capacity is required within the network, and this has not been assessed further.

5.3 Design and Cost Estimate Assumptions

5.3.1 General

- The proposed network upgrade took into account the addition of valves or valve upgrades as well as new tanks, restrictors at tanks, and booster pumps to supply troughs from tanks.
- TDC confirmed that assets within the network up to and including the ballcock within tanks will continue to be owned by TDC. Assets downstream of the ballcock (including the tanks themselves) will have private ownership.
- Unless stated otherwise, all prices referred to within this report are exclusive of GST.
- In general, prices have been developed from a combination of local contract rates and the updated valuation unit rates produced for TDC by WSP in 2019 (provided by TDC for use 18 August 2020).
- Factors are included in the relevant column of Appendix C to account for all related costs including preliminary and general items, traffic management, engineering design and construction supervision. We have not investigated or specifically factored for archaeological, ecological, consultation or contaminated land pricing risks.
- An allowance of 50 % contingency (10% construction contingency, 20% quantity confidence, 20% pricing variation) has been included to reflect the high-level nature of this issues and options investigation. Note that some contingency is already included within the pipe and valve unit rates so the resulting contingency prices are conservative.

Attributes used in the whole of life cost estimation are shown in Table 5-1.

Table 5-1 : Whole of Life Cost Attributes

Attribute	Value	Additional Commentary
Discount rate	5.0%	Real, pre-tax discount rate from The Treasury on 6 October 2020. Equivalent to rate used previously for Downlands.
Whole of life time horizon (years)	50	-
Useful life of pumps and solar powered pump system (years)	25	-
Annual cost rate for maintenance of civil works	1.0%	-
Annual cost rate for maintenance mechanical & electrical works	1.0%	-
Annual cost rate for maintenance of piped infrastructure	0.5%	Assumed this rate also applies for maintenance costs of valves / restrictors.

5.3.2 Pipe Upgrades

Where upgrades were required to reticulation pipes owned by TDC, the replacement pipe material was assumed to be PE100 PN 12.5. This was based on the maximum pressure in the Seadown network being well below 100 m and the cost savings associated with using a lower PN rating compared to TDC's Construction Standards that require PE100 PN 16 pipe to be used in rural water supplies. The costs and benefits of alternative materials should be considered at future stages.

Existing pipes which are to be upgraded have been priced for replacement of existing valves, and installation of new intermediate valves at intersections and where long lengths exist (greater than 500m length between nodes). No additional valves have been costed for existing pipes which are not upgraded.

Several pipes in the Seadown network will need to be renewed within the next 10 years based on the U.L estimate. It was assumed that the replacement of those pipes would be part of a renewal plan and were not incorporated as part of this project cost.

Pipe installation assumes fittings at roughly one per kilometre and installations mostly in the berm, with some road shoulder or road installations.

The unit rates for the cost estimate are the same as the those produced for TDC by WSP in 2019, and are shown in Table 5-2. Note that the same cost rates are applied uniformly across all pipes of the given proposed size, with no price scaling to reflect cheaper/more expensive installations (e.g. paddocks vs road).

Table 5-2 : Pipe Unit Rates

Code	Description	UnitRateRenewal ($)	Comment
WMN025Rur	Water Main 25mm	32.97	Valuation unit rates provided by TDC which include engineering, P&G (including traffic management), consenting and contingency
WMN032Rur	Water Main 32mm	39.50	
WMN040Rur	Water Main 40mm	46.97	
WMN050Rur	Water Main 50mm	56.30	
WMN063Rur	Water Main 63mm	68.43	
WMN075Rur	Water Main 75mm	79.63	
WMN100Rur	Water Main 100mm	102.96	
WMN225Rur	Water Main 225mm	219.62	
WMN250Rur	Water Main 250mm	242.95	

Given the costs are based on a 2019 valuation, there may be variance in the unit rates due to inflation and other market changes.

Table 5-3 lists the unit rates of some non-pipe assets added as part of the network upgrade.

Table 5-3 : Other Assets Unit Rates

Code	Description	UnitRateRenewal ($)	Comment
WV020GATE	Water Valve 20mm GATE	551	Valuation unit rates provided by TDC which include engineering, P&G (including traffic management), consenting and contingency
WV038GATE	Water Valve 38mm GATE	688	
WV065GATE	Water Valve 65mm GATE	1,928	
WV100GATE	Water Valve 100mm GATE	2,203	
WV150GATE	Water Valve 150mm GATE	2,478	
WV250GATE	Water Valve 250mm GATE	3,442	
-	Tanks	5,000	Refer section 5.3.4
-	Uprights/Restrictors	1,000	Refer section 5.2
-	Small Booster Pump System (Solar Powered)	15,000	Refer section 5.3.4

5.3.3 Reservoirs and Lift Pumps

Reservoir prices have been based on the installation cost of the 2,500 m³ reservoir in Temuka and Pleasant Point Reservoir Water Treatment Plant Upgrade complex. With a steel reservoir and epoxy or fibreglass coated internal walls, conventional shallow foundations (no piles), and no ground improvements, the price should be similar. The assumption of an approximately constant rate per cubic metre has been made to extrapolate to larger reservoirs. The prices for reservoir installations do not include allowances for land acquisition or geotechnical works that may be required at the site, but does include allowance of 10% preliminary and general, 15% engineering design, construction monitoring and consents.

No additional treatment was accounted for. While this assessment has not considered drinking water compliance, the impact of adding further storage in terms of the current treatment process (UV and chlorination) will need to be considered in addition to this assessment.

Where a new reservoir has been identified, the required size is based on 48 hours storage at peak day demand for Option 1A and 24 hours storage for Option 3A.

5.3.4 Tanks and Troughs

The following assumptions were adopted for tanks and trough connections:

- Trough allocation to tank have been determined based on TDC supplied Assessment ID. If more than one tank was existing, the trough was allocated to the closest tank.
- It was assumed one trough(s) owner - one tank (no shared use of tanks). Troughs with the same Assessment ID were allocated to the same tank.
- A new tank was attributed to each Assessment ID boundary zone containing only trough(s) and no tanks. The tanks were allocated at the centroids of the Assessment ID zone boundary.
- It was observed that parcels with the same Assessment ID were sometimes not next to each other. In this case troughs were allocated to the same tanks (which sometimes meant tank-to-trough connections spanned across parcels of other assessment numbers). This may need to be revised during a more detailed study of the trough supply from tanks.
- The tank storage requirements were based on 10,000 L and or minimum three days allocation. A new tank of 30,000 L was specified when the trough(s) was connected to an existing tank and the estimated storage (assuming 10,000 L) was insufficient to provide three days allocation.
- The pipe size between trough and tank was estimated according to the trough demand (65 L/ha/day) and length of mains (to estimate the headloss along the pipe). No allowance was made for additional headloss due to valves and bends.
- Pipes between DN25 and DN40 (PE100 PN 10) were used to supply the troughs from tanks.
- For simplicity, we have accounted for pumping costs at each tank by assuming installation of a solar powered pump system. Troughs with the same Assessment ID will be supplied from one tank via one pump. It was assumed that the maximum lift required was 15 m for a flow rate of 0.3 L/s for the purpose of setting an upper capital cost estimate compared with alternatives, such as a 240v power connection or gravity supply. This should be re-assessed in future to confirm appropriate pump requirements.
- For the solar powered pumping systems, a supply cost of $7,800 was provided by Able Solar which excludes freight and installation. We have assumed a total supply and installation cost per system of $15,000.

6 Cost Estimates of Option 1A and Option 3A

Each of the scenarios identified has been assessed to identify the upgrades required to achieve the required level of service.

The scenarios were developed by identifying areas where there was a pressure deficiency, and the assets that contributed to the issue. In some places a demand management option was identified, in other cases, the worst performing pipes would be upsized, and level of service deficiencies reassessed. The process was repeated until an acceptable level of service was achieved across the network.

A high-level summary of the rough order cost (ROC) estimates for the proposed options is presented Table 6-1, with a further breakdown provided in Appendix C, including details of the upgrades required for each option.

ROC have been presented with an upper and lower range of estimates. The lower estimate is notional only and is based on using gravity distribution from tanks to troughs. The assumed pipe size may need to be increased for a gravity-driven case. There are also possible efficiencies to be gained from investigating combining/linking on-farm pipe connections from tanks to troughs (refer section 5.3.4).

Table 6-1 : Rough Order Cost Estimate of Upgrades

			Ownership			
	ROC Type	Period	TDC	Private	Total Excl. Contingency	Total Incl. 50% Contingency
Option 1A	Lower	Capex	$2.96m	$0.69m	**$3.65m**	**$5.48m**
		Opex	$0.60m	$0.06m	**$0.66m**	**$0.99m**
	Upper	Capex	$2.96m	$1.02m	**$3.98m**	**$5.97m**
		Opex	$0.66m	$0.18m	**$0.78m**	**$1.17m**
Option 3A	Lower	Capex	$3.71m	$6.65m	**$10.36m**	**$15.54m**
		Opex	$0.68m	$0.77m	**$1.45m**	**$2.18m**
	Upper	Capex	$3.71m	$10.67m	**$14.38m**	**$21.57m**
		Opex	$0.68m	$2.19m	**$2.87m**	**$4.30m**

7 Funding Options

The following considerations cover some of the currently available funding options:

- Three Waters Reform / Shovel Ready Projects
    - Given the scale of effort required to progress these works to tender stage, the delivery timeframe to include these works in the first tranche of the Three Waters Reform Programme (and/or shovel ready projects) has passed.
    - It may be possible to integrate these works into future tranches of the Three Waters Reform Programme (subject to potential multi-region groupings, drivers etc).
- Government Capital Projects / Provincial Growth Fund
    - Due to the volume of applications, processes on how funding is allocated are shifting, with some uncertainty around criteria to claim the funding once projects commence.
    - Additional unknowns are also at play due to the recent general elections.
- Overall, the landscape of changes to funding access options is much more dynamic than pre-COVID-19, with various future economic stimulus responses also a possibility.
- Securing some or all funding via rate payers remains an option to consider (LTPs etc). Our rough order cost estimates of asset upgrades have been delineated into private/TDC ownership, which is one metric to help inform funding decisions.

8 Conclusions

Review of the Seadown water supply network's system performance has identified locations with high headloss which are causing pressure level of services issues, indicating that parts of the pipe network supply are under capacity. This issues and options investigation has identified several scenarios aimed at improving the resilience and level of service within the Seadown water supply:

scenarios outlines

Two scenarios were brought forward for costing following TDC's multi-criteria analysis – Option 1A and Option 3A.

- The cost estimate shows that the local pipe upgrade and selective trough connections to tanks and tank restrictions (Option 1A) will be considerably cheaper than targeting the restriction of all tanks and connecting all troughs to tanks (Option 3A).
- The estimated costs for Option 3A could be further refined by reusing existing tank connections (service pipes) where possible, or investigating supplying troughs by gravity through the relocation of tanks at strategic locations. This will need to be further investigated.

The presentation of the issues and assessed options used at the stage 3 workshop with TDC management staff on 6 November 2020 is attached as Appendix F. A slightly modified version of this presentation was then given to the TDC Councillors, with high level agreement in principle to the actioning of Option 3A.

9 Recommendations

With agreement in principle from TDC Councillors for Option 3A, TDC can now assess the way forward to progress the development of this option. Key focus areas will be on community engagement/consultation, funding mechanisms, and the availability of resources to deliver the required works.

As mentioned in section 5.3.2, this issues and options investigation has not considered the cost of pipe renewals where existing pipes meet the required hydraulic performance of the proposed changes, but may require replacement based on useful life. This should be considered as part of future costing exercises.

The recommended investigations to help mitigate the high night flow (unaccounted for water) recorded within the Arowhenua Road and Seadown Road Zones and future demand management associated with the high user in Seaforth Settlement have also not been costed.

It is understood from TDC that the low pressures recorded at Ravensdown due to higher flows have been resolved. A permanent pressure logger could be placed on site and linked to telemetry. This would provide further investigation if the pipe network needs to be upsized (1.1 km).

A consumption of 65 L/ha/day for all troughs was assumed. As a result, the trough consumptions could be under or overestimated depending on their locations. Additional pipe upgrades or trough connections to tanks may be required where the trough demands could be higher than 65 L/ha/day, for example in the Foley Road Zone.

Appendix A – ECan Proposed Plan Change 7 Implications

Memorandum

To	Estelle Boivin **Principal Hydraulic Modeller - Water**
Copy	Jeffrey McLean **Principal Hydraulic Modeller – Water and Wastewater**
From	Kylie Galbraith **Senior Planner**
Office	Timaru
Date	19 December 2019
File	3-C1860.01 00001
Subject	ECan Land and Water Regional Plan, Including Proposed Plan Change 7, Implications on TDC Seadown Water Supply Scheme

1. Purpose

This memorandum summaries the implications of Environment Canterbury (ECan) Land and Water Regional Plan (LWRP), including Proposed Plan Change 7 (PC7), on Timaru District Council's (TDC) Seadown Water Supply Scheme.

2. Background

TDC is currently assessing the key issues and drivers for the future operation of the Seadown Water Supply scheme. After the key issues and drivers are confirmed possible solutions will be investigated. Such solutions may involve, but not limited to:

- Infrastructure upgrades;
- Additional and/or new storage;
- Resilience to demand through implementation of water supply strategies i.e. education, water restrictions;
- Resilience to demand through alternative source of supply i.e. Pleasant Point, Timaru, rainwater collectors; and
- Leakage management.

PC7 was notified on 20 July 2019 where upon the provisions of the plan change took legal effect. This means the updated and/or new policies and rules need to be given effect to for any activities they cover.

Seadown Water Supply Scheme current operates under CRC010349 (commenced 21 Jan 2002, expires 9 Oct 2030) and CRC101875 (commenced 4 May 2010, expires 9 Oct 2030). These takes are located near Mill Road within the Opihi Freshwater Management Unit.

To ensure the implications of alternative sources of supply are captured fully this assessment will cover all the Freshwater Management Units, being the Orari, Temuka, Opihi, Timaru and Pareora as shown in Figures 3-1 and 3-2.

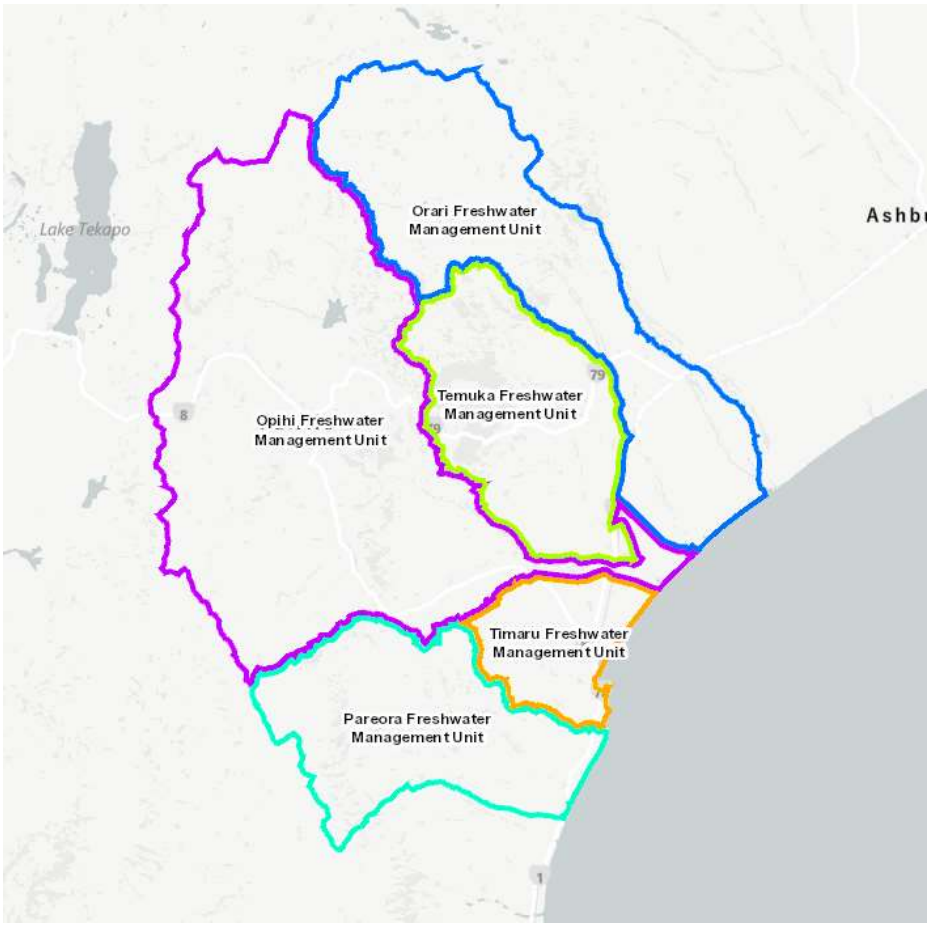


Figure 3-1 : Orari, Temuka, Opihi, Timaru and Pareora Freshwater Management Units. (Source: Canterbury Maps)

Figure 3-2 : Orari, Temuka, Opihi, Timaru and Pareora Freshwater Management Units with main river systems shown. (Source: Canterbury Maps)

3. Land and Water Regional Plan, Including Proposed Plan Change 7, Implications

If TDC wish to increase the water allocation (instantaneous rate or quantity) for the Seadown Water Supply Scheme the following aspects will need to be considered:

- Any increase in instantaneous rate that has more adverse effects than that authorised by the current consent will need to be processed as a new resource consent application instead of a variation.

- Any increase in quantity that has more adverse effects than that authorised by the current consent will need to be processed as a new resource consent application instead of a variation.
  Note: ECan may allow up to 5% increase in quantity as a variation if the adverse effects are no more than that authorised by the current consent and the catchment/aquifer is not overallocated. This is a general rule of thumb applied by other regional councils however it would need to be checked with ECan if they are happy to apply it.

- If a new application is required TDC will need to apply under Rule 5.115 of the LWRP and have a Water Supply Strategy prepared in accordance with Schedule 25 for the take.

  PC7 has amended Rule 5.115 to include the following as matters of discretion when deciding on the application:

- Any adverse effects on Ngāi Tahu values or on sites of significance to Ngāi Tahu, including wāhi tapu and wāhi taonga; and
- The potential adverse effects on significant habitats of indigenous fauna and flora.

These matters are unclear and TDC has submitted on PC7 seeking the following to provide clarity and certainty of when the matters will be triggered:

- The Ngāi Tahu values or sites of significance to Ngāi Tahu to be listed/or mapped; and
- The mapped Indigenous Freshwater Species Habitat is utilised as a matter of discretion.

Additionally, PC7 has introduced further provisions which mean any new water take application for a community water supply can only apply:

- Within the Opihi, Timaru and Pareora Freshwater Management Units as they will not need to comply with any minimum flow, residual flow or partial restriction conditions, or the environmental flow and allocation regime or groundwater allocation limit for the Freshwater Management Unit.
  Note: TDC has submitted on PC7 to ensure all linkages for this exception are correct.
- Within the Orari Freshwater Management Unit where the take does not exceed the TDC community drinking water and stock water take of 235 L/s.

Because of PC7, no new community water supply takes can be applied for within the Opihi Freshwater Management Unit.

If TDC wish to change the location of the water sourced for the Seadown Water Supply Scheme the following aspects will need to be considered:

- Any transfer of location will need to be within the same surface water catchment or groundwater allocation zone.

  PC7 has included provisions that mean transfers can occur within the Orari. Opihi, Timaru and Pareora Freshwater Management Units.

  Because of PC7, no transfers can occur within the Temuka Freshwater Management Unit since it is overallocated. TDC has submitted on this restriction, seeking for it not to apply for community water supply takes.

  Note: This requirement does not restrict TDC taking over an existing water take and transferring it into their name.

- Any construction works that trigger a restricted discretionary activity (i.e. taking and use of water for infrastructure construction (Rule 5.117 of the LWRP); groundwater dewatering (Rule 5.120 of the LWRP)) now also need to consider the following matters of discretion when deciding on the application:
  - Any adverse effects on Ngāi Tahu values or on sites of significance to Ngāi Tahu, including wāhi tapu and wāhi taonga; and/or
  - The potential adverse effects on significant habitats of indigenous fauna and flora.

  Again, these matters are unclear and TDC has submitted on PC7 seeking the following to provide clarity and certainty of when the matters will be triggered:
  - The Ngāi Tahu values or sites of significance to Ngāi Tahu to be listed/or mapped; and/or

- The mapped Indigenous Freshwater Species Habitat is utilised as a matter of discretion.

- Any temporary diversion to install structure under, in or through a river that reduces the wetted width of the existing channel by more than 25% at any point during the construction works will require a resource consent.

4. Other Plans / Acts May Apply

TDC needs to be aware that other plans / acts may apply, such as the Timaru District Plan and/or Building Act.

Infrastructure (new and upgrades) may trigger earthworks and vegetation clearance rules in the District Plan, requiring resource consent.

Additionally, new storage reservoirs that are in build to the ground may trigger the dam rules in the Building Act, requiring resource consent.

5. Looking forward

Some submitters to PC7 have sought additional restrictions that will impact TDC functions if they come into effect and operative. Many of these requests are out of scope of PC7 and should not be incorporated into the LWRP through the PC7 process and should be subject to a different plan change.

To see how the out of scope requests and PC7 provisions play out a watching brief of the PC7 process needs to occur. If the Seadown Water Supply Scheme key issues and drivers have not been resolved and implemented when the PC7 decisions are released (expected end of 2020) reassessment of the PC7 implications should be completed.

Appendix B – Seadown Model Update

1 Seadown Model Update

1.1 Trough and Tank Survey

TDC undertook a trough and tank survey in 2020. The data has been assessed for the purpose of updating the Seadown hydraulic model. The Seadown customers can be categorised into three types of connections, see Figure 1-1:

- 612 troughs (63% of total connections)
- 223 unrestricted tanks (TANKN) (23% of total connections)
- 133 restricted tanks (TANKR) (14% of total connections)

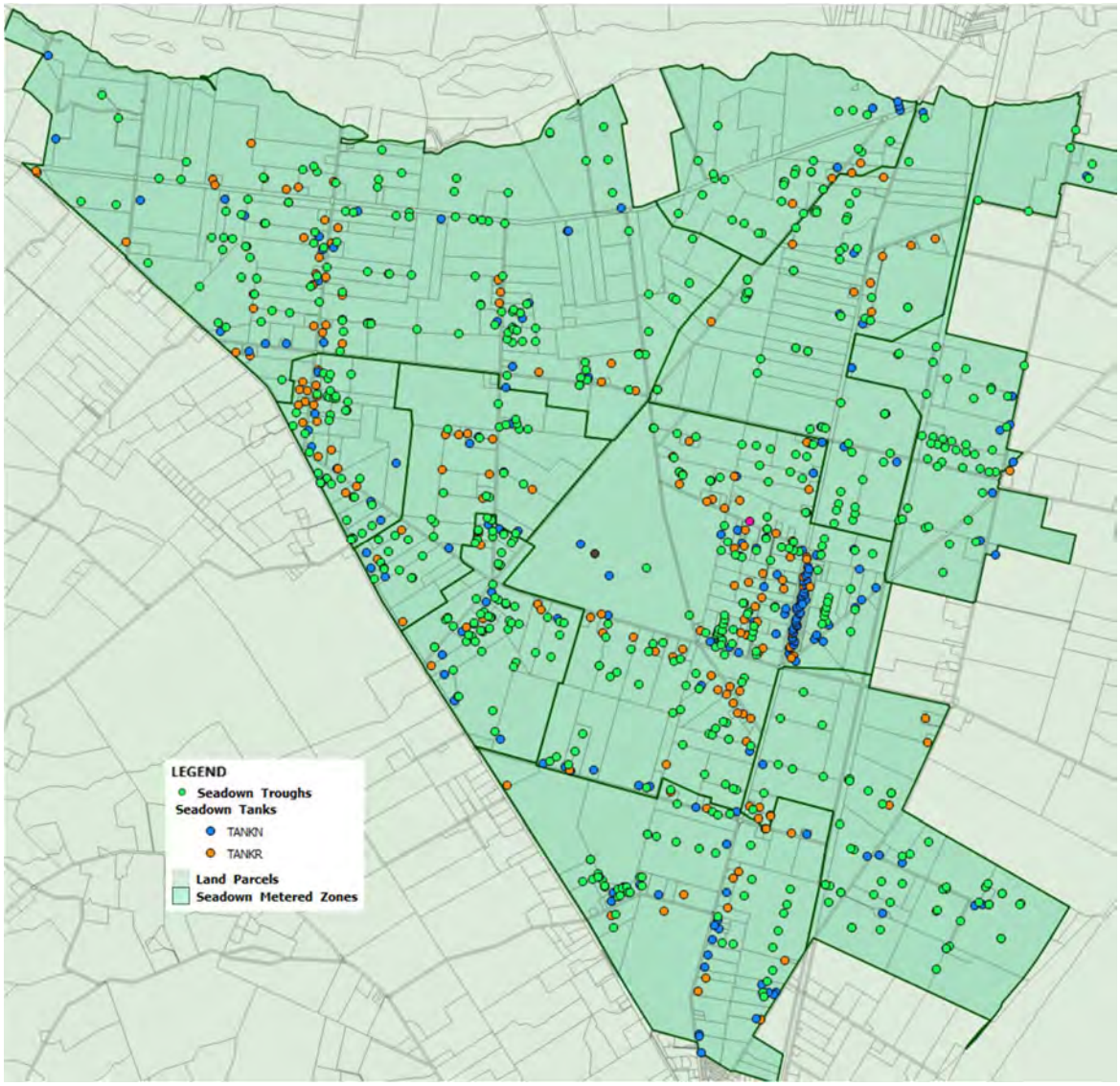


Figure 1-1 : Trough and Tank Survey

1.2 Model Update and Demand Allocation

The model was updated using the recently completed tank and trough survey (January 2020 survey): of all troughs (directly connected to network) and tanks located within Seadown distribution network. The unit restriction of all restricted domestic tanks was taken from the previous tanks record. The tanks were assumed to be unrestricted when the number of units was not specified, or they were listed as unrestricted tanks. Private troughs supplied from tanks have not been recorded and therefore were not represented in the model.

A new demand analysis was carried out, and no further changes were required in the calibration actions.

In terms of demand there are three types of connections to the Seadown water supply:

- Restricted domestic – Household supply only to a customer tank with a restrictor sized to a maximum daily consumption of 1,000 L/unit.
- Unrestricted domestic and stockwater – Household and stockwater supply from a customer tank with an unrestricted connection.
- Stockwater – several stockwater connections to troughs are made directly from the Seadown network, and not through a customer tank.

Table 1-1 presents a breakdown of the updated demand and estimated unaccounted for water rates for each zone using assumed troughs and tank consumptions.

Table 1-1 : Breakdown of Estimated Zone Demand and Unaccounted-for Water Rates

Demand Zone	No. of Connections	Length of mains (km)	No Unit	No Restricted	No Unrestricted	No trough	Unrestricted Av Consumption (L/prop/day)	Restricted Av Consumption (L/unit/day)	Trough Demand (L/T/day)	Av Unaccounted for water (L/s) / (L/prop/day)
Mills Rd	522	98.1	149.2	84	137	301	616.5	600	300	2.47 / 408.1
Kerrytown	65	8.3	25.4	14	14	37	494	400	200	0.24 / 313.8
Naughton Rd	44	7.1	7.2	4	13	27	695.8	600	100	0.11 / 223.8
Seadown Rd	57	13	1.8	1	8	48	336.1	350	500	0.65 / 987.2
Divan Rd	82	12.5	23.8	12	22	48	567.8	500	100	0.19 / 203.5
Seaforth Settlement	71	12.1	11	6	9	56	720.7	650	60	0.02 / 30.8
Arowhenua Rd	43	7.95	9	5	6	32	403.9	300	100	0.48 /563.0
Foley Rd	84	9.3	11.8	7	14	63	420.8	350	680	0.35 / 395.1

Unaccounted for water rate is difficult to estimate in a rural supply as a proportion of the night time will relate to the re-filling of tanks and troughs, and there is no definitive period of low demand that can be used to predict minimum use. In Seadown, this is further complicated by unrestricted demand for stockwater in terms of unknown profile and volume. The unaccounted for water rate estimates have been based on domestic demand, shape and size of zone flow, and engineering judgement.

The demand assessment completed for the Seadown water supply network showed that:

- High night flow mainly in two zones: Arowhenua Road and Seadown Road
- Very low unaccounted-for water rate is estimated in Seaforth Settlement Zone
- Estimated high trough demand within the Foley Road Zone

Further investigation is recommended for:

- Seadown Road Zone - recorded high night flow

- Arowhenua Road Zone - recorded high night flow
- Dominion Road Zone (Seadown Airport) and Seaforth Settlement Road Zones - unknown unrestricted user creating large headloss during the day

Figure 1-2 highlights the calibration outputs for each zone.

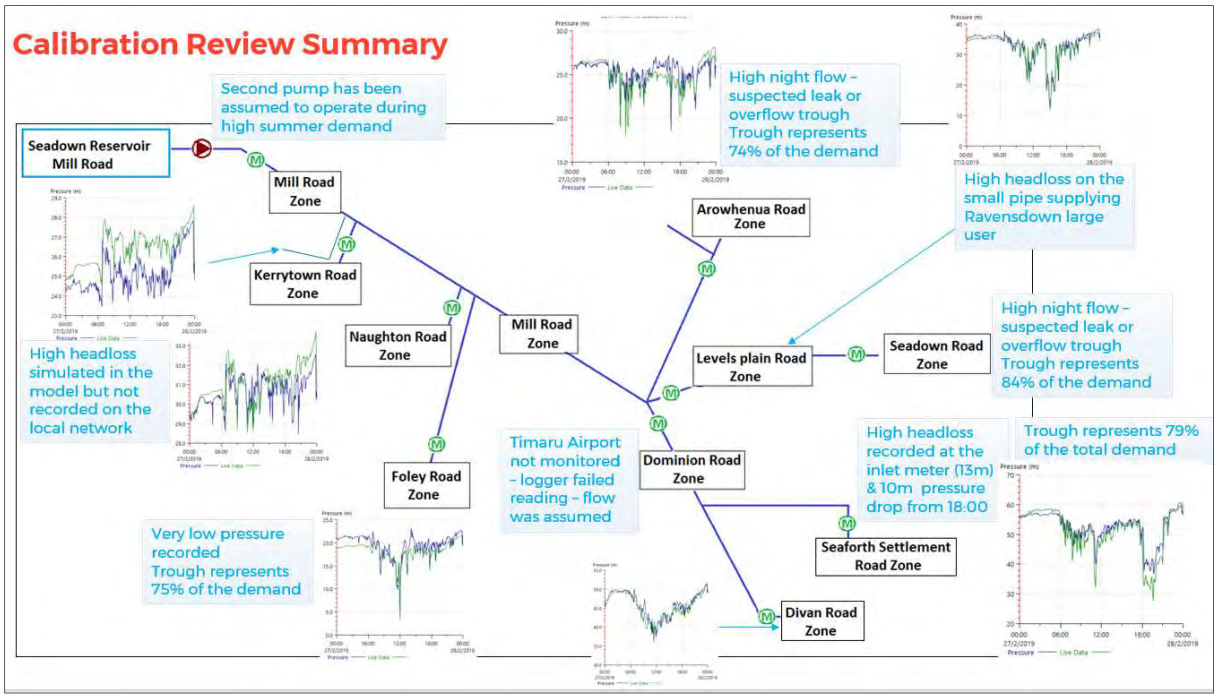


Figure 1-2 : Seadown Model Calibration Summary

2 Growth Model and Consents

The Seadown model has been used as a key tool for this issues and options assessment, with the following applications:

- Being able to understand the impact of changing unrestricted connections to troughs and tanks to restricted connections.
- Assessing the impact of additional growth in the Seadown water supply in terms of network performance and demand.

2.1 Changing to Restricted Connections

To set up the model to investigate the impact of changing to restricted connections the following actions and assumptions have been applied:

- A desktop study was undertaken to estimate the number of hectares associated to each customer using the parcel ID.
- The stockwater was applied to troughs when a trough (or more) existed within the parcel boundary. The stockwater was applied to tanks when no trough was present within the parcel boundary. A general assumption of 65 L /ha/day was applied for all stockwater consumption.

  It should be noted that the additional allocation to stockwater would increase the overall consumption, with the risk of exceeding the maximum consent limit of 21 L/s. In general, the maximum flow to zones were well represented in the model using 65 L/ha/day when

compared with historical recorded flows. There are some limitations rising from this assumption, which are listed in 2.4.2 of this appendix. Growth consumption does not impact on the individual zone total flows as it was assumed that the growth will be in general spread across the network.

- Unrestricted tanks were given a consumption of 1000 L/prop/day and a peak domestic flow applied (assumed peak factor of 3).
- A demand of 1000 L/unit/day was applied to restricted tanks with a flat domestic profile (peak factor of 1).

Appendix D summarises the number of connections and number of hectares per parcel boundary.

2.1.1 Trough Consumption and Profile

The trough consumptions were based on 65 L/ha/day. The estimated consumptions depend on the number of hectares attributed to the parcel ID and number of troughs present within the same parcel boundary.

Figure 2-1 and Figure 2-2 show trough profiles used for all troughs within the Seadown network.

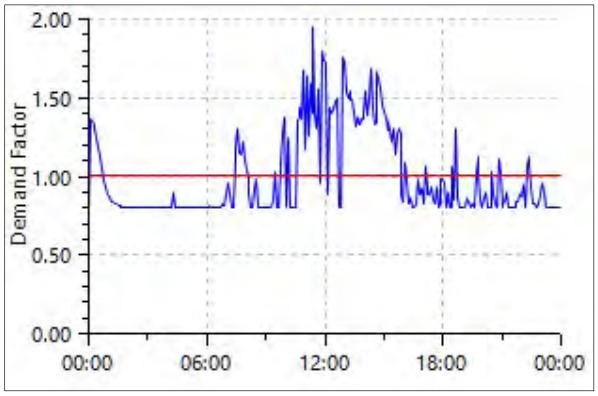


Figure 2-1 : Trough Profile Supplied from Network

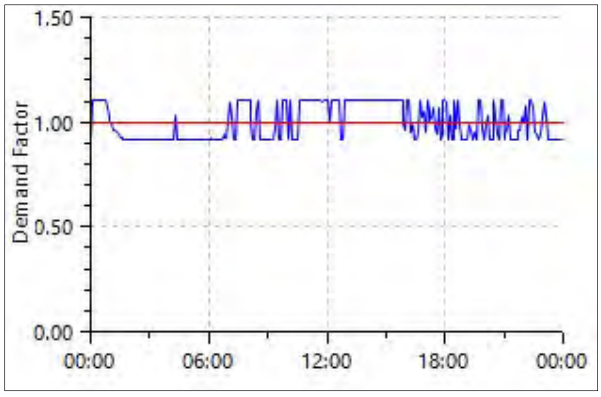


Figure 2-2 : Trough Profile when Connected to Tank

2.1.2 Restricted Tank Consumption and Profile

The number of units per restricted tanks was applied from previous datafile. The restricted tanks were updated to unrestricted tanks when the number of units could not be crosschecked against the previous datafile and was unknown (total 45 tanks).

A demand of 1,000 L/unit/day was applied to restricted tanks with a flat domestic profile (peak factor of 1). Additional stockwater 65 L/ha/day was applied on the top of the demand when no trough or unrestricted tank were located within the parcel boundary.

The Figure 2-3 shows the restricted tank profile applied in the model.

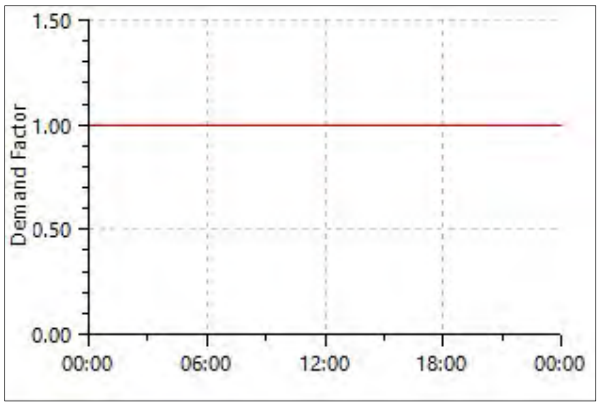


Figure 2-3 : Restricted Tank Profile

2.1.1 Unrestricted Tank Consumption and Profile

A demand of 1,000 L/prop/day was applied to unrestricted tanks with a diurnal domestic profile (Mill Road domestic profile, peak factor of 3). Additional stockwater 65 L/ha/day was applied on the top of the demand when no trough was present within the parcel boundary.

Figure *2-4* shows the unrestricted tank profile applied in the model.

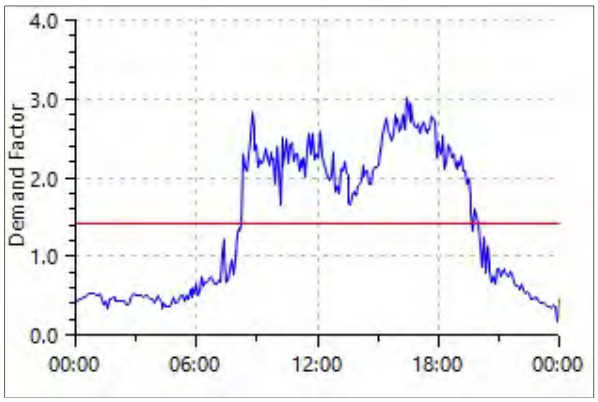


Figure 2-4 : Unrestricted Tank Profile

2.2 Growth Assumptions

The 2015 Water Supply Services Activity Management Plan comments that:

- Domestic demand: "Population remains stable over the next ten years. Council has assumed no annual growth rate. The risk is that the demand either rapidly declines or increases."
- Industrial demand: "Population remains stable over the next ten years. Council has assumed no annual growth rate. The risk is that the demand either rapidly declines or increases."

A growth of 10 % has been assumed for domestic tank connections within the Seadown water supply. Table 2-1 lists the growth applied in the model. It was assumed that growth will comprise additional lifestyle lots supplied by restricted tanks at 1 unit per lot (1,000 L/unit/day).

Table 2-1 : Growth Allocation

Demand Zone	No. of Connections	No. Restricted	No. Unrestricted	No. Trough	% Trough	30 Years - Assumption New Restricted Customers (10%)
Mills Road (inc. Dominion Rd)	522	84	137	301	58	22
Kerrytown	65	14	14	37	57	3
Naughton Rd	44	4	13	27	61	2
Seadown Rd	57	1	8	48	84	1
Divan Rd	82	12	22	48	59	3
Seaforth Settlement	71	6	9	56	79	2
Arowhenua	43	5	6	32	74	1
Foley Rd	84	7	14	63	75	2
Total	**968**	**133**	**223**	**612**	-	**36**

No additional industrial demand was applied in the model. It was assumed that the growth will follow a restricted tank profile and consumption (1-unit allocation).

In addition to the future growth, the model was updated with:

- the new development along Divan Road for which TDC provided the connections details. The new development comprises 10 lots and each lot is restricted to 1 unit, with the exception of one lot which is restricted to 2 units. The pipe along Divan Road has been increased to a DN90 PE main.
- an additional development has been added around the Airport area comprising 10 residential lots restricted to 1000 L/unit/day.

Appendix E summarises the estimated consumption per customer.

2.3 Seadown Consents

There are currently two consents associated with the Seadown water supply:

CRC010349 – Seadown Water Supply Scheme restricts the supply to Seadown to:

- Maximum of 21 L/s
- 149,743 m^3 for 122 consecutive days

CRC101875 – Timaru District Council Water Unit. This consent has not been considered in this assessment as TDC have advised that it is only used as an emergency supply and is not always available.

In terms of CRC010349 the average daily flow recorded at the Seadown reservoir bulk flow meter is at times above the maximum 21 L/s. In the last five years the volume of water consumed has not exceeded the 122 consecutive days limit of 149,743 m^3, though there is one period in the summer of 2017-2018 where it came close to being exceeded. Figure 2-5 and Figure 2-6 shows the historical daily flow over the past 4.5 years.

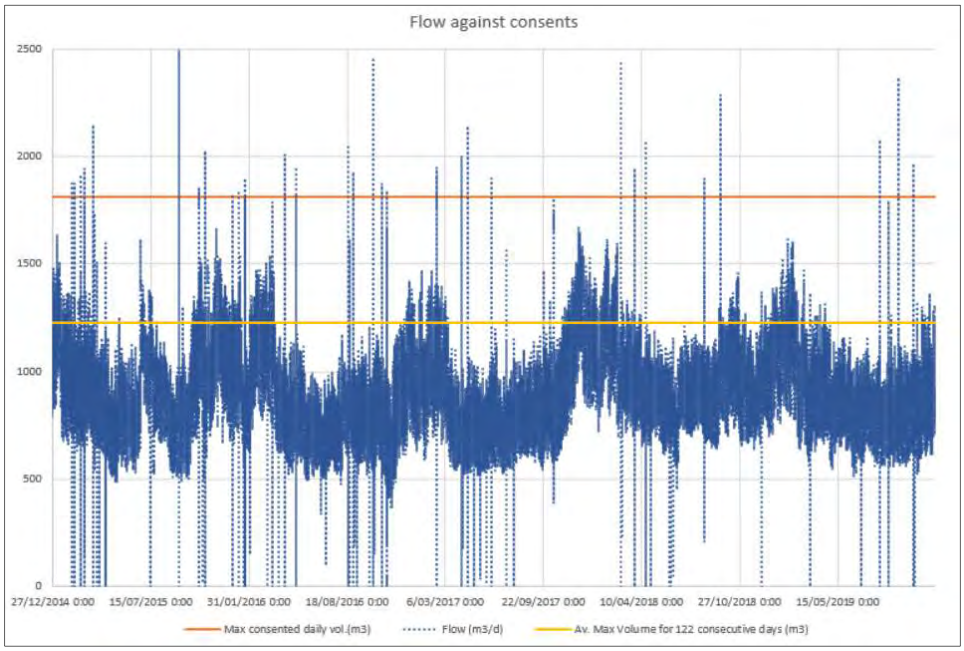


Figure 2-5 : Maximum Historical Flow

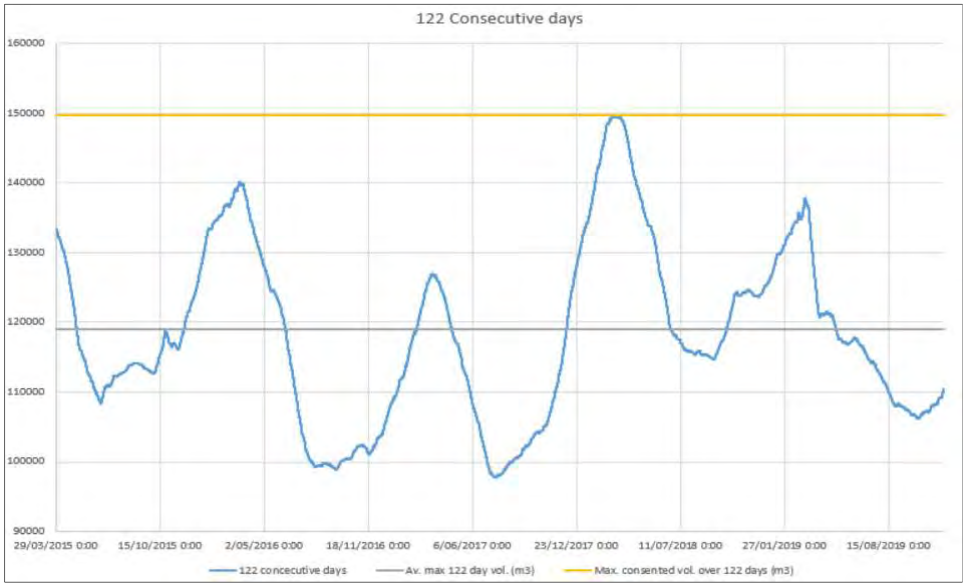


Figure 2-6 : Consecutive Historical Flow

2.4 Peak Day Model Representation

The model simulated flows were compared to historical flow data to evaluate the previous demand assumptions.

2.4.1 Historical Flow Comparison

The Seadown hydraulic model has both peak and average day models which have been based on TDC's historical telemetry data. The peak day model is based on 10 February 2019 and has an estimated demand of 1,260 m^3/day with a maximum of approximately 18.5 L/s. The average day model is based on the period June 2018 to December 2018 with an demand of 870 m^3/day. The peak day, average day and calibration day demand diagrams are shown in Figure 2-7.

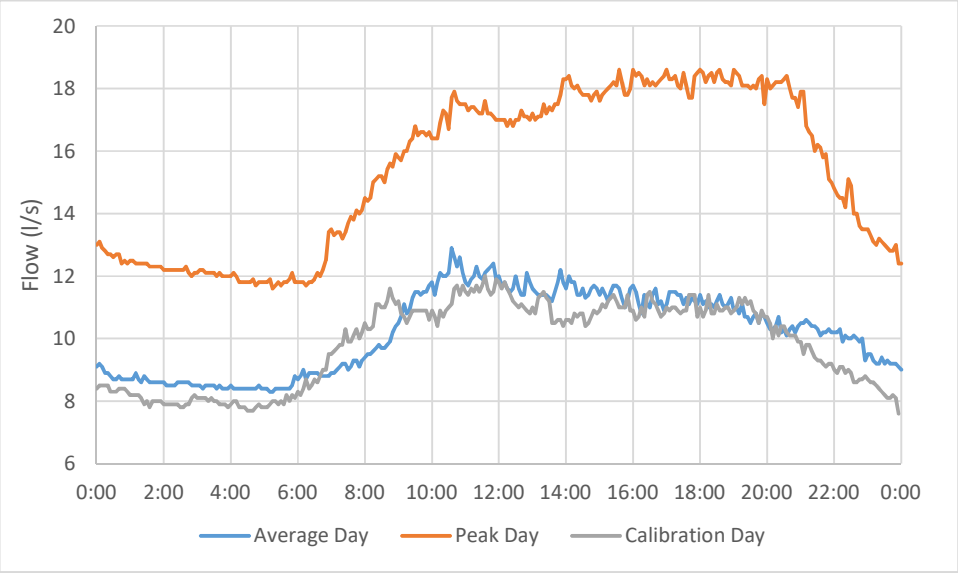


Figure 2-7 : Seadown Historical Peak, Average and Calibration Day Flow

2.4.2 Growth Model Peak Day Demand

Figure 2-8 shows the simulated growth model daily volume of 1,340 m^3. The Seadown water supply will need to supply a flow close to the maximum consented 21 L/s for the assumed 10% growth. It should be noted that the daily volume of 1340 m^3 (equivalent to 163,480 m^3 for 122 consecutive days) will exceed the consented limit of 149,743 m^3 for 122 consecutive days.

Figure 2-8 : Seadown Future Model – Total Flow

2.4.3 Limitations

Overall a good flow representation was obtained in most of the zones when simulated flow at meters was compared to historical flows.

Two zones (Foley Road and Seaforth Settlement Zones) did not replicate the same patterns and indicated that the assumed consumption for domestic customers and troughs could be higher than the consumption applied for the rest of the Seadown network.

- The Foley Road Peak flow reaches 1.4 L/s at times when the model simulates a peak of 1.1 L/s with the above assumptions. A trough consumption could be higher in this part of the network. A better peak was represented with a consumption of 130 L/ha/day. Note that the consumption was not increased in the model. More detailed investigation on the trough requirements and need will need to be undertaken to estimate their consumptions and pipe sizes.
- Seaforth Settlement has a unique demand profile, distinguished by the unknown user which could be using up to 0.5 L/s at peak time, see Figure 2-9 for details.

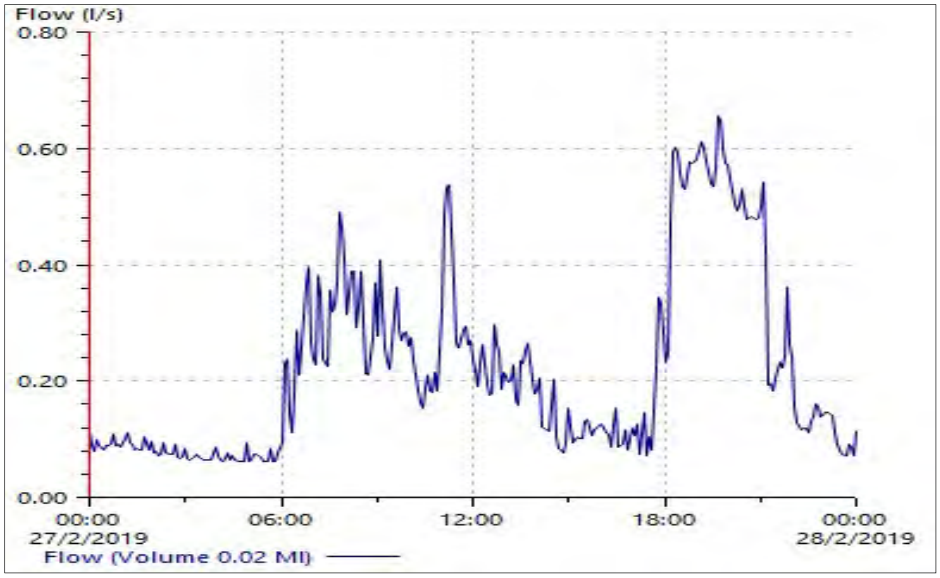


Figure 2-9 : Seaforth Settlement Recorded Flow

The above limitations have not been represented in the model but have been considered as part of the options assessment.

Appendix C – Scenarios Cost Overview

= Private ownership proposed

Ref	Location	Description	Driver	No. Pumps	No. Valves	Length (m)	Initial DN Diameter (mm)	Proposed DN Diameter (mm)	Pipeline Criteria	Restrictors	No. New Tanks	No. Existing Tanks	No. Troughs Supplied from Tank	Demand (m³/d)	Tank volume (m3)	Initial Capital Cost (Physical works)	Initial Capital Cost (Incl. P&G, Design/ Eng, Consenting)	WoL Cost Excl. Initial Capex	Comment
O1A - S1	Mill Rd Reservoir Site	Additional Treated Reservoir	Resilience	-	-	-	-	-	-	-	1	-	-	1320	2640	$565,000.00	$652,575.00		Physical works cost already includes P&G. 10% for Design & Eng, 5% Consenting
O1A - S1	Mill Rd Reservoir Site	Lift Pumps from Raw water to treated reservoir	Resilience	-	-	-	-	-	-	-	-	-	-	-	-	$450,000.00	$571,725.00	$431,783.96	10% P&G, 10% for Eng & Design, 5% Consents
O1A - S2	Mill Rd Zone	Upgrade the 150 mm AC main to 200 mm PE main along trunk main.	LoS / Growth	-	4	2650	150	250	PE100 DN250 PN 12.5	-	-	-	-	-	-	$657,594.46	$657,594.46	$63,312.95	Physical works cost already includes factors in section 5.3
O1A - S3	Divans Rd Zone	Pipe upgrade 50mm PE main along State Hwy 1	LoS	-	2	1010	50	90	PE100 DN90 PN 12.5	-	-	-	-	-	-	$93,317.63	$93,317.63	$8,984.59	Physical works cost already includes factors in section 5.3
O1A - S4	Divans Rd Zone	New pipe connection to new 80mm on Divans Rd	LoS	-	1	2	-	90	PE100 DN90 PN 12.5	-	-	-	-	-	-	$2,408.89	$2,408.89	$231.93	Physical works cost already includes factors in section 5.3
O1A - S5	Divans Rd Zone	Pipe upgrade off Seadown Rd 25 mm PE main	LoS	-	2	490	25	50	PE100 DN50 PN 12.5	-	-	-	-	-	-	$31,442.38	$31,442.38	$3,027.26	Physical works cost already includes factors in section 5.3
O1A - S6	Divans Rd Zone	Pipe upgrade off Divans Rd 1 50mm PE main	LoS	-	3	1740	25-32	50	PE100 DN50 PN 12.5	-	-	-	-	-	-	$103,745.47	$103,745.47	$9,988.57	Physical works cost already includes factors in section 5.3

Ref	Location	Description	Driver	No. Pumps	No. Valves	Length (m)	Initial DN Diameter (mm)	Proposed DN Diameter (mm)	Pipeline Criteria	Restrictors	No. New Tanks	No. Existing Tanks	No. Troughs Supplied from Tank	Demand (m^3/d)	Tank volume (m^3)	Initial Capital Cost (Physical works)	Initial Capital Cost (Incl. P&G, Design/ Eng, Consenting)	WoL Cost Excl. Initial Capex	Comment
O1A - S7	Naughton Rd Zone	Upgrade pipe 40 mm PVC-U	LoS	-	4	703	40	75	PE100 DN75 PN 12.5	-	-	-	-	-	-	$63,691.66	$63,691.66	$6,132.21	Physical works cost already includes factors in section 5.3
O1A - S8	Naughton Rd Zone	Upgrade pipe 32 mm PVC-U	LoS	-	2	500	32	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$38,071.58	$38,071.58	$3,665.52	Physical works cost already includes factors in section 5.3
O1A - S9	Foley Rd Zone	Upgrade pipe within Foley Zone	LoS	-	2	800	40	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$58,601.42	$58,601.42	$5,642.12	Physical works cost already includes factors in section 5.3
O1A - S10	Mill Rd Zone	Off trunk main - between Mill Road and Kerry Road (Road 5)	LoS	-	2	980	25-32	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$70,919.32	$70,919.32	$6,828.09	Physical works cost already includes factors in section 5.3
O1A - S11	Mill Rd Zone	Local pipe upgrade 32 mm AC main	LoS	-	2	1200	32	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$85,974.54	$85,974.54	$8,277.60	Physical works cost already includes factors in section 5.3
O1A - S12	Seadown Rd Zone	Upgrade pipe 50 mm PE main	LoS	-	2	1690	50	75	PE100 DN75 PN 12.5	-	-	-	-	-	-	$138,433.26	$138,433.26	$13,328.30	Physical works cost already includes factors in section 5.3
O1A - S13	Levels Plain Rd Zone	Upgrade pipe 25 mm PE main on State Hwy 1	LoS	-	-	305	25	50	PE100 DN50 PN 12.5	-	-	-	-	-	-	$17,171.62	$17,171.62	$1,653.28	Physical works cost already includes factors in section 5.3
O1A - S14	Seaforth Settlement Rd Zone	Upsize the 40 mm PVC-U main	LoS	-	1	570	40	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$40,934.29	$40,934.29	$3,941.14	Physical works cost already includes factors in section 5.3
O1A - S15	Seaforth Settlement Rd Zone	Restrictor at large / irregular user - location is unknown	LoS	-	-	-	-	-	-	1	-	-	-	-	-	$1,000.00	$1,380.00	$96.28	15% P&G, 20% Eng

Ref	Location	Description	Driver	No. Pumps	No. Valves	Length (m)	Initial DN Diameter (mm)	Proposed DN Diameter (mm)	Pipeline Criteria	Restrictors	No. New Tanks	No. Existing Tanks	No. Troughs Supplied from Tank	Demand (m^3/d)	Tank volume (m^3)	Initial Capital Cost (Physical works)	Initial Capital Cost (Incl. P&G, Design/ Eng, Consenting)	WoL Cost Excl. Initial Capex	Comment
O1A - S16	Arowhenua Rd Zone	Pipe upgrade 40 mm PVC main	LoS	-	1	260	40	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$19,720.12	$19,720.12	$1,898.65	Physical works cost already includes factors in section 5.3
O1A - S17	Mill Road Zone	Pipe upgrade 32 mm PVC main	LoS	-	2	535	32	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$40,466.73	$40,466.73	$3,896.12	Physical works cost already includes factors in section 5.3
O1A - S18	Mill Road Zone	Pipe upgrade 25 mm PVC main	LoS	-	1	525	25	50	PE100 DN50 PN 12.5	-	-	-	-	-	-	$43,734.39	$43,734.39	$4,210.73	Physical works cost already includes factors in section 5.3
O1A - S19	Overall zone	Trough connected to existing tanks - restrictors	LoS	-	-	-	-	-	-	34	-	34		-	-	$34,000.00	$46,920.00	$3,273.51	15% P&G, 20% Eng
O1A - S20	Overall zone	New tanks	LoS	-	-	-	-	-	-	-	6	-	40	-	-	$30,000.00	$41,400.00	$14,635.86	15% P&G, 20% Eng
O1A - S21	Overall zone	New tanks - restrictors	LoS	-	-	-	-	-	-	6	-	-	-	-	-	$6,000.00	$8,280.00	$577.68	15% P&G, 20% Eng
O1A - S22	Overall zone-connection from network to tank	Pipe connection to new tanks	LoS	-	3	262	-	25	PE100 DN25 PN 12.5	-	-	-	-	-	-	$12,428.69	$12,428.69	$1,196.63	Physical works cost already includes factors in section 5.3
O1A - S23	Overall zone-connection from network to tank	Pipe connection to new tanks	LoS	-	2	311	-	32	PE100 DN32 PN 12.5	-	-	-	-	-	-	$13,645.38	$13,645.38	$1,313.77	Physical works cost already includes factors in section 5.3
O1A - S24	Overall zone-connection from network to tank	Pipe connection to new tanks	LoS	-	1	48	-	40	PE100 DN40 PN 12.5	-	-	-	-	-	-	$2,942.80	$2,942.80	$283.33	Physical works cost already includes factors in section 5.3

Ref	Location	Description	Driver	No. Pumps	No. Valves	Length (m)	Initial DN Diameter (mm)	Proposed DN Diameter (mm)	Pipeline Criteria	Restrictors	No. New Tanks	No. Existing Tanks	No. Troughs Supplied from Tank	Demand (m^3/d)	Tank volume (m^3)	Initial Capital Cost (Physical works)	Initial Capital Cost (Incl. P&G, Design/ Eng, Consenting)	WoL Cost Excl. Initial Capex	Comment
O1A - S25	Overall zone-connection from network to tank	Pipe connection to existing tanks	LoS	-	1	1492	-	32	PE100 DN32 PN 12.5	-	-	-	-	-	-	$60,883.44	$60,883.44	$5,861.84	Physical works cost already includes factors in section 5.3
O1A - S26	Overall zone-connection from network to tank	Pipe connection to existing tanks	LoS	-	2	433	-	40	PE100 DN40 PN 12.5	-	-	-	-	-	-	$24,205.30	$24,205.30	$2,330.48	Physical works cost already includes factors in section 5.3
O1A - S27	Overall zone-connection from network to tank	Pipe connection to existing tanks	LoS	-	1	1492	-	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$104,338.16	$104,338.16	$10,045.64	Physical works cost already includes factors in section 5.3
O1A - S28	Overall zone	Solar powered pump system	LoS	16	-	-	-	-	-	-	-	-	-	-	-	$240,000.00	$331,200.00	$117,086.89	15% P&G, 20% Eng
O1A - S29	Overall zone - connection from tank to trough	25 mm pipe connection to troughs	LoS	-	39	10281	-	25	PE100 DN25 PN 10	-	-	-	-	-	-	$365,801.63	$504,806.24	$35,219.24	15% P&G, 20% Eng
O1A - S30	Overall zone - connection from tank to trough	32 mm pipe connection to troughs	LoS	-	1	1492	-	32	PE100 DN32 PN 10	-	-	-	-	-	-	$70,787.36	$97,686.55	$6,815.38	15% P&G, 20% Eng
O3A - S1	Mill Rd Reservoir Site	Additional Treated Reservoir	Resilience	-	-	-	-	-	-	-	1	-	-	1300	1300	$650,000.00	$750,750.00		Physical works cost already includes P&G. 10% for Design & Eng, 5% Consenting
O3A - S1	Mill Rd Reservoir Site	Lift Pumps from Raw water to treated reservoir	Resilience	-	-	-	-	-		-	-	-	-	-	-	$450,000.00	$571,725.00	$450,688.47	10% P&G, 10% for Eng & Design, 5% Consents
O3A - S2	Mill Rd Zone	Trunk main pipe upgrade - same as Option 1a	LoS	-	4	2650	150	225	PE100 DN225 PN 12.5	-	-	-	-	-	-	$595,765.72	$595,765.72	$57,360.10	Physical works cost already includes factors in section 5.3

Ref	Location	Description	Driver	No. Pumps	No. Valves	Length (m)	Initial DN Diameter (mm)	Proposed DN Diameter (mm)	Pipeline Criteria	Restrictors	No. New Tanks	No. Existing Tanks	No. Troughs Supplied from Tank	Demand (m^3/d)	Tank volume (m^3)	Initial Capital Cost (Physical works)	Initial Capital Cost (Incl. P&G, Design/ Eng, Consenting)	WoL Cost Excl. Initial Capex	Comment
O3A - S3	Mill Rd Zone	Off trunk main - between Mill Road and Kerry Road (Road 5)	LoS	-	2	980	25-32	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$70,919.32	$70,919.32	$6,828.09	Physical works cost already includes factors in section 5.3
O3A - S4	Mill Rd Zone	Local pipe upgrade 32 mm AC main	LoS	-	2	1200	32	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$85,974.54	$85,974.54	$8,277.60	Physical works cost already includes factors in section 5.3
O3A - S5	Mill Road Zone	Pipe upgrade 32 mm PVC main	LoS	-	2	535	32	63	PE100 DN63 PN 12.5							$40,466.73	$40,466.73	$3,896.12	Physical works cost already includes factors in section 5.3
O3A - S6	Overall zone - connection from tank to trough	25 mm pipe connection to troughs	LoS	-	609	160416	-	25	PE100 DN25 PN 10	-	-	-	-	-	-	$5,707,993.28	$5,707,993.28	$549,563.47	Physical works cost already includes factors in section 5.3
O3A - S7	Overall zone - connection from tank to trough	32 mm pipe connection to troughs	LoS	-	2	1856	-	32	PE100 DN32 PN 10	-	-	-	-	-	-	$73,321.79	$73,321.79	$7,059.39	Physical works cost already includes factors in section 5.3
O3A - S8	Overall zone - connection from tank to trough	40 mm pipe connection to troughs	LoS	-	1	777	-	40	PE100 DN40 PN 10	-	-	-	-	-	-	$37,269.70	$37,269.70	$3,588.31	Physical works cost already includes factors in section 5.3
O3A - S9	Overall zone	New tanks installed	LoS	-	-	-	-	-	-	-	53	-		-	-	$265,000.00	$365,700.00	$129,283.44	15% P&G, 20% Eng
O3A - S10	Overall zone	New tanks - Restrictors	LoS	-	-	-	-	-	-	53	-	-		-	-	$53,000.00	$73,140.00	$5,102.82	15% P&G, 20% Eng
O3A - S11	Overall zone	Trough connected to existing tanks	LoS	-	-	-	-	-	-	223	-	141	612	-	-	$223,000.00	$307,740.00	$21,470.36	15% P&G, 20% Eng

Ref	Location	Description	Driver	No. Pumps	No. Valves	Length (m)	Initial DN Diameter (mm)	Proposed DN Diameter (mm)	Pipeline Criteria	Restrictors	No. New Tanks	No. Existing Tanks	No. Troughs Supplied from Tank	Demand (m^3/d)	Tank volume (m^3)	Initial Capital Cost (Physical works)	Initial Capital Cost (Incl. P&G, Design/ Eng, Consenting)	WoL Cost Excl. Initial Capex	Comment
O3A - S12	Overall zone-connection from network to tank	Pipe connection to new tanks	LoS	-	40	3147	-	25	PE100 DN25 PN 12.5	-	-	-	-	-	-	$131,305.96	$131,305.96	$12,642.09	Physical works cost already includes factors in section 5.3
O3A - S13	Overall zone-connection from network to tank	Pipe connection to new tanks	LoS	-	8	767	-	32	PE100 DN32 PN 12.5	-	-	-	-	-	-	$35,792.73	$35,792.73	$3,446.11	Physical works cost already includes factors in section 5.3
O3A - S14	Overall zone-connection from network to tank	Pipe connection to new tanks	LoS	-	5	433	-	40	PE100 DN40 PN 12.5	-	-	-	-	-	-	$29,954.65	$29,954.65	$2,884.02	Physical works cost already includes factors in section 5.3
O3A - S15	Overall zone-connection from network to tank	Pipe connection to existing tanks	LoS	-	36	9813	-	32	PE100 DN32 PN 12.5	-	-	-	-	-	-	$412,426.10	$412,426.10	$39,708.23	Physical works cost already includes factors in section 5.3
O3A - S16	Overall zone-connection from network to tank	Pipe connection to existing tanks	LoS	-	17	6460	-	40	PE100 DN40 PN 12.5	-	-	-	-	-	-	$336,181.02	$336,181.02	$32,367.38	Physical works cost already includes factors in section 5.3
O3A - S17	Overall zone-connection from network to tank	Pipe connection to existing tanks	LoS	-	6	4450	-	50	PE100 DN50 PN 12.5	-	-	-	-	-	-	$262,102.32	$262,102.32	$25,235.11	Physical works cost already includes factors in section 5.3
O3A - S18	Overall zone-connection from network to tank	Pipe connection to existing tanks	LoS	-	4	4525	-	63	PE100 DN63 PN 12.5	-	-	-	-	-	-	$317,368.78	$317,368.78	$30,556.15	Physical works cost already includes factors in section 5.3
O3A - S19	Overall zone	Solar powered pump system	LoS	194	-	-	-	-	-	-	-	-	-	-	-	$2,910,000.00	$4,015,800.00	$1,419,678.50	15% P&G, 20% Eng
O3A - S20	Overall zone	Upsize existing tanks	Resilience	-	-	-	-	-	-	-	24	-	-	-	-	$120,000.00	$165,600.00	$58,543.44	15% P&G, 20% Eng

Ref	Location	Description	Driver	No. Pumps	No. Valves	Length (m)	Initial DN Diameter (mm)	Proposed DN Diameter (mm)	Pipeline Criteria	Restrictors	No. New Tanks	No. Existing Tanks	No. Troughs Supplied from Tank	Demand (m^3/d)	Tank volume (m^3)	Initial Capital Cost (Physical works)	Initial Capital Cost (Incl. P&G, Design/ Eng, Consenting)	WoL Cost Excl. Initial Capex	Comment
O1A&O3A - S1	Multi zones	Leakage detection survey in Seadown Rd Zone, Arowhenua Rd Zone, Divans Rd Zone and Foley Rd Zone (Not costed)	LoS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix D – Parcel Details (Connections and Hectares)

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 1 DP 11229	8.109	0	1	0	8.109
Lot 1 DP 11318	42.264	1	0	3	14.088
Lot 1 DP 15668	0.219	1	0	0	0.219
Lot 1 DP 16018	77.759	0	0	3	25.91967
Lot 1 DP 16059	1.267	1	0	0	1.267
Lot 1 DP 16237	0.849	1	0	1	0.849
Lot 1 DP 17630	15.665	0	0	1	15.665
Lot 1 DP 17840	0.405	1	0	1	0.405
Lot 1 DP 18081	0.809	1	0	0	0.809
Lot 1 DP 18419	2.428	1	0	0	2.428
Lot 1 DP 19604	2.023	1	0	0	2.023
Lot 1 DP 2149	22.756	0	0	5	4.5512
Lot 1 DP 22287	1.576	1	1	3	0.525333
Lot 1 DP 23449	24.293	0	0	2	12.1465
Lot 1 DP 23816	4.045	1	0	3	1.348333
Lot 1 DP 24500	0.806	1	0	0	0.806
Lot 1 DP 24535	4.041	1	0	4	1.01025
Lot 1 DP 25300	0.782	0	1	0	0.782
Lot 1 DP 26220	4.962	1	0	1	4.962
Lot 1 DP 26551	0.377	1	0	0	0.377
Lot 1 DP 26938	4.252	1	0	1	4.252
Lot 1 DP 27124	36.861	0	0	4	9.21525
Lot 1 DP 301043	1.026	0	1	0	1.026
Lot 1 DP 301694	3.214	0	1	1	3.214
Lot 1 DP 304827	1.801	0	0	1	1.801
Lot 1 DP 306008	14.598	1	1	0	14.598
Lot 1 DP 309948	1.512	1	0	0	1.512
Lot 1 DP 311850	0.8	1	0	0	0.8
Lot 1 DP 334712	1.537	1	0	1	1.537
Lot 1 DP 337699	0.231	0	1	0	0.231
Lot 1 DP 338846	20.652	0	0	1	20.652
Lot 1 DP 344837	36.26	1	0	0	36.26
Lot 1 DP 344875	46.517	1	0	0	46.517
Lot 1 DP 349773	1.394	0	1	0	1.394
Lot 1 DP 35708	10.114	0	1	0	10.114
Lot 1 DP 35960	41.023	0	0	2	20.5115
Lot 1 DP 360515	1.165	0	1	0	1.165
Lot 1 DP 36116	26.707	0	0	2	13.3535
Lot 1 DP 364593	2.649	1	0	1	2.649
Lot 1 DP 367372	1.999	0	0	1	1.999

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 1 DP 36770	0.402	1	0	0	0.402
Lot 1 DP 368193	1.999	0	1	0	1.999
Lot 1 DP 373242	1.244	1	0	1	1.244
Lot 1 DP 377209	0.859	1	0	1	0.859
Lot 1 DP 377427	0.767	0	1	0	0.767
Lot 1 DP 37925	0.809	1	0	0	0.809
Lot 1 DP 380389	1.599	0	1	1	1.599
Lot 1 DP 381039	2.071	1	0	0	2.071
Lot 1 DP 387124	1.557	0	1	0	1.557
Lot 1 DP 39975	2.461	1	0	4	0.61525
Lot 1 DP 400461	2.144	0	1	0	2.144
Lot 1 DP 402675	2.906	0	1	2	1.453
Lot 1 DP 410964	2.42	1	0	1	2.42
Lot 1 DP 411210	0.386	0	1	0	0.386
Lot 1 DP 420056	5.492	1	0	2	2.746
Lot 1 DP 420188	6.661	1	0	2	3.3305
Lot 1 DP 421414	13.157	0	0	3	4.385667
Lot 1 DP 421940	53.183	0	0	3	17.72767
Lot 1 DP 436963	7.293	0	1	7	1.041857
Lot 1 DP 437725	8.015	0	0	1	8.015
Lot 1 DP 440423	1.467	0	1	0	1.467
Lot 1 DP 442519	0.787	0	1	0	0.787
Lot 1 DP 442526	0.55	0	1	0	0.55
Lot 1 DP 443574	38.008	0	0	9	4.223111
Lot 1 DP 45137	15.488	0	0	7	2.212571
Lot 1 DP 455222	1.035	0	1	0	1.035
Lot 1 DP 456649	9.892	0	1	4	2.473
Lot 1 DP 46747	5.286	1	0	0	5.286
Lot 1 DP 47994	5.707	0	1	1	5.707
Lot 1 DP 48201	1.303	1	0	1	1.303
Lot 1 DP 491876	4.696	1	0	1	4.696
Lot 1 DP 493241	0.565	1	0	0	0.565
Lot 1 DP 493563	0.808	1	0	0	0.808
Lot 1 DP 497247	1.339	1	0	0	1.339
Lot 1 DP 501888	1.944	0	1	1	1.944
Lot 1 DP 50848	0.775	1	0	0	0.775
Lot 1 DP 50852	2.023	1	0	1	2.023
Lot 1 DP 51065	8.474	1	0	0	8.474
Lot 1 DP 515633	36.674	1	0	8	4.58425
Lot 1 DP 516523	0.758	1	0	0	0.758
Lot 1 DP 53165	20.689	0	1	0	20.689
Lot 1 DP 53770	4.249	1	0	5	0.8498
Lot 1 DP 54042	2.648	0	0	1	2.648
Lot 1 DP 54193	42.981	0	0	1	42.981

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 1 DP 55809	0.797	1	0	0	0.797
Lot 1 DP 56081	4.936	1	0	1	4.936
Lot 1 DP 56179	0.8	0	1	0	0.8
Lot 1 DP 56412	0.8	0	1	0	0.8
Lot 1 DP 56887	13.306	0	0	1	13.306
Lot 1 DP 57000	35.478	1	0	0	35.478
Lot 1 DP 57121	0.25	1	0	0	0.25
Lot 1 DP 57210	0.799	1	0	0	0.799
Lot 1 DP 57218	0.8	0	1	0	0.8
Lot 1 DP 57848	0.8	0	1	0	0.8
Lot 1 DP 59436	13.814	0	0	1	13.814
Lot 1 DP 59917	3.015	0	1	0	3.015
Lot 1 DP 60535	0.8	0	1	0	0.8
Lot 1 DP 60697	1.27	0	1	0	1.27
Lot 1 DP 61811	8.225	0	2	3	2.741667
Lot 1 DP 62149	1.35	1	0	2	0.675
Lot 1 DP 62447	0.391	1	0	1	0.391
Lot 1 DP 63572	13.789	1	0	3	4.596333
Lot 1 DP 63901	0.799	1	0	0	0.799
Lot 1 DP 63918	8.088	1	0	0	8.088
Lot 1 DP 64216	1.907	1	0	1	1.907
Lot 1 DP 66120	14.025	2	1	6	2.3375
Lot 1 DP 67011	0.8	0	1	0	0.8
Lot 1 DP 67107	2.214	1	0	1	2.214
Lot 1 DP 67722	0.09	1	0	0	0.09
Lot 1 DP 67907	0.859	0	1	0	0.859
Lot 1 DP 67954	0.8	1	0	0	0.8
Lot 1 DP 69264	0.574	1	0	0	0.574
Lot 1 DP 71265	0.8	0	1	0	0.8
Lot 1 DP 71729	1.169	1	0	0	1.169
Lot 1 DP 71954	1.79	0	1	0	1.79
Lot 1 DP 72249	0.8	1	0	0	0.8
Lot 1 DP 72273	0.8	0	1	0	0.8
Lot 1 DP 72670	0.84	1	0	0	0.84
Lot 1 DP 72733	27.202	1	0	0	27.202
Lot 1 DP 72919	0.8	0	1	0	0.8
Lot 1 DP 72920	0.8	0	1	0	0.8
Lot 1 DP 73483	28.367	1	0	0	28.367
Lot 1 DP 74210	25.777	1	0	4	6.44425
Lot 1 DP 75306	1.617	0	0	3	0.539
Lot 1 DP 75944	0.31	0	1	0	0.31
Lot 1 DP 77889	66.372	1	0	8	8.2965
Lot 1 DP 78782	18.894	1	0	2	9.447
Lot 1 DP 80385	9.735	1	0	0	9.735

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 1 DP 80920	2.444	0	1	1	2.444
Lot 1 DP 81671	59.809	1	0	3	19.93633
Lot 1 DP 81696	0.8	1	0	0	0.8
Lot 1 DP 83267	1.309	0	1	0	1.309
Lot 10 DP 18609	0.506	1	0	0	0.506
Lot 11 DP 18609	0.253	1	0	0	0.253
Lot 11 DP 27039	14.091	1	0	0	14.091
Lot 12 DP 18609	0.253	1	0	0	0.253
Lot 12 DP 25715	4.073	1	0	1	4.073
Lot 13 DP 18609	0.253	1	0	0	0.253
Lot 13 DP 25715	4.047	0	1	4	1.01175
Lot 14 DP 18609	0.253	1	0	0	0.253
Lot 14 DP 25715	4.051	0	0	1	4.051
Lot 15 DP 18609	0.253	1	0	0	0.253
Lot 16 DP 18609	0.251	1	0	0	0.251
Lot 17 DP 18609	0.251	1	0	0	0.251
Lot 17 DP 25715	4.051	1	0	1	4.051
Lot 18 DP 18609	0.253	1	0	0	0.253
Lot 19 DP 18609	0.253	1	0	0	0.253
Lot 2 DP 16237	0.867	1	0	0	0.867
Lot 2 DP 16641	36.343	1	0	0	36.343
Lot 2 DP 17840	0.807	1	0	0	0.807
Lot 2 DP 17903	0.202	1	0	0	0.202
Lot 2 DP 18609	0.635	1	0	0	0.635
Lot 2 DP 19604	6.076	0	1	0	6.076
Lot 2 DP 20653	16.184	0	1	0	16.184
Lot 2 DP 23449	44.349	1	0	0	44.349
Lot 2 DP 25300	7.335	0	0	2	3.6675
Lot 2 DP 25309	0.101	1	0	0	0.101
Lot 2 DP 25715	4.048	1	0	2	2.024
Lot 2 DP 26220	41.155	0	0	7	5.879286
Lot 2 DP 26551	0.272	1	0	0	0.272
Lot 2 DP 27124	4.773	1	0	0	4.773
Lot 2 DP 301043	0.961	0	1	0	0.961
Lot 2 DP 301694	17.158	0	1	2	8.579
Lot 2 DP 302571	44.124	1	0	2	22.062
Lot 2 DP 303547	1.836	0	1	0	1.836
Lot 2 DP 306008	2.79	1	0	0	2.79
Lot 2 DP 309948	1.512	0	1	0	1.512
Lot 2 DP 311850	13.728	1	0	0	13.728
Lot 2 DP 337699	28.493	1	0	0	28.493
Lot 2 DP 344875	2.511	0	0	1	2.511
Lot 2 DP 349773	5.156	0	1	1	5.156
Lot 2 DP 360515	2.594	0	1	0	2.594

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 2 DP 36116	21.892	1	0	2	10.946
Lot 2 DP 364593	8.882	1	0	2	4.441
Lot 2 DP 36770	39.978	0	0	1	39.978
Lot 2 DP 368193	15.232	0	0	1	15.232
Lot 2 DP 373242	3.703	0	1	0	3.703
Lot 2 DP 377209	3.191	0	1	1	3.191
Lot 2 DP 377427	9.766	0	1	1	9.766
Lot 2 DP 380389	1.17	0	1	0	1.17
Lot 2 DP 381039	2.011	0	1	0	2.011
Lot 2 DP 387124	6.612	0	1	2	3.306
Lot 2 DP 397420	3.636	1	0	0	3.636
Lot 2 DP 400461	1.906	1	0	1	1.906
Lot 2 DP 402675	2.839	1	0	0	2.839
Lot 2 DP 410964	0.807	0	1	2	0.4035
Lot 2 DP 411210	48.263	0	0	6	8.043833
Lot 2 DP 41228	0.746	1	0	0	0.746
Lot 2 DP 4174	19.718	0	0	4	4.9295
Lot 2 DP 420056	2.622	0	1	0	2.622
Lot 2 DP 420188	20.151	1	0	0	20.151
Lot 2 DP 421414	0.846	1	0	0	0.846
Lot 2 DP 42580	0.42	0	1	0	0.42
Lot 2 DP 431026	29.645	0	0	4	7.41125
Lot 2 DP 437725	1.487	1	0	0	1.487
Lot 2 DP 440423	1.822	1	0	0	1.822
Lot 2 DP 442519	16.299	1	1	1	16.299
Lot 2 DP 442526	1.973	0	1	1	1.973
Lot 2 DP 45137	50.174	0	0	1	50.174
Lot 2 DP 455222	32.804	0	0	4	8.201
Lot 2 DP 456649	5.237	0	0	2	2.6185
Lot 2 DP 46218	3.861	0	1	1	3.861
Lot 2 DP 462578	16.235	1	0	0	16.235
Lot 2 DP 46747	2.427	1	0	3	0.809
Lot 2 DP 47994	10.872	1	0	5	2.1744
Lot 2 DP 48201	0.113	1	0	0	0.113
Lot 2 DP 482133	1.613	1	0	0	1.613
Lot 2 DP 491876	18.683	1	0	0	18.683
Lot 2 DP 493241	3.476	0	0	1	3.476
Lot 2 DP 499559	64.896	0	0	3	21.632
Lot 2 DP 501888	10.284	0	1	0	10.284
Lot 2 DP 50848	0.773	0	1	0	0.773
Lot 2 DP 50852	18.337	1	1	0	18.337
Lot 2 DP 515633	24.907	1	0	2	12.4535
Lot 2 DP 518786	4.013	0	2	0	2.0065
Lot 2 DP 53165	0.565	1	0	0	0.565

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 2 DP 53166	1.051	1	0	0	1.051
Lot 2 DP 54042	8.627	2	0	0	4.3135
Lot 2 DP 55702	20.332	0	1	4	5.083
Lot 2 DP 55875	33.559	0	0	3	11.18633
Lot 2 DP 56412	7.2	1	0	7	1.028571
Lot 2 DP 56772	4.046	1	0	2	2.023
Lot 2 DP 56887	0.799	0	1	0	0.799
Lot 2 DP 57121	0.121	1	0	0	0.121
Lot 2 DP 57210	0.8	1	0	0	0.8
Lot 2 DP 57218	9.682	0	1	6	1.613667
Lot 2 DP 57848	5.751	0	1	3	1.917
Lot 2 DP 59436	3.65	0	1	1	3.65
Lot 2 DP 59917	0.897	0	1	0	0.897
Lot 2 DP 60535	0.799	0	1	0	0.799
Lot 2 DP 60697	0.8	0	1	0	0.8
Lot 2 DP 61308	12.221	1	0	0	12.221
Lot 2 DP 61579	11.077	1	0	2	5.5385
Lot 2 DP 61811	10.065	0	1	2	5.0325
Lot 2 DP 62149	14.911	0	0	2	7.4555
Lot 2 DP 63572	0.8	0	1	0	0.8
Lot 2 DP 63901	11.465	0	0	2	5.7325
Lot 2 DP 64216	6.54	0	0	3	2.18
Lot 2 DP 66120	0.8	0	1	0	0.8
Lot 2 DP 67011	0.799	0	1	0	0.799
Lot 2 DP 67107	4.696	0	0	1	4.696
Lot 2 DP 67722	0.163	0	1	0	0.163
Lot 2 DP 67954	14.433	0	0	2	7.2165
Lot 2 DP 69264	4.974	0	1	1	4.974
Lot 2 DP 71265	0.8	0	1	0	0.8
Lot 2 DP 71954	2.273	1	0	0	2.273
Lot 2 DP 72249	0.8	0	1	0	0.8
Lot 2 DP 72273	19.456	0	0	1	19.456
Lot 2 DP 72444	10.068	0	1	3	3.356
Lot 2 DP 72670	7.305	0	1	0	7.305
Lot 2 DP 72733	28.733	0	0	3	9.577667
Lot 2 DP 72919	7.279	0	1	0	7.279
Lot 2 DP 72920	0.8	0	1	0	0.8
Lot 2 DP 73483	23.084	1	0	0	23.084
Lot 2 DP 75306	1.476	0	1	0	1.476
Lot 2 DP 75944	1.29	0	1	0	1.29
Lot 2 DP 77889	1.858	1	0	1	1.858
Lot 2 DP 77919	20.088	0	0	3	6.696
Lot 2 DP 78782	0.829	1	0	1	0.829
Lot 2 DP 81696	6.671	0	1	1	6.671

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 2 DP 83267	15.169	1	0	1	15.169
Lot 20 DP 18609	0.253	1	0	0	0.253
Lot 21 DP 18609	0.506	1	0	0	0.506
Lot 23 DP 18609	0.253	1	0	0	0.253
Lot 24 DP 18609	0.253	1	0	0	0.253
Lot 25 DP 18609	0.254	1	0	0	0.254
Lot 26 DP 18609	0.254	1	0	0	0.254
Lot 27 DP 18609	0.254	1	0	0	0.254
Lot 28 DP 18609	0.254	1	0	0	0.254
Lot 29 DP 18609	0.254	1	0	0	0.254
Lot 3 DP 16237	0.604	1	0	0	0.604
Lot 3 DP 18609	0.252	1	0	0	0.252
Lot 3 DP 25715	4.047	1	0	16	0.252938
Lot 3 DP 25872	4.03	1	0	0	4.03
Lot 3 DP 26551	0.272	1	0	0	0.272
Lot 3 DP 27038	4.195	0	1	2	2.0975
Lot 3 DP 309948	59.89	0	0	7	8.555714
Lot 3 DP 380389	17.567	0	0	2	8.7835
Lot 3 DP 402675	2.637	1	0	0	2.637
Lot 3 DP 410964	0.82	0	1	0	0.82
Lot 3 DP 4174	17.243	0	0	1	17.243
Lot 3 DP 421414	1.186	0	1	0	1.186
Lot 3 DP 45137	52.156	0	0	2	26.078
Lot 3 DP 50848	1.242	0	1	0	1.242
Lot 3 DP 53166	2.045	1	0	0	2.045
Lot 3 DP 56887	0.799	0	1	0	0.799
Lot 3 DP 57121	0.112	1	0	0	0.112
Lot 3 DP 57210	12.633	0	1	4	3.15825
Lot 3 DP 57848	0.8	0	1	1	0.8
Lot 3 DP 579	8.817	1	0	2	4.4085
Lot 3 DP 60697	0.8	1	0	0	0.8
Lot 3 DP 61811	0.8	0	1	0	0.8
Lot 3 DP 67954	11.195	0	0	3	3.731667
Lot 3 DP 72249	28.616	0	1	8	3.577
Lot 3 DP 72444	0.8	0	1	0	0.8
Lot 3 DP 72670	13.733	1	0	13	1.056385
Lot 3 DP 72733	53.271	0	0	2	26.6355
Lot 3 DP 72920	50.798	1	0	0	50.798
Lot 3 DP 75306	17.186	0	0	1	17.186
Lot 3 DP 77889	20.837	0	0	4	5.20925
Lot 3 DP 78782	0.797	0	1	0	0.797
Lot 3 DP 83267	1.717	1	0	1	1.717
Lot 30 DP 18609	0.254	1	0	0	0.254
Lot 31 DP 18609	0.255	0	1	0	0.255

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 32 DP 18609	0.299	1	0	0	0.299
Lot 4 DP 18609	0.253	0	1	0	0.253
Lot 4 DP 23449	21.712	0	0	2	10.856
Lot 4 DP 25715	4.048	1	0	1	4.048
Lot 4 DP 25872	5.35	1	0	8	0.66875
Lot 4 DP 26551	0.272	0	1	0	0.272
Lot 4 DP 27038	5.665	1	0	2	2.8325
Lot 4 DP 397420	7.328	0	1	2	3.664
Lot 4 DP 402675	1.213	0	1	0	1.213
Lot 4 DP 410964	1.087	1	0	0	1.087
Lot 4 DP 4174	21.937	0	0	2	10.9685
Lot 4 DP 421414	0.68	0	1	0	0.68
Lot 4 DP 440423	3.662	0	1	0	3.662
Lot 4 DP 50848	1.27	1	1	1	1.27
Lot 4 DP 53166	13.373	1	0	3	4.457667
Lot 4 DP 56887	9.997	0	0	2	4.9985
Lot 4 DP 57121	0.117	1	0	0	0.117
Lot 4 DP 595	14.126	0	0	2	7.063
Lot 4 DP 59917	16.84	0	1	0	16.84
Lot 4 DP 60697	0.8	1	0	0	0.8
Lot 4 DP 66120	0.8	0	1	0	0.8
Lot 4 DP 67954	0.8	0	1	0	0.8
Lot 4 DP 72444	0.8	0	1	0	0.8
Lot 4 DP 72670	11.205	1	0	7	1.600714
Lot 4 DP 83267	10.274	0	1	1	10.274
Lot 5 DP 18609	0.252	1	0	0	0.252
Lot 5 DP 23245	14.182	1	0	3	4.727333
Lot 5 DP 26551	0.261	1	0	0	0.261
Lot 5 DP 27038	4.968	1	0	2	2.484
Lot 5 DP 402675	9.459	1	0	0	9.459
Lot 5 DP 410964	6.008	0	1	2	3.004
Lot 5 DP 421414	0.68	1	0	0	0.68
Lot 5 DP 57848	0.8	0	1	0	0.8
Lot 5 DP 67954	0.847	0	1	0	0.847
Lot 5 DP 72670	9.998	0	1	1	9.998
Lot 6 DP 18609	0.25	1	0	0	0.25
Lot 6 DP 25872	3.851	1	0	0	3.851
Lot 6 DP 26551	0.471	0	1	0	0.471
Lot 6 DP 27038	5.874	1	0	2	2.937
Lot 6 DP 421414	0.825	1	0	1	0.825
Lot 6 DP 4431	12.201	0	0	1	12.201
Lot 6 DP 67954	11.365	0	0	4	2.84125
Lot 7 DP 18609	0.253	1	0	0	0.253
Lot 7 DP 27039	5.42	0	1	4	1.355

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Lot 7 DP 397420	7.543	0	1	0	7.543
Lot 7 DP 402675	51.527	0	0	2	25.7635
Lot 7 DP 56887	0.799	0	1	0	0.799
Lot 7 DP 60697	8.413	1	0	1	8.413
Lot 7 DP 657	28.419	1	0	7	4.059857
Lot 8 DP 27039	6.416	1	0	1	6.416
Lot 8 DP 56887	0.795	0	1	0	0.795
Lot 8 DP 595	46.741	0	0	1	46.741
Lot 9 DP 25715	4.061	0	0	3	1.353667
Lot 9 DP 657	31.32	0	1	6	5.22
Part Lot 1 DP 16526	0.398	1	0	0	0.398
Part Lot 1 DP 4505	5.228	3	0	2	2.614
Part Lot 2 DP 6380	3.175	1	0	5	0.635
Part Lot 3 DP 16526	1.226	1	0	0	1.226
Part Lot 3 DP 63572	40.456	0	0	8	5.057
Part Lot 3 DP 71265	30.8	0	0	1	30.8
Part Lot 4 DP 29669	46.882	0	0	1	46.882
Part Lot 4 DP 579	20.501	2	0	0	10.2505
Part Lot 6 DP 16543	69.281	0	0	2	34.6405
Part Lot 6 DP 657	20.243	0	0	4	5.06075
Part Lot 9 DP 595	14.449	0	0	2	7.2245
Part Railway Reserve Survey Office Plan 9768	42.227	0	0	8	5.278375
Part Res 1309	8.098	0	1	0	8.098
Part RES 251	81.06	1	0	0	81.06
Part RS 10130	18.043	0	0	1	18.043
Part RS 11530	8.224	0	0	1	8.224
Part RS 12916	8.05	1	0	0	8.05
Part RS 14050	7.442	0	0	2	3.721
Part RS 14114	1.929	0	0	2	0.9645
Part RS 14542	36.166	0	0	4	9.0415
Part RS 14569	23.736	0	0	1	23.736
Part RS 16705	20.116	0	0	1	20.116
Part RS 17627	4.994	1	0	4	1.2485
Part RS 19746	44.761	1	0	0	44.761
Part RS 20873	20.951	0	0	3	6.983667
Part RS 21034	42.377	1	1	5	8.4754
Part RS 21122	29.726	1	0	0	29.726
Part RS 21264	19.882	0	0	1	19.882

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
Part RS 21370	27.553	0	0	1	27.553
Part RS 21439	1.27	0	0	1	1.27
Part RS 22161	26.29	0	0	2	13.145
Part RS 22764	5.885	2	0	1	5.885
Part RS 3893	4.143	0	1	0	4.143
Part RS 4226	96.646	1	0	2	48.323
Part RS 8287	10.06	1	0	1	10.06
Part RS 9855	6.19	0	0	1	6.19
Part RS 9894	40.839	1	0	3	13.613
Part Rural Section 14583	8.442	0	0	2	4.221
Part Section 2 Milford SETT	26.149	2	0	5	5.2298
RES 5010	205.07	4	0	2	102.535
RS 10728	19.775	0	0	1	19.775
RS 12811	25.065	1	0	4	6.26625
RS 12912	7.967	0	0	1	7.967
RS 14060	12.112	0	0	2	6.056
RS 14439	8.186	0	0	1	8.186
RS 14515	13.079	0	0	1	13.079
RS 14574	47.909	0	0	6	7.984833
RS 14584	17.614	0	0	1	17.614
RS 14634	16.9	1	0	2	8.45
RS 14965	9.27	1	0	2	4.635
RS 15607	20.317	0	0	5	4.0634
RS 15658	70.535	2	0	0	35.2675
RS 16650	26.906	0	0	1	26.906
RS 16862	16.237	0	0	1	16.237
RS 16986	26.901	0	0	1	26.901
RS 16996	10.085	0	0	2	5.0425
RS 17062	20.216	1	0	2	10.108
RS 19100	45.922	0	0	2	22.961
RS 19696	11.213	1	0	0	11.213
RS 20736	8.157	0	0	3	2.719
RS 20815	35.74	0	0	2	17.87
RS 20872	8.138	0	0	1	8.138
RS 20911	16.199	1	0	2	8.0995
RS 20966	23.427	0	0	1	23.427
RS 22591	13.481	1	0	1	13.481
RS 22592	26.282	0	1	6	4.380333
RS 22817	16.254	2	0	3	5.418
RS 22832	8.295	1	0	2	4.1475
RS 23152	23.505	1	0	5	4.701
RS 25938	6.187	1	0	1	6.187
RS 37723	38.388	1	0	4	9.597

Parcel ID	Sum of Polygon Area (ha)	Sum of TANKN	Sum of TANKR	Sum of TROUGH	Polygon Area (ha) / connections
RS 37724	11.518	0	0	1	11.518
RS 37725	7.74	0	0	1	7.74
RS 37729	31.979	0	0	2	15.9895
RS 38570	2.032	1	0	2	1.016
RS 38640	2.031	1	0	0	2.031
RS 40154	0.871	0	0	1	0.871
RS 40679	0.465	0	0	1	0.465
RS 5349	8.091	0	0	1	8.091
RS 7763	7.888	0	0	2	3.944
RS 8037	8.394	0	0	1	8.394
Section 1 Milford SETT	21.018	0	0	14	1.501286
Section 1 Seaforth SETT	21.234	1	0	2	10.617
Section 10 Seaforth SETT	34.142	0	0	1	34.142
Section 2 Seaforth SETT	23.642	0	0	5	4.7284
Section 3 Milford SETT	26.493	1	0	3	8.831
Section 4 Milford SETT	26.472	0	0	3	8.824
Section 6 Seaforth SETT	21.667	0	0	2	10.8335
Section 7C Seaforth SETT	2.023	0	0	1	2.023
Grand Total		**223**	**133**	**612**	**3129.42**

Appendix E – Estimated Consumption Per Customer

Key	Category Type	Demand Category	Tank demand	Stockwater demand
AROW-TK83855	Property	DMA01-SeadownCentral UnRest	1000	0
MILR-TK83858	Property	DMA01-SeadownCentral UnRest	1000	1932.19
NAUG-TK83851	Property	DMA01-SeadownCentral UnRest	1000	310.245
AROW-TK83854	Property	DMA01-SeadownCentral UnRest	1000	0
KERY-TK83760	Property	DMA01-SeadownCentral UnRest	1000	0
KERY-TK83761	Property	DMA01-SeadownCentral UnRest	1000	0
KERY-TK83759	Property	DMA01-SeadownCentral UnRest	1000	523.25
AROW-TK83757	Property	DMA01-SeadownCentral UnRest	1000	0
AROW-TK83751	Property	DMA01-SeadownCentral UnRest	1000	2292.3875
AROW-TK83752	Property	DMA01-SeadownCentral UnRest	1000	3023.605
AROW-TK84039	Property	DMA01-SeadownCentral UnRest	1000	2292.3875
AROW-TK83749	Property	DMA01-SeadownCentral UnRest	1000	0
SH01-TK84945	Property	DMA01-SeadownCentral UnRest	1000	0
SH01-TK84483	Property	DMA01-SeadownCentral UnRest	1000	36.725
SH01-TK83736	Property	DMA01-SeadownCentral UnRest	1000	0
LEVP-TK83741	Property	DMA01-SeadownCentral UnRest	1000	0
LEVP-TK84097	Property	DMA01-SeadownCentral UnRest	1000	0
DMIN-TK84154	Property	DMA01-SeadownCentral UnRest	1000	0
LEVP-TK83792	Property	DMA01-SeadownCentral UnRest	1000	0
SH01-TK83685	Property	DMA01-SeadownCentral UnRest	1000	52.455
DMIN-TK83684	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83829	Property	DMA01-SeadownCentral UnRest	1000	0
LEVP-TK84468	Property	DMA01-SeadownCentral UnRest	1000	0
FOLY-TK83781	Property	DMA01-SeadownCentral UnRest	1000	0
FOLY-TK83790	Property	DMA01-SeadownCentral UnRest	1000	0
FOLY-TK83787	Property	DMA01-SeadownCentral UnRest	1000	0
NAUG-TK83780	Property	DMA01-SeadownCentral UnRest	1000	0
NAUG-TK83826	Property	DMA01-SeadownCentral UnRest	1000	0
FOLY-TK83779	Property	DMA01-SeadownCentral UnRest	1000	51.805
FOLY-TK83753	Property	DMA01-SeadownCentral UnRest	1000	0
FOLY-TK83754	Property	DMA01-SeadownCentral UnRest	1000	0
FOLY-TK83788	Property	DMA01-SeadownCentral UnRest	1000	0
FOLY-TK84772	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83833	Property	DMA01-SeadownCentral UnRest	1000	96.655
FOLY-TK83789	Property	DMA01-SeadownCentral UnRest	1000	0
AROW-TK83756	Property	DMA01-SeadownCentral UnRest	1000	525.72
KERY-TK84580	Property	DMA01-SeadownCentral UnRest	1000	52.585
KERY-TK84540	Property	DMA01-SeadownCentral UnRest	1000	1191.905
KERY-TK84881	Property	DMA01-SeadownCentral UnRest	1000	0
KERY-TK83852	Property	DMA01-SeadownCentral UnRest	1000	0
KERY-TK84084	Property	DMA01-SeadownCentral UnRest	1000	0

Key	Category Type	Demand Category	Tank demand	Stockwater demand
NAUG-TK83846	Property	DMA01-SeadownCentral UnRest	1000	632.775
KERY-TK83771	Property	DMA01-SeadownCentral UnRest	1000	157.82
KERY-TK83775	Property	DMA01-SeadownCentral UnRest	1000	0
KERY-TK83828	Property	DMA01-SeadownCentral UnRest	1000	132.015
KERY-TK83778	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83844	Property	DMA01-SeadownCentral UnRest	1000	134.615
SH08-TK83843	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83841	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83838	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83837	Property	DMA01-SeadownCentral UnRest	1000	0
LEVP-TK84263	Property	DMA01-SeadownCentral UnRest	1000	0
LEVP-TK83794	Property	DMA01-SeadownCentral UnRest	1000	82.355
LEVP-TK83793	Property	DMA01-SeadownCentral UnRest	1000	0
LYNC-TK84179	Property	DMA01-SeadownCentral UnRest	1000	13.13
SH01-TK83671	Property	DMA01-SeadownCentral UnRest	1000	118.43
SH01-TK84891	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83662	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83661	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK84808	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83664	Property	DMA01-SeadownCentral UnRest	1000	0
LYNC-TK83674	Property	DMA01-SeadownCentral UnRest	1000	0
SH01-TK83669	Property	DMA01-SeadownCentral UnRest	1000	0
SH01-TK83667	Property	DMA01-SeadownCentral UnRest	1000	147.745
LYNC-TK83820	Property	DMA01-SeadownCentral UnRest	1000	0
LYNC-TK83821	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83663	Property	DMA01-SeadownCentral UnRest	1000	0
FALV-TK83665	Property	DMA01-SeadownCentral UnRest	1000	70.655
LYNC-TK84897	Property	DMA01-SeadownCentral UnRest	1000	50.375
ACIA-TK83689	Property	DMA01-SeadownCentral UnRest	1000	6.565
ACIA-TK84360	Property	DMA01-SeadownCentral UnRest	1000	16.965
ACIA-TK83692	Property	DMA01-SeadownCentral UnRest	1000	17.68
ACIA-TK83693	Property	DMA01-SeadownCentral UnRest	1000	17.68
ACIA-TK83694	Property	DMA01-SeadownCentral UnRest	1000	24.505
ACIA-TK83695	Property	DMA01-SeadownCentral UnRest	1000	19.435
ACIA-TK83696	Property	DMA01-SeadownCentral UnRest	1000	16.51
ACIA-TK83697	Property	DMA01-SeadownCentral UnRest	1000	16.51
ACIA-TK83698	Property	DMA01-SeadownCentral UnRest	1000	16.51
ACIA-TK83699	Property	DMA01-SeadownCentral UnRest	1000	16.51
ACIA-TK83700	Property	DMA01-SeadownCentral UnRest	1000	16.51
ACIA-TK83701	Property	DMA01-SeadownCentral UnRest	1000	16.51
ACIA-TK83702	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83703	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83705	Property	DMA01-SeadownCentral UnRest	1000	32.89
ACIA-TK83706	Property	DMA01-SeadownCentral UnRest	1000	16.445

Key	Category Type	Demand Category	Tank demand	Stockwater demand
ACIA-TK83707	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83708	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83709	Property	DMA01-SeadownCentral UnRest	1000	16.315
ACIA-TK84542	Property	DMA01-SeadownCentral UnRest	1000	16.315
ACIA-TK83711	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83712	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83713	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83714	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83715	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83716	Property	DMA01-SeadownCentral UnRest	1000	32.89
ACIA-TK83717	Property	DMA01-SeadownCentral UnRest	1000	5.85
ACIA-TK83719	Property	DMA01-SeadownCentral UnRest	1000	16.445
ACIA-TK83720	Property	DMA01-SeadownCentral UnRest	1000	16.25
ACIA-TK83721	Property	DMA01-SeadownCentral UnRest	1000	16.38
ACIA-TK83722	Property	DMA01-SeadownCentral UnRest	1000	16.38
ACIA-TK83723	Property	DMA01-SeadownCentral UnRest	1000	41.275
ACIA-TK83726	Property	DMA01-SeadownCentral UnRest	1000	54.99
ACIA-TK84036	Property	DMA01-SeadownCentral UnRest	1000	0
DMIN-TK83686	Property	DMA01-SeadownCentral UnRest	1000	0
HEDL-TK83816	Property	DMA01-SeadownCentral UnRest	1000	666.2825
HEDL-TK83815	Property	DMA01-SeadownCentral UnRest	1000	666.2825
HEDL-TK84920	Property	DMA01-SeadownCentral UnRest	1000	79.69
HEDL-TK83814	Property	DMA01-SeadownCentral UnRest	1000	280.3775
ACIA-TK84568	Property	DMA01-SeadownCentral UnRest	1000	44.2
HEDL-TK83727	Property	DMA01-SeadownCentral UnRest	1000	250.315
ACIA-TK83710	Property	DMA01-SeadownCentral UnRest	1000	261.95
ACIA-TK83725	Property	DMA01-SeadownCentral UnRest	1000	0
HEDL-TK83813	Property	DMA01-SeadownCentral UnRest	1000	0
DMIN-TK83687	Property	DMA01-SeadownCentral UnRest	1000	0
SH01-TK84433	Property	DMA01-SeadownCentral UnRest	1000	0
SEAD-TK84952	Property	DMA01-SeadownCentral UnRest	1000	0
SEAD-TK84554	Property	DMA01-SeadownCentral UnRest	1000	1843.855
SEAD-TK83734	Property	DMA01-SeadownCentral UnRest	1000	0
SEAD-TK83733	Property	DMA01-SeadownCentral UnRest	1000	0
SEAD-TK83732	Property	DMA01-SeadownCentral UnRest	1000	0
SEAD-TK83730	Property	DMA01-SeadownCentral UnRest	1000	0
SEAD-TK83729	Property	DMA01-SeadownCentral UnRest	1000	36.725
SEAD-TK83728	Property	DMA01-SeadownCentral UnRest	1000	2356.9
SEAD-TK83859	Property	DMA01-SeadownCentral UnRest	1000	0
SEAF-TK83628	Property	DMA01-SeadownCentral UnRest	1000	75.985
SEAF-TK83627	Property	DMA01-SeadownCentral UnRest	1000	0
SEAD-TK83626	Property	DMA01-SeadownCentral UnRest	1000	550.81
DIVN-TK83641	Property	DMA02-Kerrytown Unrestricted	1000	49.27
SH01-TK83651	Property	DMA02-Kerrytown Unrestricted	1000	0

Key	Category Type	Demand Category	Tank demand	Stockwater demand
SH01-TK84482	Property	DMA02-Kerrytown Unrestricted	1000	0
DIVN-TK83645	Property	DMA02-Kerrytown Unrestricted	1000	52.39
SH01-TK83644	Property	DMA02-Kerrytown Unrestricted	1000	14.235
DIVN-TK83646	Property	DMA02-Kerrytown Unrestricted	1000	52.585
DIVN-TK83647	Property	DMA02-Kerrytown Unrestricted	1000	131.495
DIVN-TK83648	Property	DMA02-Kerrytown Unrestricted	1000	26.13
DIVN-TK83805	Property	DMA02-Kerrytown Unrestricted	1000	0
DIVN-TK83803	Property	DMA02-Kerrytown Unrestricted	1000	0
DIVN-TK83804	Property	DMA02-Kerrytown Unrestricted	1000	7.345
BROS-TK84543	Property	DMA02-Kerrytown Unrestricted	1000	132.925
KERY-TK84532	Property	DMA02-Kerrytown Unrestricted	1000	51.935
KERY-TK84533	Property	DMA03-Naughton Unrest	1000	52
KERY-TK84551	Property	DMA03-Naughton Unrest	1000	52
FOLY-TK83782	Property	DMA03-Naughton Unrest	1000	52
WILS-TK83824	Property	DMA03-Naughton Unrest	1000	0
SH01-TK83735	Property	DMA03-Naughton Unrest	1000	51.935
BROS-TK83682	Property	DMA03-Naughton Unrest	1000	0
LYNC-TK84037	Property	DMA03-Naughton Unrest	1000	0
LYNC-TK84038	Property	DMA03-Naughton Unrest	1000	0
KERY-TK83767	Property	DMA03-Naughton Unrest	1000	0
SH01-TK83819	Property	DMA03-Naughton Unrest	1000	52
MILR-TK84536	Property	DMA03-Naughton Unrest	1000	794.365
SEAD-TK84555	Property	DMA03-Naughton Unrest	1000	1500.46
FOLY-TK83784	Property	DMA05-Seadown Rd Unrestricted	1000	474.435
FOLY-TK83783	Property	DMA05-Seadown Rd Unrestricted	1000	181.35
KERY-TK84367	Property	DMA05-Seadown Rd Unrestricted	1000	0
KERY-TK84885	Property	DMA05-Seadown Rd Unrestricted	1000	0
NAUG-TK84553	Property	DMA05-Seadown Rd Unrestricted	1000	0
NAUG-TK83848	Property	DMA05-Seadown Rd Unrestricted	1000	87.035
NAUG-TK83847	Property	DMA05-Seadown Rd Unrestricted	1000	0
SEAF-TK83624	Property	DMA05-Seadown Rd Unrestricted	1000	0
SEAF-TK83625	Property	DMA06-Divan Unrestricted	1000	0
SH01-TK83817	Property	DMA06-Divan Unrestricted	1000	52
BROS-TK84323	Property	DMA06-Divan Unrestricted	1000	68.315
DIVN-TK83802	Property	DMA06-Divan Unrestricted	1000	0
SH01-TK83812	Property	DMA06-Divan Unrestricted	1000	0
SH01-TK83811	Property	DMA06-Divan Unrestricted	1000	728.845
SEAD-TK83731	Property	DMA06-Divan Unrestricted	1000	104.845
AWST-TK84524	Property	DMA06-Divan Unrestricted	1000	614.835
AWST-TK84525	Property	DMA06-Divan Unrestricted	1000	171.405
ACIA-TK84541	Property	DMA06-Divan Unrestricted	1000	25.87
LYNC-TK84545	Property	DMA06-Divan Unrestricted	1000	236.34
FOLY-TK84547	Property	DMA06-Divan Unrestricted	1000	52
BROS-TK84549	Property	DMA06-Divan Unrestricted	1000	52.52

Key	Category Type	Demand Category	Tank demand	Stockwater demand
SH01-TK83738	Property	DMA06-Divan Unrestricted	1000	184.535
FALV-TK84703	Property	DMA06-Divan Unrestricted	1000	915.915
KERY-TK84880	Property	DMA06-Divan Unrestricted	1000	0
HEDL-TK85022	Property	DMA06-Divan Unrestricted	1000	280.3775
SH01-TK83635	Property	DMA06-Divan Unrestricted	1000	0
MILR-TK84040	Property	DMA06-Divan Unrestricted	1000	2882.685
MILR-TK84079	Property	DMA06-Divan Unrestricted	1000	2306.07
AROW-TK84471	Property	DMA08-FalveyRd Unrest	1800	50.83
LEVP-TK84472	Property	DMA08-FalveyRd Unrest	1800	0
AROW-TK83748	Property	DMA08-FalveyRd Unrest	1000	0
LEVP-TK83746	Property	DMA08-FalveyRd Unrest	1800	0
SH01-TK83737	Property	DMA08-FalveyRd Unrest	1800	1344.785
FALV-TK83660	Property	DMA08-FalveyRd Unrest	1000	0
FALV-TK84144	Property	DMA08-FalveyRd Unrest	1000	0
FALV-TK84151	Property	DMA08-FalveyRd Unrest	1000	0
FALV-TK84478	Property	DMA08-FalveyRd Unrest	1000	0
LYNC-TK83679	Property	DMA09-Arowhenua Unrest	1800	90.61
FOLY-TK84442	Property	DMA09-Arowhenua Unrest	1800	67.275
FOLY-TK83791	Property	DMA09-Arowhenua Unrest	1800	0
FALV-TK83842	Property	DMA09-Arowhenua Unrest	1000	1768.13
FOLY-TK83832	Property	DMA09-Arowhenua Unrest	1000	52
KERY-TK83766	Property	DMA09-Arowhenua Unrest	1800	52
KERY-TK84445	Property	DMA10-Foley Unrestricted	1800	1191.905
KERY-TK83764	Property	DMA10-Foley Unrestricted	1800	101.205
KERY-TK83776	Property	DMA10-Foley Unrestricted	1800	0
KERY-TK83774	Property	DMA10-Foley Unrestricted	1800	0
FALV-TK83839	Property	DMA10-Foley Unrestricted	2000	0
SH08-TK83835	Property	DMA10-Foley Unrestricted	1000	0
FALV-TK84424	Property	DMA10-Foley Unrestricted	1800	0
SH08-TK83836	Property	DMA10-Foley Unrestricted	1000	0
SH08-TK83834	Property	DMA10-Foley Unrestricted	1000	0
LEVP-TK83796	Property	DMA10-Foley Unrestricted	1000	0
SH08-TK83799	Property	DMA10-Foley Unrestricted	1000	54.6
LEVP-TK83795	Property	DMA10-Foley Unrestricted	1000	0
LEVP-TK84581	Property	DMA10-Foley Unrestricted	1000	0
BROS-TK83657	Property	restricted flat profile	1800	0
LYNC-TK83825	Property	restricted flat profile	1000	2909.465
FALV-TK83668	Property	restricted flat profile	1800	0
LYNC-TK84178	Property	restricted flat profile	1800	0
LYNC-TK83670	Property	restricted flat profile	1800	260.845
HEDL-TK84341	Property	restricted flat profile	1800	30.615
ACIA-TK83691	Property	restricted flat profile	1800	17.68
ACIA-TK84425	Property	restricted flat profile	1800	16.575
ACIA-TK84236	Property	restricted flat profile	1800	16.445

Key	Category Type	Demand Category	Tank demand	Stockwater demand
SH01-TK84264	Property	restricted flat profile	1800	269.295
SEAD-TK84411	Property	restricted flat profile	2000	0
SEAD-TK84416	Property	restricted flat profile	1800	0
SEAD-TK84053	Property	restricted flat profile	4000	15.015
SEAD-TK84181	Property	restricted flat profile	1800	27.3
SH01-TK83807	Property	restricted flat profile	1800	62.465
DIVN-TK82076	Property	restricted flat profile	1000	1055.275
SH01-TK83643	Property	restricted flat profile	1800	35.75
FALV-TK83658	Property	restricted flat profile	1800	0
FALV-TK84426	Property	restricted flat profile	1800	95.94
DIVN-TK83649	Property	restricted flat profile	1000	1309.815
KENN-TK83637	Property	restricted flat profile	1000	48.49
SH08-TK83800	Property	restricted flat profile	1000	0
KENN-TK83638	Property	restricted flat profile	1000	0
KENN-TK83639	Property	restricted flat profile	1000	0
KENN-TK84406	Property	restricted flat profile	1800	0
KENN-TK84584	Property	restricted flat profile	1000	0
KENN-TK84473	Property	restricted flat profile	1000	343.59
KENN-TK83640	Property	restricted flat profile	1000	0
KENN-TK84305	Property	restricted flat profile	1800	526.37
SH01-TK83632	Property	restricted flat profile	1000	0
SH01-TK83633	Property	restricted flat profile	1000	39.26
SH01-TK83634	Property	restricted flat profile	1000	56.355
SEAD-TK84415	Property	restricted flat profile	1000	0
NAUG-TK83827	Property	restricted flat profile	1800	0
LEVP-TK84409	Property	restricted flat profile	1800	52
FALV-TK83840	Property	restricted flat profile	1800	52
KERY-TK83763	Property	restricted flat profile	1800	0
NAUG-TK83765	Property	restricted flat profile	1800	0
KERY-TK84408	Property	restricted flat profile	1800	0
KERY-TK83769	Property	restricted flat profile	1800	52
BROS-TK83652	Property	restricted flat profile	1800	51.675
BROS-TK83654	Property	restricted flat profile	1800	0
BROS-TK83810	Property	restricted flat profile	1800	51.935
BROS-TK83809	Property	restricted flat profile	1800	51.935
DIVN-TK83650	Property	restricted flat profile	1800	394.94
NAUG-TK83850	Property	restricted flat profile	1800	195.975
FOLY-TK84410	Property	restricted flat profile	1800	51.935
FOLY-TK83775	Property	restricted flat profile	1800	52
KERY-TK83770	Property	restricted flat profile	1800	0
BROS-TK83653	Property	restricted flat profile	1800	51.935
FOLY-TK83845	Property	restricted flat profile	1800	82.55
BROS-TK83655	Property	restricted flat profile	1800	52
NAUG-TK83825	Property	restricted flat profile	1800	51.155

Key	Category Type	Demand Category	Tank demand	Stockwater demand
NAUG-TK83849	Property	restricted flat profile	1800	58.305
KERY-TK83772	Property	restricted flat profile	1800	52
LYNC-TK83681	Property	restricted flat profile	1800	0
LYNC-TK83678	Property	restricted flat profile	1800	52
LYNC-TK84419	Property	restricted flat profile	1800	49.855
LYNC-TK83680	Property	restricted flat profile	1800	52
ACIA-TK83718	Property	restricted flat profile	1800	10.595
LEVP-TK83472	Property	restricted flat profile	1800	52
KERY-TK83768	Property	restricted flat profile	1800	51.935
LEVP-TK83745	Property	restricted flat profile	1000	52
DIVN-TK82443	Property	restricted flat profile	1800	52
LYNC-TK83672	Property	restricted flat profile	1800	52
MILR-TK83857	Property	restricted flat profile	1800	52
LEVP-TK83744	Property	restricted flat profile	1800	52
FALV-TK83831	Property	restricted flat profile	1800	0
AROW-TK84254	Property	restricted flat profile	1800	83.85
FALV-TK84389	Property	restricted flat profile	1800	0
AROW-TK86248	Property	restricted flat profile	1000	3301.87
KERY-TK83762	Property	restricted flat profile	1800	51.805
FALV-TK83659	Property	restricted flat profile	1800	0
DIVN-TK83642	Property	restricted flat profile	1800	119.34
ACIA-TK84384	Property	restricted flat profile	1800	77.09
ACIA-TK84385	Property	restricted flat profile	1800	44.2
SH01-TK83683	Property	restricted flat profile	1800	52
SH08-TK84577	Property	restricted flat profile	1000	0
FALV-TK84188	Property	restricted flat profile	1800	76.05
LYNC-TK83677	Property	restricted flat profile	1800	0
LYNC-TK83676	Property	restricted flat profile	1800	52
LYNC-TK83673	Property	restricted flat profile	1800	0
LYNC-TK84184	Property	restricted flat profile	1800	0
SEAD-TK83631	Property	restricted flat profile	1000	0
SEAD-TK83629	Property	restricted flat profile	1000	1852.045
AROW-TK84434	Property	restricted flat profile	1000	7.605
AROW-TK84435	Property	restricted flat profile	1000	7.28
AROW-TK84436	Property	restricted flat profile	1000	7.865
AROW-TK84437	Property	restricted flat profile	1000	16.25
AROW-TK83856	Property	restricted flat profile	1800	52
DIVN-TK84417	Property	restricted flat profile	1800	52
DIVN-TK84418	Property	restricted flat profile	1800	52
SH01-TK84407	Property	restricted flat profile	1800	139.36
SH01-TK84441	Property	restricted flat profile	1800	0
SH01-TK84104	Property	restricted flat profile	1000	892.32
LEVP-TK84546	Property	restricted flat profile	1000	1214.395
LEVP-TK83797	Property	restricted flat profile	1800	0

Key	Category Type	Demand Category	Tank demand	Stockwater demand
DIVN-TK84357	Property	restricted flat profile	1800	657.41
FALV-TK84218	Property	restricted flat profile	1800	0
FALV-TK84167	Property	restricted flat profile	1800	240.695
KENN-TK84377	Property	restricted flat profile	1000	5268.9
FOLY-TK84380	Property	restricted flat profile	1800	474.435
KERY-TK84391	Property	restricted flat profile	1800	473.135
BROS-TK84398	Property	restricted flat profile	1800	129.935
KERY-TK84400	Property	restricted flat profile	1800	1094.6
DIVN-TK83801	Property	restricted flat profile	1000	2362.295
FOLY-TK83786	Property	restricted flat profile	1800	52
LYNC-TK84413	Property	restricted flat profile	1800	260.845
SEAD-TK83636	Property	restricted flat profile	1800	98.28
LYNC-TK84103	Property	restricted flat profile	1800	0
AROW-TK84420	Property	restricted flat profile	2000	20.15
KERY-TK84500	Property	restricted flat profile	2000	668.46
AROW-TK84423	Property	restricted flat profile	1800	0
DIVN-TK84466	Property	restricted flat profile	1800	168.61
FALV-TK84187	Property	restricted flat profile	1800	0
FALV-TK83830	Property	restricted flat profile	1800	55.835
FALV-TK84212	Property	restricted flat profile	1800	130.715
FALV-TK84219	Property	restricted flat profile	1800	0
FALV-TK84220	Property	restricted flat profile	1800	53.3
SH01-TK84451	Property	restricted flat profile	1800	25.09
LEVP-TK83743	Property	restricted flat profile	1800	0
NAUG-TK84469	Property	restricted flat profile	1000	0
KERY-TK84470	Property	restricted flat profile	1800	0
KERY-TK84165	Property	restricted flat profile	1800	0
AWST-TK84250	Property	restricted flat profile	1800	0
AWST-TK84438	Property	restricted flat profile	1800	78.845
BROS-TK84247	Property	restricted flat profile	1800	0
LYNC-TK83822	Property	restricted flat profile	1800	0
LYNC-TK83823	Property	restricted flat profile	1800	50.245
SH01-TK84373	Property	restricted flat profile	1000	238.03
SH01-TK84374	Property	restricted flat profile	1000	95.355
SH01-TK83806	Property	restricted flat profile	1000	98.28
AROW-TK83853	Property	restricted flat profile	1800	52
KERY-TK84253	Property	restricted flat profile	1800	85.085
SH01-TK83818	Property	restricted flat profile	1800	55.055
LYNC-TK84088	Property	restricted flat profile	1800	490.295
KERY-TK83773	Property	restricted flat profile	1800	0
SH08-TK84193	Property	restricted flat profile	1800	1051.96
LEVP-TK83798	Property	restricted flat profile	1800	474.825
BROS-TK84091	Property	restricted flat profile	1800	0
FALV-TK84222	Property	restricted flat profile	1800	170.43

Key	Category Type	Demand Category	Tank demand	Stockwater demand
LYNC-TK84086	Property	restricted flat profile	1800	80.73
SH01-TK83666	Property	restricted flat profile	1800	116.35
WAIP-TK84427	Property	restricted flat profile	1800	527.085
SH01-TK83808	Property	restricted flat profile	1800	66.69
DIVN-TK84095	Property	restricted flat profile	1800	75.725
SEAD-TK85019	Property	restricted flat profile	1000	37.31
SEAD-TK85003	Property	restricted flat profile	1000	0
G4	Property	restricted flat profile	1000	0
G5	Property	restricted flat profile	1000	0
G3	Property	restricted flat profile	1000	0
G2	Property	restricted flat profile	1000	0
G1	Property	restricted flat profile	1000	0
G11	Property	restricted flat profile	1000	0
G10	Property	restricted flat profile	1000	0
G9	Property	restricted flat profile	1000	0
G8	Property	restricted flat profile	2000	0
G7	Property	restricted flat profile	1000	0
Growth Dev	Property	restricted flat profile *10 prop	1000	0
Growth-Foley	Property	restricted flat profile *2 prop	1000	0
Growth-Airport	Property	restricted flat profile *10 prop	1000	0
Growth-Divan	Property	restricted flat profile *2 prop	1000	0
Growth-Divan2	Property	restricted flat profile	1000	0
Growth-Seaforth	Property	restricted flat profile *2 prop	1000	0
Growth-Naughton	Property	restricted flat profile *2 prop	1000	0
Growth-Kerry	Property	restricted flat profile *3 prop	1000	0
Growth-Millrd	Property	restricted flat profile *10 prop	1000	0
Growth-Levels	Property	restricted flat profile *2 prop	1000	0
Growth-Arowhenua	Property	restricted flat profile	1000	0
Growth-Seadown	Property	restricted flat profile	1000	0
KERY-TR82958	Property	Trough-Divan	0	433.615
SH01-TR82549	Property	Trough-Divan	0	393.64
LEVP-TR82235	Property	Trough-Divan	0	104.0464286
FOLY-TR82320	Property	Trough-Divan	0	546.845
SEAD-TR84558	Property	Trough-Divan	0	339.3
SEAD-TR84562	Property	Trough-Divan	0	339.3
SEAD-TR84564	Property	Trough-Divan	0	339.3
SEAD-TR84565	Property	Trough-Divan	0	339.3
AROW-TR83001	Property	Trough-Divan	0	526.4675
MILR-TR84111	Property	Trough-Divan	0	3047.33
MILR-TR84503	Property	Trough-Divan	0	789.5225
MILR-TR84504	Property	Trough-Divan	0	789.5225
AROW-TR83016	Property	Trough-Divan	0	1492.465

Key	Category Type	Demand Category	Tank demand	Stockwater demand
MILR-TR83989	Property	Trough-Divan	0	1492.465
AROW-TR83021	Property	Trough-Divan	0	1285.375
AROW-TR83981	Property	Trough-Divan	0	238.3875
AROW-TR83976	Property	Trough-Divan	0	141.336
AROW-TR82990	Property	Trough-Divan	0	141.336
AROW-TR83977	Property	Trough-Divan	0	141.336
AROW-TR84764	Property	Trough-Divan	0	526.4675
KERY-TR82993	Property	Trough-Divan	0	985.985
KERY-TR83065	Property	Trough-Divan	0	667.81
KERY-TR83063	Property	Trough-Divan	0	111.605
KERY-TR84883	Property	Trough-Divan	0	53.885
KERY-TR83196	Property	Trough-Divan	0	81.1525
AROW-TR83182	Property	Trough-Divan	0	81.1525
AROW-TR83180	Property	Trough-Divan	0	81.1525
KERY-TR83192	Property	Trough-Divan	0	534.56
KERY-TR83189	Property	Trough-Divan	0	1172.795
KERY-TR83200	Property	Trough-Divan	0	435.24
KERY-TR83188	Property	Trough-Divan	0	435.24
AROW-TR83960	Property	Trough-Divan	0	1684.778333
AROW-TR83174	Property	Trough-Divan	0	1684.778333
AROW-TR84573	Property	Trough-Divan	0	1684.778333
AROW-TR84842	Property	Trough-Divan	0	163.215
AROW-TR83350	Property	Trough-Divan	0	915.72
AROW-TR83344	Property	Trough-Divan	0	915.72
AROW-TR83346	Property	Trough-Divan	0	915.72
AROW-TR83382	Property	Trough-Divan	0	481.73125
AROW-TR83384	Property	Trough-Divan	0	481.73125
AROW-TR83387	Property	Trough-Divan	0	481.73125
AROW-TR83391	Property	Trough-Divan	0	481.73125
LEVP-TR83450	Property	Trough-Divan	0	232.505
LEVP-TR83449	Property	Trough-Divan	0	459.095
LEVP-TR83447	Property	Trough-Divan	0	232.505
LEVP-TR83445	Property	Trough-Divan	0	232.505
LEVP-TR84352	Property	Trough-Divan	0	232.505
LEVP-TR84353	Property	Trough-Divan	0	232.505
LEVP-TR84354	Property	Trough-Divan	0	232.505
LEVP-TR84355	Property	Trough-Divan	0	232.505
LEVP-TR84922	Property	Trough-Divan	0	232.505
SH01-TR83534	Property	Trough-Divan	0	328.705
SH01-TR83531	Property	Trough-Divan	0	328.705
SH01-TR83529	Property	Trough-Divan	0	328.705
SH01-TR83526	Property	Trough-Divan	0	298.7616667

Key	Category Type	Demand Category	Tank demand	Stockwater demand
SH01-TR83525	Property	Trough-Divan	0	298.7616667
SH01-TR83523	Property	Trough-Divan	0	298.7616667
SH01-TR83520	Property	Trough-Divan	0	545.61
SH01-TR83517	Property	Trough-Divan	0	256.36
SH01-TR83516	Property	Trough-Divan	0	256.36
SH01-TR83507	Property	Trough-Divan	0	653.9
SH01-TR84002	Property	Trough-Divan	0	587.6975
SH01-TR84004	Property	Trough-Divan	0	587.6975
SH01-TR83485	Property	Trough-Divan	0	587.6975
SH01-TR83486	Property	Trough-Divan	0	587.6975
SH01-TR83481	Property	Trough-Divan	0	1307.54
LEVP-TR83483	Property	Trough-Divan	0	1522.755
LEVP-TR83375	Property	Trough-Divan	0	301.275
LEVP-TR83378	Property	Trough-Divan	0	301.275
LEVP-TR83380	Property	Trough-Divan	0	850.135
LEVP-TR83408	Property	Trough-Divan	0	884.845
LEVP-TR83413	Property	Trough-Divan	0	712.9525
LEVP-TR83415	Property	Trough-Divan	0	712.9525
WILS-TR83365	Property	Trough-Divan	0	1161.55
LEVP-TR83366	Property	Trough-Divan	0	1161.55
LEVP-TR84940	Property	Trough-Divan	0	884.845
LEVP-TR84941	Property	Trough-Divan	0	884.845
DMIN-TR82838	Property	Trough-Divan	0	66.04
LEVP-TR82257	Property	Trough-Divan	0	87.64166667
FOLY-TR82259	Property	Trough-Divan	0	87.64166667
LEVP-TR82255	Property	Trough-Divan	0	87.64166667
FALV-TR82216	Property	Trough-Divan	0	305.565
FOLY-TR82306	Property	Trough-Divan	0	867.9775
FOLY-TR84256	Property	Trough-Divan	0	867.9775
FOLY-TR84259	Property	Trough-Divan	0	484.6075
FOLY-TR84260	Property	Trough-Divan	0	43.875
FOLY-TR84262	Property	Trough-Divan	0	484.6075
FOLY-TR82266	Property	Trough-Divan	0	65.66625
FOLY-TR82265	Property	Trough-Divan	0	65.66625
FOLY-TR82270	Property	Trough-Divan	0	65.66625
FOLY-TR82268	Property	Trough-Divan	0	65.66625
FOLY-TR82285	Property	Trough-Divan	0	711.49
FOLY-TR82286	Property	Trough-Divan	0	711.49
NAUG-TR83110	Property	Trough-Divan	0	402.155
LYNC-TR82806	Property	Trough-Divan	0	335.14
NAUG-TR84815	Property	Trough-Divan	0	550.901
NAUG-TR84816	Property	Trough-Divan	0	550.901
NAUG-TR84817	Property	Trough-Divan	0	550.901
FOLY-TR84829	Property	Trough-Divan	0	274.5022222

Key	Category Type	Demand Category	Tank demand	Stockwater demand
FOLY-TR84830	Property	Trough-Divan	0	274.5022222
FOLY-TR83126	Property	Trough-Divan	0	274.5022222
FOLY-TR83123	Property	Trough-Divan	0	274.5022222
FOLY-TR83122	Property	Trough-Divan	0	274.5022222
FOLY-TR83099	Property	Trough-Divan	0	533.065
FOLY-TR83142	Property	Trough-Divan	0	533.065
FOLY-TR83140	Property	Trough-Divan	0	533.065
FOLY-TR84854	Property	Trough-Divan	0	533.065
FOLY-TR83132	Property	Trough-Divan	0	55.237
FOLY-TR83136	Property	Trough-Divan	0	320.84
FOLY-TR82264	Property	Trough-Divan	0	104.8883333
FOLY-TR82276	Property	Trough-Divan	0	307.2766667
FOLY-TR82277	Property	Trough-Divan	0	307.2766667
KERY-TR83082	Property	Trough-Divan	0	176.735
KERY-TR83084	Property	Trough-Divan	0	176.735
KERY-TR83086	Property	Trough-Divan	0	176.735
KERY-TR83056	Property	Trough-Divan	0	352.17
KERY-TR82979	Property	Trough-Divan	0	269.5875
KERY-TR82984	Property	Trough-Divan	0	352.17
KERY-TR82974	Property	Trough-Divan	0	276.38
KERY-TR82472	Property	Trough-Divan	0	124.605
KERY-TR82475	Property	Trough-Divan	0	124.605
KERY-TR82476	Property	Trough-Divan	0	124.605
KERY-TR82485	Property	Trough-Divan	0	88.075
KERY-TR82483	Property	Trough-Divan	0	417.04
KERY-TR84345	Property	Trough-Divan	0	80.86
SH08-TR82463	Property	Trough-Divan	0	66.85714286
SH08-TR82465	Property	Trough-Divan	0	66.85714286
SH08-TR82464	Property	Trough-Divan	0	66.85714286
FALV-TR82452	Property	Trough-Divan	0	250.965
FALV-TR82459	Property	Trough-Divan	0	876.265
FALV-TR82345	Property	Trough-Divan	0	190.905
FALV-TR82367	Property	Trough-Divan	0	190.905
SH08-TR84487	Property	Trough-Divan	0	161.46
SH08-TR84490	Property	Trough-Divan	0	161.46
SH08-TR84491	Property	Trough-Divan	0	184.1125
SH08-TR82357	Property	Trough-Divan	0	184.1125
LEVP-TR82213	Property	Trough-Divan	0	68.665
LEVP-TR84673	Property	Trough-Divan	0	68.665
LEVP-TR84674	Property	Trough-Divan	0	68.665
LEVP-TR84675	Property	Trough-Divan	0	68.665
LEVP-TR84676	Property	Trough-Divan	0	68.665
LEVP-TR84677	Property	Trough-Divan	0	68.665
LEVP-TR84678	Property	Trough-Divan	0	68.665

Key	Category Type	Demand Category	Tank demand	Stockwater demand
LEVP-TR84679	Property	Trough-Divan	0	68.665
LEVP-TR84680	Property	Trough-Divan	0	68.665
LEVP-TR84666	Property	Trough-Divan	0	41.275
LEVP-TR84667	Property	Trough-Divan	0	41.275
LEVP-TR84668	Property	Trough-Divan	0	41.275
LEVP-TR84669	Property	Trough-Divan	0	41.275
LEVP-TR82230	Property	Trough-Divan	0	41.275
LEVP-TR82224	Property	Trough-Divan	0	68.665
LEVP-TR82225	Property	Trough-Divan	0	104.0464286
LEVP-TR82237	Property	Trough-Divan	0	104.0464286
LEVP-TR82240	Property	Trough-Divan	0	104.0464286
LEVP-TR84657	Property	Trough-Divan	0	68.665
LEVP-TR84658	Property	Trough-Divan	0	68.665
LEVP-TR84659	Property	Trough-Divan	0	68.665
LEVP-TR84660	Property	Trough-Divan	0	104.0464286
LEVP-TR84661	Property	Trough-Divan	0	104.0464286
LEVP-TR84662	Property	Trough-Divan	0	104.0464286
BROS-TR82584	Property	Trough-Divan	0	327.1125
BROS-TR83877	Property	Trough-Divan	0	327.1125
BROS-TR82586	Property	Trough-Divan	0	178.2083333
BROS-TR82587	Property	Trough-Divan	0	178.2083333
BROS-TR82589	Property	Trough-Divan	0	178.2083333
FALV-TR82624	Property	Trough-Divan	0	16.4409375
FALV-TR84739	Property	Trough-Divan	0	16.4409375
FALV-TR84740	Property	Trough-Divan	0	16.4409375
FALV-TR84741	Property	Trough-Divan	0	16.4409375
FALV-TR84742	Property	Trough-Divan	0	16.4409375
FALV-TR84743	Property	Trough-Divan	0	16.4409375
FALV-TR84744	Property	Trough-Divan	0	16.4409375
FALV-TR84745	Property	Trough-Divan	0	16.4409375
FALV-TR84746	Property	Trough-Divan	0	16.4409375
FALV-TR84747	Property	Trough-Divan	0	16.4409375
FALV-TR84748	Property	Trough-Divan	0	16.4409375
FALV-TR84749	Property	Trough-Divan	0	16.4409375
FALV-TR84750	Property	Trough-Divan	0	16.4409375
FALV-TR84751	Property	Trough-Divan	0	16.4409375
FALV-TR84752	Property	Trough-Divan	0	16.4409375
FALV-TR84753	Property	Trough-Divan	0	16.4409375
FALV-TR84810	Property	Trough-Divan	0	178.49
FALV-TR84812	Property	Trough-Divan	0	178.49
LYNC-TR84210	Property	Trough-Divan	0	264.745
SH01-TR82716	Property	Trough-Divan	0	65.76375
SH01-TR83623	Property	Trough-Divan	0	123.89
SH01-TR83621	Property	Trough-Divan	0	263.315

Key	Category Type	Demand Category	Tank demand	Stockwater demand
LYNC-TR82733	Property	Trough-Divan	0	87.98833333
LYNC-TR82736	Property	Trough-Divan	0	87.98833333
LYNC-TR84895	Property	Trough-Divan	0	87.98833333
LYNC-TR82718	Property	Trough-Divan	0	55.835
LYNC-TR82720	Property	Trough-Divan	0	207.415
SH01-TR82715	Property	Trough-Divan	0	263.315
FALV-TR84791	Property	Trough-Divan	0	131.56
FALV-TR84792	Property	Trough-Divan	0	131.56
FALV-TR84795	Property	Trough-Divan	0	157.3
ACIA-TR82699	Property	Trough-Divan	0	285.0683333
ACIA-TR82697	Property	Trough-Divan	0	285.0683333
DMIN-TR82850	Property	Trough-Divan	0	297.97625
DMIN-TR82848	Property	Trough-Divan	0	297.97625
DMIN-TR82847	Property	Trough-Divan	0	297.97625
DMIN-TR82846	Property	Trough-Divan	0	297.97625
DMIN-TR82855	Property	Trough-Divan	0	297.97625
HEDL-TR82703	Property	Trough-Divan	0	360.0025
HEDL-TR82702	Property	Trough-Divan	0	360.0025
HEDL-TR84030	Property	Trough-Divan	0	43.46875
HEDL-TR84031	Property	Trough-Divan	0	43.46875
HEDL-TR84027	Property	Trough-Divan	0	43.46875
HEDL-TR84026	Property	Trough-Divan	0	43.46875
HEDL-TR84731	Property	Trough-Divan	0	43.46875
HEDL-TR84732	Property	Trough-Divan	0	43.46875
HEDL-TR84733	Property	Trough-Divan	0	43.46875
HEDL-TR84734	Property	Trough-Divan	0	43.46875
DMIN-TR82862	Property	Trough-Divan	0	809.4775
DMIN-TR82868	Property	Trough-Divan	0	809.4775
DMIN-TR82851	Property	Trough-Divan	0	297.97625
DMIN-TR82852	Property	Trough-Divan	0	297.97625
DMIN-TR82854	Property	Trough-Divan	0	297.97625
AWST-TR83602	Property	Trough-Divan	0	2251.6325
AWST-TR83604	Property	Trough-Divan	0	2251.6325
AWST-TR83612	Property	Trough-Divan	0	1018.225
AWST-TR83616	Property	Trough-Divan	0	129.935
SEAD-TR83585	Property	Trough-Divan	0	339.937
SEAD-TR83587	Property	Trough-Divan	0	574.015
SEAD-TR83591	Property	Trough-Divan	0	573.56
SEAD-TR83589	Property	Trough-Divan	0	574.015
SEAD-TR83592	Property	Trough-Divan	0	574.015
SEAD-TR83599	Property	Trough-Divan	0	573.56
SEAD-TR83584	Property	Trough-Divan	0	573.56
SEAD-TR82908	Property	Trough-Divan	0	97.58357143
SEAD-TR82947	Property	Trough-Divan	0	339.937

Key	Category Type	Demand Category	Tank demand	Stockwater demand
SEAD-TR82935	Property	Trough-Divan	0	97.58357143
SEAD-TR82933	Property	Trough-Divan	0	97.58357143
SEAD-TR82941	Property	Trough-Divan	0	339.937
SEAD-TR82931	Property	Trough-Divan	0	97.58357143
SEAD-TR82939	Property	Trough-Divan	0	339.937
SEAD-TR82929	Property	Trough-Divan	0	97.58357143
SEAD-TR82937	Property	Trough-Divan	0	97.58357143
SEAD-TR82927	Property	Trough-Divan	0	97.58357143
SEAD-TR82936	Property	Trough-Divan	0	97.58357143
SEAD-TR82925	Property	Trough-Divan	0	97.58357143
SEAD-TR82924	Property	Trough-Divan	0	97.58357143
SEAD-TR82923	Property	Trough-Divan	0	97.58357143
SEAD-TR82917	Property	Trough-Divan	0	97.58357143
SEAD-TR82914	Property	Trough-Divan	0	97.58357143
SEAD-TR82913	Property	Trough-Divan	0	97.58357143
SEAD-TR82953	Property	Trough-Divan	0	339.937
SEAD-TR82899	Property	Trough-Divan	0	748.67
SEAD-TR82904	Property	Trough-Divan	0	503.1
SEAD-TR82896	Property	Trough-Divan	0	623.805
SEAD-TR82905	Property	Trough-Divan	0	623.805
SEAD-TR82910	Property	Trough-Divan	0	623.805
SEAD-TR82888	Property	Trough-Divan	0	225.94
SEAD-TR83883	Property	Trough-Divan	0	343.094375
SEAD-TR83884	Property	Trough-Divan	0	339.3
SEAD-TR83888	Property	Trough-Divan	0	339.3
SEAD-TR82028	Property	Trough-Divan	0	263.8907143
SEAD-TR82023	Property	Trough-Divan	0	263.8907143
SEAD-TR82024	Property	Trough-Divan	0	263.8907143
SEAD-TR82025	Property	Trough-Divan	0	263.8907143
SEAD-TR82027	Property	Trough-Divan	0	263.8907143
SEAF-TR82156	Property	Trough-Divan	0	690.105
SEAF-TR82158	Property	Trough-Divan	0	690.105
SH01-TR82488	Property	Trough-Divan	0	128.245
SH01-TR82492	Property	Trough-Divan	0	407.30625
SH01-TR82512	Property	Trough-Divan	0	1748.565
SH01-TR82520	Property	Trough-Divan	0	1144.91
SH01-TR82507	Property	Trough-Divan	0	1748.89
SH01-TR82505	Property	Trough-Divan	0	407.30625
SH01-TR82503	Property	Trough-Divan	0	407.30625
SH01-TR82499	Property	Trough-Divan	0	407.30625
SH01-TR82555	Property	Trough-Divan	0	289.7483333
SH01-TR82556	Property	Trough-Divan	0	170.2025
DIVN-TR82574	Property	Trough-Divan	0	216.4825
DIVN-TR82171	Property	Trough-Divan	0	657.02

Key	Category Type	Demand Category	Tank demand	Stockwater demand
SH08-TR83863	Property	Trough-Divan	0	143.8171429
SH08-TR84590	Property	Trough-Divan	0	143.8171429
SH08-TR84594	Property	Trough-Divan	0	143.8171429
SH08-TR84595	Property	Trough-Divan	0	143.8171429
SH08-TR84596	Property	Trough-Divan	0	143.8171429
SH08-TR84597	Property	Trough-Divan	0	143.8171429
SH08-TR84599	Property	Trough-Divan	0	143.8171429
DIVN-TR82546	Property	Trough-Divan	0	216.4825
DIVN-TR82176	Property	Trough-Divan	0	84.695
SH01-TR82031	Property	Trough-Divan	0	143.91
SH01-TR82039	Property	Trough-Divan	0	55.185
SEAD-TR82009	Property	Trough-Divan	0	169.91
NAUG-TR83227	Property	Trough-Divan	0	550.901
NAUG-TR83048	Property	Trough-Divan	0	205.28625
BROS-TR82559	Property	Trough-Divan	0	160.745
BROS-TR82560	Property	Trough-Divan	0	170.2025
BROS-TR82564	Property	Trough-Divan	0	160.745
BROS-TR82562	Property	Trough-Divan	0	160.745
KERY-TR83036	Property	Trough-Divan	0	52
FOLY-TR84343	Property	Trough-Divan	0	1731.3075
WILS-TR83363	Property	Trough-Divan	0	25.415
NAUG-TR83355	Property	Trough-Divan	0	1059.435
SH01-TR83580	Property	Trough-Divan	0	372.6125
BROS-TR82788	Property	Trough-Divan	0	99.905
BROS-TR82795	Property	Trough-Divan	0	1292.33
BROS-TR82789	Property	Trough-Divan	0	990.08
LYNC-TR82800	Property	Trough-Divan	0	151.9375
LYNC-TR82792	Property	Trough-Divan	0	151.9375
LYNC-TR82790	Property	Trough-Divan	0	151.9375
LYNC-TR82748	Property	Trough-Divan	0	634.79
LYNC-TR82753	Property	Trough-Divan	0	218.14
KERY-TR84725	Property	Trough-Divan	0	418.87625
KERY-TR84726	Property	Trough-Divan	0	418.87625
KERY-TR84727	Property	Trough-Divan	0	418.87625
SEAF-TR82160	Property	Trough-Divan	0	117.065
KERY-TR83203	Property	Trough-Divan	0	1406.08
KERY-TR83957	Property	Trough-Divan	0	1406.08
FALV-TR82221	Property	Trough-Divan	0	305.565
FALV-TR84506	Property	Trough-Divan	0	649.87
FALV-TR84509	Property	Trough-Divan	0	305.565
FALV-TR84515	Property	Trough-Divan	0	330.395
FALV-TR84516	Property	Trough-Divan	0	330.395
AROW-TR83983	Property	Trough-Divan	0	238.3875
FALV-TR82580	Property	Trough-Divan	0	557.635

Key	Category Type	Demand Category	Tank demand	Stockwater demand
FALV-TR84567	Property	Trough-Divan	0	557.635
DMIN-TR82810	Property	Trough-Divan	0	242.5583333
DMIN-TR84911	Property	Trough-Divan	0	1790.945
DMIN-TR84913	Property	Trough-Divan	0	66.04
FALV-TR84528	Property	Trough-Divan	0	6664.775
FALV-TR84646	Property	Trough-Divan	0	35.035
FALV-TR84647	Property	Trough-Divan	0	35.035
FALV-TR84652	Property	Trough-Divan	0	330.395
FALV-TR84653	Property	Trough-Divan	0	305.565
FALV-TR84654	Property	Trough-Divan	0	305.565
FALV-TR84696	Property	Trough-Divan	0	66.85714286
FALV-TR82579	Property	Trough-Divan	0	1117.09
FALV-TR82592	Property	Trough-Divan	0	208.91
FALV-TR82596	Property	Trough-Divan	0	103.935
FALV-TR82599	Property	Trough-Divan	0	35.035
FOLY-TR83929	Property	Trough-Divan	0	622.5483333
FOLY-TR82315	Property	Trough-Divan	0	622.5483333
FOLY-TR82313	Property	Trough-Divan	0	520.975
FOLY-TR83152	Property	Trough-Divan	0	327.7625
FOLY-TR83107	Property	Trough-Divan	0	1731.3075
KERY-TR83038	Property	Trough-Divan	0	418.87625
AROW-TR84856	Property	Trough-Divan	0	264.121
FOLY-TR84843	Property	Trough-Divan	0	55.237
FOLY-TR84844	Property	Trough-Divan	0	55.237
FOLY-TR84848	Property	Trough-Divan	0	55.237
FOLY-TR84849	Property	Trough-Divan	0	55.237
FOLY-TR84852	Property	Trough-Divan	0	327.7625
FOLY-TR84821	Property	Trough-Divan	0	274.5022222
FOLY-TR84822	Property	Trough-Divan	0	274.5022222
FOLY-TR84823	Property	Trough-Divan	0	274.5022222
FOLY-TR84824	Property	Trough-Divan	0	274.5022222
FOLY-TR84766	Property	Trough-Divan	0	131.495
FOLY-TR84767	Property	Trough-Divan	0	131.495
FOLY-TR84774	Property	Trough-Divan	0	622.5483333
FOLY-TR84777	Property	Trough-Divan	0	104.8883333
FOLY-TR84778	Property	Trough-Divan	0	104.8883333
FOLY-TR84779	Property	Trough-Divan	0	104.8883333
FOLY-TR84780	Property	Trough-Divan	0	104.8883333
FOLY-TR84781	Property	Trough-Divan	0	104.8883333
FOLY-TR84786	Property	Trough-Divan	0	307.2766667
FOLY-TR84788	Property	Trough-Divan	0	43.875
KENN-TR84612	Property	Trough-Divan	0	39.99125
KENN-TR84613	Property	Trough-Divan	0	39.99125

Key	Category Type	Demand Category	Tank demand	Stockwater demand
KENN-TR84614	Property	Trough-Divan	0	39.99125
KENN-TR84618	Property	Trough-Divan	0	39.99125
KENN-TR84619	Property	Trough-Divan	0	34.14666667
KENN-TR84620	Property	Trough-Divan	0	34.14666667
KENN-TR84621	Property	Trough-Divan	0	34.14666667
KENN-TR84627	Property	Trough-Divan	0	52.585
KENN-TR84628	Property	Trough-Divan	0	52.585
KENN-TR84629	Property	Trough-Divan	0	52.585
KERY-TR84705	Property	Trough-Divan	0	88.075
KERY-TR84706	Property	Trough-Divan	0	88.075
KERY-TR84707	Property	Trough-Divan	0	88.075
KERY-TR84712	Property	Trough-Divan	0	67.72071429
KERY-TR84713	Property	Trough-Divan	0	67.72071429
KERY-TR84714	Property	Trough-Divan	0	67.72071429
KERY-TR84715	Property	Trough-Divan	0	67.72071429
KERY-TR84716	Property	Trough-Divan	0	67.72071429
KERY-TR84717	Property	Trough-Divan	0	67.72071429
KERY-TR84718	Property	Trough-Divan	0	67.72071429
KERY-TR84864	Property	Trough-Divan	0	131.495
KERY-TR84866	Property	Trough-Divan	0	126.36
KERY-TR84867	Property	Trough-Divan	0	295.828
KERY-TR84868	Property	Trough-Divan	0	205.28625
KERY-TR84871	Property	Trough-Divan	0	205.28625
KERY-TR84872	Property	Trough-Divan	0	295.828
KERY-TR84873	Property	Trough-Divan	0	295.828
KERY-TR84876	Property	Trough-Divan	0	1055.405
KERY-TR84877	Property	Trough-Divan	0	352.17
KERY-TR84461	Property	Trough-Divan	0	370.955
KERY-TR84117	Property	Trough-Divan	0	205.28625
KERY-TR82988	Property	Trough-Divan	0	614.055
KERY-TR82987	Property	Trough-Divan	0	614.055
KERY-TR83005	Property	Trough-Divan	0	141.336
KERY-TR83205	Property	Trough-Divan	0	1406.08
KERY-TR83193	Property	Trough-Divan	0	517.855
KERY-TR83201	Property	Trough-Divan	0	435.24
KERY-TR83047	Property	Trough-Divan	0	295.828
KERY-TR83052	Property	Trough-Divan	0	269.5875
KERY-TR83097	Property	Trough-Divan	0	295.828
LYNC-TR82725	Property	Trough-Divan	0	82.55
LYNC-TR84134	Property	Trough-Divan	0	151.9375
LYNC-TR84899	Property	Trough-Divan	0	218.14
LYNC-TR84901	Property	Trough-Divan	0	151.9375
LYNC-TR84903	Property	Trough-Divan	0	151.9375
LYNC-TR84834	Property	Trough-Divan	0	65.76375

Key	Category Type	Demand Category	Tank demand	Stockwater demand
LYNC-TR84835	Property	Trough-Divan	0	65.76375
LYNC-TR84838	Property	Trough-Divan	0	65.76375
MILR-TR84112	Property	Trough-Divan	0	402.35
MILR-TR83008	Property	Trough-Divan	0	705.64
NAUG-TR83226	Property	Trough-Divan	0	550.901
NAUG-TR83229	Property	Trough-Divan	0	1333.2475
NAUG-TR83228	Property	Trough-Divan	0	1333.2475
SEAD-TR82145	Property	Trough-Divan	0	328.94875
SEAD-TR82147	Property	Trough-Divan	0	328.94875
SEAD-TR82149	Property	Trough-Divan	0	328.94875
SEAD-TR82139	Property	Trough-Divan	0	727.1116667
SEAD-TR82152	Property	Trough-Divan	0	328.94875
SEAD-TR82876	Property	Trough-Divan	0	1039.3175
SEAD-TR82884	Property	Trough-Divan	0	1039.3175
SEAD-TR82010	Property	Trough-Divan	0	169.91
SEAD-TR83966	Property	Trough-Divan	0	727.1116667
SEAD-TR82900	Property	Trough-Divan	0	343.094375
SEAD-TR82902	Property	Trough-Divan	0	343.094375
SEAD-TR84949	Property	Trough-Divan	0	1434.03
SEAD-TR84950	Property	Trough-Divan	0	1434.03
SEAD-TR84954	Property	Trough-Divan	0	343.094375
SEAF-TR82131	Property	Trough-Divan	0	338.60125
SEAF-TR82127	Property	Trough-Divan	0	338.60125
SEAF-TR82129	Property	Trough-Divan	0	338.60125
SEAF-TR82121	Property	Trough-Divan	0	131.495
SEAF-TR82119	Property	Trough-Divan	0	2219.23
SEAF-TR82123	Property	Trough-Divan	0	539.2725
SEAF-TR82108	Property	Trough-Divan	0	307.346
SEAF-TR82109	Property	Trough-Divan	0	307.346
SEAF-TR82106	Property	Trough-Divan	0	307.346
SEAF-TR82104	Property	Trough-Divan	0	539.2725
SEAF-TR82102	Property	Trough-Divan	0	539.2725
SEAF-TR82099	Property	Trough-Divan	0	539.2725
SEAF-TR82100	Property	Trough-Divan	0	539.2725
SEAF-TR82112	Property	Trough-Divan	0	120.77
SEAF-TR83970	Property	Trough-Divan	0	539.2725
SEAF-TR83972	Property	Trough-Divan	0	539.2725
WILS-TR83372	Property	Trough-Divan	0	525.915
SH01-TR82063	Property	Trough-Divan	0	522.8491667
SH01-TR82061	Property	Trough-Divan	0	522.8491667
SH01-TR82059	Property	Trough-Divan	0	522.8491667
SH01-TR82057	Property	Trough-Divan	0	522.8491667
SH01-TR84633	Property	Trough-Divan	0	522.8491667
SH01-TR84634	Property	Trough-Divan	0	522.8491667

Key	Category Type	Demand Category	Tank demand	Stockwater demand
SH01-TR84637	Property	Trough-Divan	0	241.865
SH01-TR84640	Property	Trough-Divan	0	289.7483333
SH01-TR84947	Property	Trough-Divan	0	3140.995
KERY-TR84322	Property	Trough-Divan	0	598.99125
SH08-TR82980	Property	Trough-Divan	0	598.99125
SH08-TR82969	Property	Trough-Divan	0	598.99125
SH08-TR82964	Property	Trough-Divan	0	598.99125
AROW-TR83157	Property	Trough-Divan	0	1152.298333
AROW-TR83170	Property	Trough-Divan	0	264.121
AROW-TR83169	Property	Trough-Divan	0	264.121
AROW-TR83166	Property	Trough-Divan	0	264.121
AROW-TR83374	Property	Trough-Divan	0	1342.38
AROW-TR83394	Property	Trough-Divan	0	469.5925
AROW-TR83396	Property	Trough-Divan	0	2793.765
AROW-TR83354	Property	Trough-Divan	0	1152.298333
AROW-TR84499	Property	Trough-Divan	0	1152.298333
AROW-TR84887	Property	Trough-Divan	0	141.336
AROW-TR84857	Property	Trough-Divan	0	264.121
AROW-TR84860	Property	Trough-Divan	0	81.1525
BROS-TR84307	Property	Trough-Divan	0	6664.775
BROS-TR82625	Property	Trough-Divan	0	864.89
BROS-TR82635	Property	Trough-Divan	0	324.9025
BROS-TR82637	Property	Trough-Divan	0	324.9025
BROS-TR84643	Property	Trough-Divan	0	160.745
DIVN-TR84639	Property	Trough-Divan	0	657.02
DIVN-TR82571	Property	Trough-Divan	0	289.7483333
DIVN-TR82537	Property	Trough-Divan	0	1264.64
DIVN-TR82535	Property	Trough-Divan	0	274.365
DIVN-TR82531	Property	Trough-Divan	0	62.6925
DIVN-TR82529	Property	Trough-Divan	0	274.365
DIVN-TR82527	Property	Trough-Divan	0	62.6925
SH01-TR82841	Property	Trough-Divan	0	519.0141667
SH01-TR82819	Property	Trough-Divan	0	184.68125
SH01-TR82824	Property	Trough-Divan	0	184.68125
SH01-TR82837	Property	Trough-Divan	0	26.325
SH01-TR82551	Property	Trough-Divan	0	393.64
SH01-TR82547	Property	Trough-Divan	0	241.865
SH01-TR83554	Property	Trough-Divan	0	94.445
SH01-TR83551	Property	Trough-Divan	0	1674.6275
SH01-TR83549	Property	Trough-Divan	0	94.445
SH01-TR83547	Property	Trough-Divan	0	372.6125
SH01-TR83544	Property	Trough-Divan	0	1542.84
SH01-TR83539	Property	Trough-Divan	0	343.094375

Key	Category Type	Demand Category	Tank demand	Stockwater demand
SH01-TR84905	Property	Trough-Divan	0	218.14
SH01-TR84907	Property	Trough-Divan	0	184.68125
SH01-TR84909	Property	Trough-Divan	0	184.68125
SH01-TR84946	Property	Trough-Divan	0	3140.995
SH01-TR84926	Property	Trough-Divan	0	519.0141667
SH01-TR84927	Property	Trough-Divan	0	519.0141667
SH01-TR84928	Property	Trough-Divan	0	519.0141667
SH01-TR84930	Property	Trough-Divan	0	519.0141667
SH01-TR84934	Property	Trough-Divan	0	343.094375
SH01-TR84935	Property	Trough-Divan	0	532.09
SH01-TR84938	Property	Trough-Divan	0	1674.6275
DOMN-TR84925	Property	Trough-Divan	0	519.0141667
LEVP-TR84529	Property	Trough-Divan	0	305.24
LEVP-TR84606	Property	Trough-Divan	0	284.7216667
LEVP-TR84607	Property	Trough-Divan	0	284.7216667
LEVP-TR84608	Property	Trough-Divan	0	284.7216667
BROS-TR82783	Property	Trough-Divan	0	56.615
BROS-TR82784	Property	Trough-Divan	0	82.55
LEVP-TR82249	Property	Trough-Divan	0	284.7216667
LEVP-TR83431	Property	Trough-Divan	0	320.4175
LEVP-TR83429	Property	Trough-Divan	0	320.4175
LEVP-TR83426	Property	Trough-Divan	0	320.4175
LEVP-TR83424	Property	Trough-Divan	0	1120.795
LEVP-TR83439	Property	Trough-Divan	0	320.4175
LEVP-TR83440	Property	Trough-Divan	0	158.86
LEVP-TR82251	Property	Trough-Divan	0	284.7216667
LEVP-TR83404	Property	Trough-Divan	0	854.425
LEVP-TR83405	Property	Trough-Divan	0	854.425
LEVP-TR84240	Property	Trough-Divan	0	328.705
LEVP-TR84241	Property	Trough-Divan	0	328.705
SH08-TR84697	Property	Trough-Divan	0	66.85714286
SH08-TR84698	Property	Trough-Divan	0	66.85714286
SH08-TR84701	Property	Trough-Divan	0	66.85714286
SH08-TR84695	Property	Trough-Divan	0	30.225
FALV-TR84363	Property	Trough-Divan	0	195.26
FALV-TR84797	Property	Trough-Divan	0	195.26
FALV-TR84800	Property	Trough-Divan	0	26.2275
FALV-TR84801	Property	Trough-Divan	0	26.2275
FALV-TR84804	Property	Trough-Divan	0	238.16
FALV-TR84805	Property	Trough-Divan	0	238.16
KERY-TR84538	Property	Trough-Divan	0	528.97
FALV-TR84512	Property	Trough-Divan	0	570.9275
FALV-TR84519	Property	Trough-Divan	0	570.9275

Key	Category Type	Demand Category	Tank demand	Stockwater demand
FALV-TR84650	Property	Trough-Divan	0	330.395
DIVN-TR84575	Property	Trough-Divan	0	2598.57
SEAD-TR84969	Property	Trough-Divan	0	263.8907143
SEAF-TR84980	Property	Trough-Divan	0	338.60125
SEAF-TR84981	Property	Trough-Divan	0	307.346
SEAF-TR84972	Property	Trough-Divan	0	704.1775
KERY-TR85005	Property	Trough-Divan	0	214.89
HEDL-TR84984	Property	Trough-Divan	0	286.5525
DMIN-TR85007	Property	Trough-Divan	0	469.0725
SEAD-TR84962	Property	Trough-Divan	0	623.805
SEAF-TR84978	Property	Trough-Divan	0	307.346
LEVP-TR85011	Property	Trough-Divan	0	328.705
DMIN-TR85010	Property	Trough-Divan	0	242.5583333
LEVP-TR85012	Property	Trough-Divan	0	328.705
HEDL-TR84956	Property	Trough-Divan	0	172.12
DIVN-TR84989	Property	Trough-Divan	0	2002
ACIA-TR84960	Property	Trough-Divan	0	53.625
SH08-TR85017	Property	Trough-Divan	0	705.64
SEAD-TR84999	Property	Trough-Divan	0	727.1116667
DMIN-TR85008	Property	Trough-Divan	0	469.0725
SEAF-TR84976	Property	Trough-Divan	0	539.2725
KERY-TR85006	Property	Trough-Divan	0	214.89
HEDL-TR84985	Property	Trough-Divan	0	286.5525
DMIN-TR85009	Property	Trough-Divan	0	242.5583333
FALV-TR84996	Property	Trough-Divan	0	263.12
SEAD-TR84964	Property	Trough-Divan	0	263.8907143
SEAD-TR84968	Property	Trough-Divan	0	343.094375
ACIA-TR84958	Property	Trough-Divan	0	285.0683333
SH01-TR85015	Property	Trough-Divan	0	328.705
SEAF-TR84974	Property	Trough-Divan	0	704.1775
SEAD-TR84966	Property	Trough-Divan	0	343.094375
AROW-TR83465	Property	Trough-Divan	0	1295.861667
AROW-TR83467	Property	Trough-Divan	0	1295.861667
AROW-TR83576	Property	Trough-Divan	0	1295.861667
LEVP-TR83995	Property	Trough-Divan	0	237.25
SH08-TR82358	Property	Trough-Divan	0	288.665
SH08-TR82356	Property	Trough-Divan	0	136.3375
SH08-TR82354	Property	Trough-Divan	0	288.665
SH08-TR82351	Property	Trough-Divan	0	172.185
SH08-TR82348	Property	Trough-Divan	0	453.9383333
SH08-TR82343	Property	Trough-Divan	0	141.7
SH08-TR82338	Property	Trough-Divan	0	453.9383333
SH08-TR82339	Property	Trough-Divan	0	453.9383333
LEVP-TR82206	Property	Trough-Divan	0	322.53

Key	Category Type	Demand Category	Tank demand	Stockwater demand
LEVP-TR82211	Property	Trough-Divan	0	382.525
LEVP-TR83912	Property	Trough-Divan	0	382.1535714
KENN-TR82091	Property	Trough-Divan	0	1695.07
SH08-TR84591	Property	Trough-Divan	0	3261.31
SH08-TR84600	Property	Trough-Divan	0	1695.07
KENN-TR84585	Property	Trough-Divan	0	549.25
KENN-TR84586	Property	Trough-Divan	0	549.25
SH01-TR84522	Property	Trough-Divan	0	305.24
SH01-TR82047	Property	Trough-Divan	0	556.1214286
SH01-TR82054	Property	Trough-Divan	0	556.1214286
SEAD-TR83861	Property	Trough-Divan	0	793.065
SEAD-TR82104	Property	Trough-Divan	0	556.1214286
SEAD-TR82016	Property	Trough-Divan	0	556.1214286
SEAD-TR82018	Property	Trough-Divan	0	556.1214286
SEAD-TR82020	Property	Trough-Divan	0	556.1214286
SEAD-TR84042	Property	Trough-Divan	0	556.1214286
SH08-TR82183	Property	Trough-Divan	0	382.1535714
SH08-TR82186	Property	Trough-Divan	0	382.1535714
SH08-TR82201	Property	Trough-Divan	0	382.1535714
SH08-TR82202	Property	Trough-Divan	0	382.1535714
SH08-TR82203	Property	Trough-Divan	0	382.1535714
AROW-TR83397	Property	Trough-Divan	0	469.5925
AROW-TR83399	Property	Trough-Divan	0	3038.165
AROW-TR83464	Property	Trough-Divan	0	459.095
LEVP-TR82246	Property	Trough-Divan	0	284.7216667
SH08-TR84611	Property	Trough-Divan	0	136.3375
SH08-TR84689	Property	Trough-Divan	0	123.955
SH08-TR84690	Property	Trough-Divan	0	141.7
SH08-TR84691	Property	Trough-Divan	0	141.7
LEVP-TR83747	Property	Trough-Divan	0	897.91
SH08-TR84994	Property	Trough-Divan	0	382.1535714
SEAD-TR84991	Property	Trough-Divan	0	323.31

Appendix F - Seadown Water Supply Scheme Review Stage 3 Presentation 6 November 2020

Seadown Water Supply Scheme Review – Issues & Options

Meeting Presented by:
Kylie Galbraith and Estelle Boivin

Agenda

1. Introduction & Scope
2. Seadown Water Distribution Network - Background Information *(expected presentation / discussion time: 5 minutes)*
3. Assumptions: Model and Growth Overview *(expected presentation / discussion time: 5 minutes)*
    - Growth demand
4. Plan Change 7 *(expected presentation / discussion time: less than 5 minutes)*
5. Network performance *(expected presentation / discussion time: 5 minutes)*
    - Level of service
6. Optioneering (expected presentation / discussion time: 15 minutes)
    - Drivers
    - Scenarios - MCA process
    - Issues / Preferred options overview
7. Cost Estimate *(expected presentation / discussion time: 5 minutes)*
8. Conclusion & Recommendations
9. Questions *(expected presentation / discussion time: 15 minutes)*

Introduction & Scope of work:

- The purpose of this project was to identify the issues and options and overall strategy for the future management of the Seadown water supply from a source to point of supply perspective.

- The key objective of the workshop will be to present and discuss the options and overall strategy for future management of the Seadown water supply network.

History of the Seadown Water Supply Scheme

- This scheme was installed in 1974 by Levels County Council.
- It was originally an open race scheme that was converted to a piped scheme.
- At that time it was Timaru's only way of getting additional water from the Opihi River.

How we supply water to the consumers

The water is supplied to unrestricted tanks or troughs that are directly connected to the scheme on original connections. Since the early 1990's new connections are to restricted tanks that feed private troughs. No new trough connections have been allowed since this time.

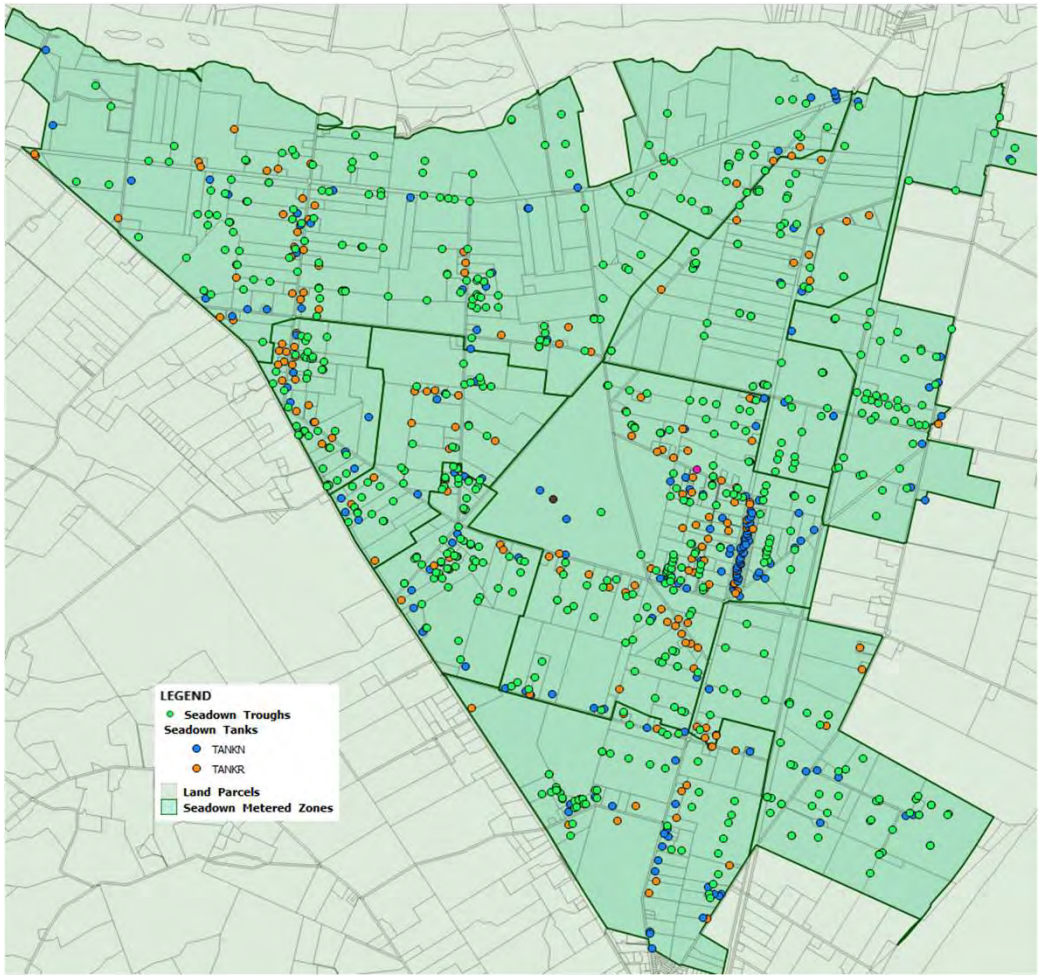
Issues that are found at the connections

Issues that are found at the connections

Seadown Current Demand

Connections overview:

- 612 Troughs (63 % of total customers)
- 223 unrestricted tanks (23 % of total connections)
- 133 restricted tanks (14 % of total customers



Current Network Performance

Key Issues:

- High headloss in Foley Rd, Arowhenua, Mill RD, Levels Plain, Seaford Settlement and Divan Rd zones during high peak day demand.
- The pressures in these areas drop below the 20 minimum pressure level of service (indicating that the pipe network are undersized)
- High demand in the Foley Road zone
- High real losses in Arowhenua and Seadown Road zones.
- Very spiky demand profile due to unrestricted consumption and non compliance connections, which is likely to be causing pressure level of service issues.
- Aging infrastructure, which could lead to interruption of supply
- The daily volume & current rate of take utilise 25% of the 100 L/s take.

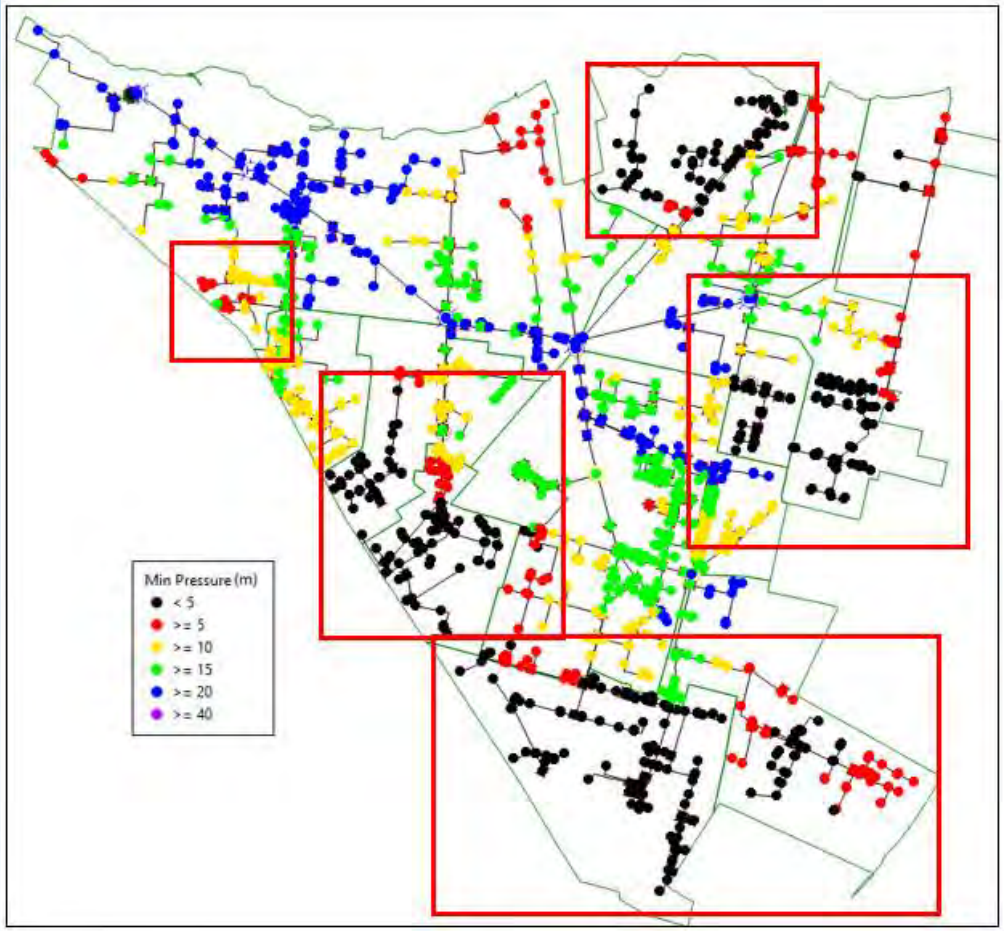
Demand Projection

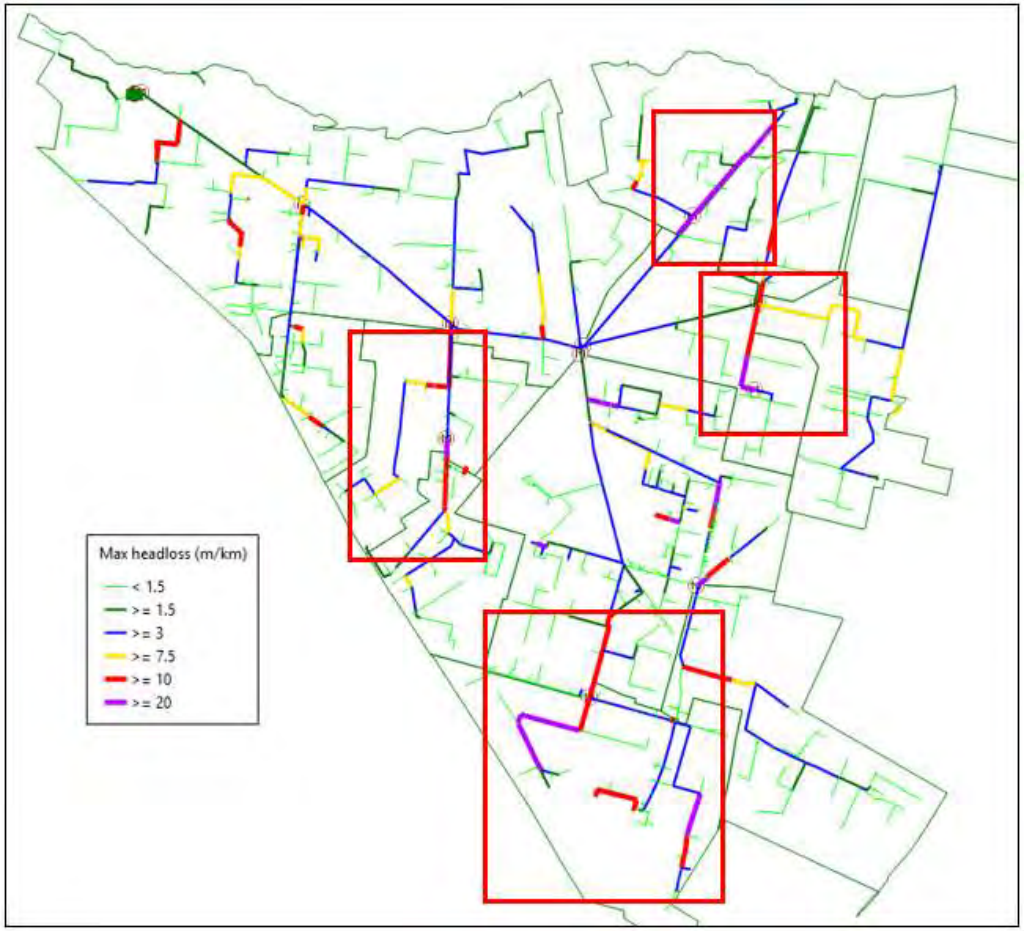
Assumptions:

- Consent CRC010349 – Seadown Water Supply Scheme
  - Max 21 L/s
  - 149,743 m^3 for 122 consecutive days
- Growth projection: 10 % forecast growth: lifestyle lots (restricted tanks at 1 unit per lot (1,000 L/unit/day) spread evenly throughout each zone.

- Additional demand was added for 2 development sites:
  - Along Divan Road: 10 restricted tanks (restricted to 1 unit /day, except one tank restricted to 2 units /day.
  - Dominion Road Zone: 10 restricted tanks (restricted to 1 unit /day)

Network Performance – Pressure & headloss

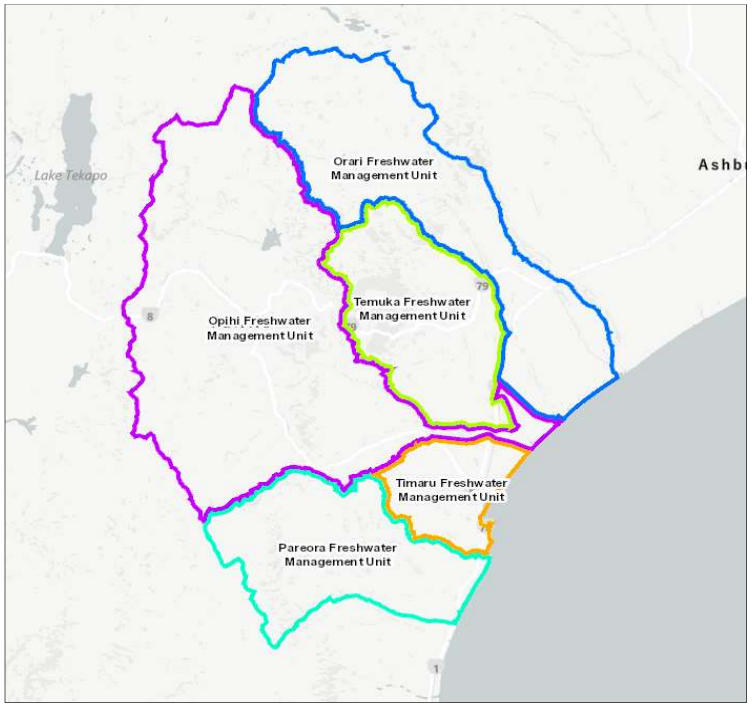




Plan Change 7

A review of ECan's Land and Water Regional Plan (LWRP) and Proposed Plan Chance 7 (PC7) has been undertaken to understand the potential impact of PC7 on proposed solutions for the Seadown water supply.

- Demand management plan
- Nitrate management



Optioneering

Drivers for options to be based on providing/improving:

1. *safe water*
2. *adequate quantity / efficient use of water*
3. *reliable supply of water (continuity of supply)*
4. *resilient supply of water (extreme event)*
5. *environmentally sustainable*

	Max Peak flow (L/s)	Peak daily volume (Ml/d)
Option 1	20.7	1.34
Option 2	20.7	1.34
Option 3	15.5	1.27

List of options:

- Scenario 1: To target the existing network performance issues.
- Scenario 2: To develop a solution to further improve the Seadown water supply network performance by forming a ring main.
- Option 3: To provide a single restricted supply to all customers.

Multi Criteria Analysis Assessment Results

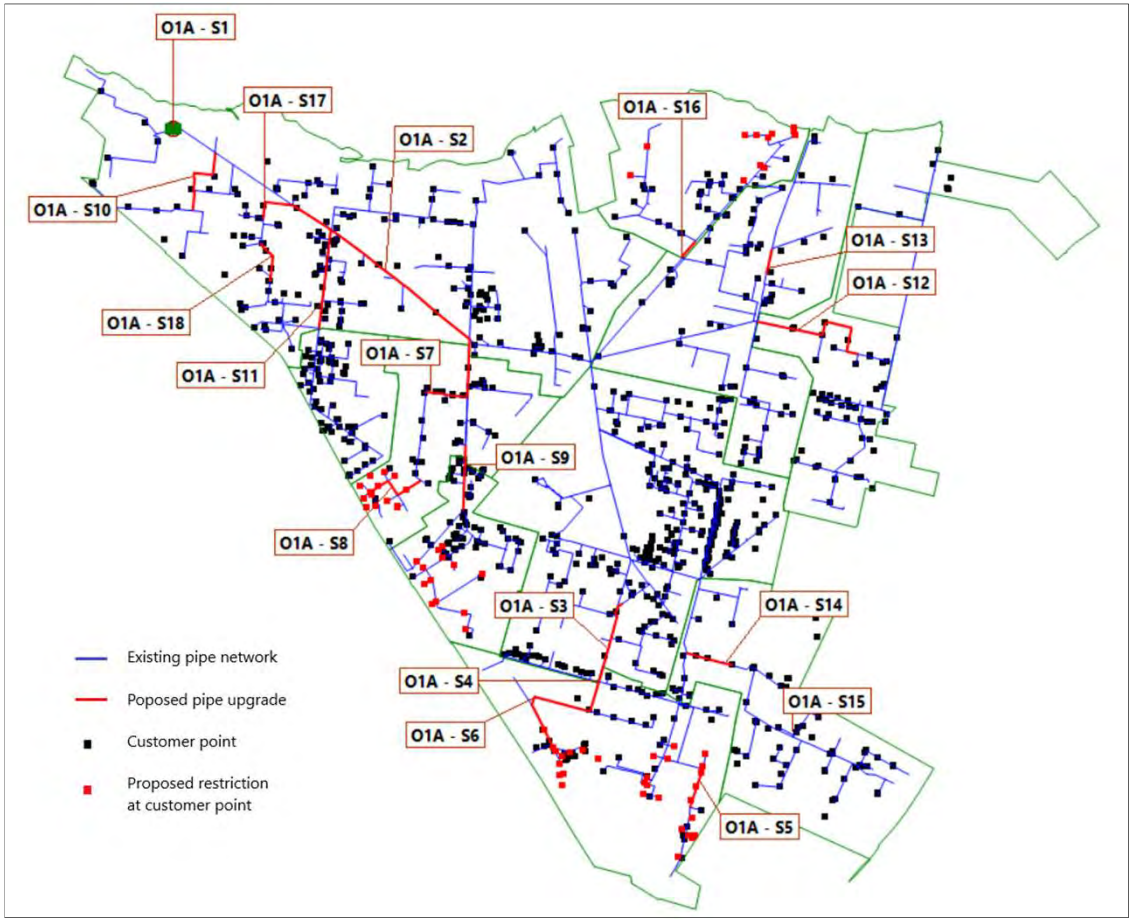
- The MCA process resulted in Option 3A having the best score in terms of reducing contamination pathways, improving demand management (full restrictions at troughs and tanks) and improving the network resilience via the individual storage tanks.
- Options 1B, 2B and 3B were assessed to increase the overall environmental impact due to the need for additional storage, pumping and water treatment (i.e. would have higher operational and maintenance costs).
- For Options 2A and 2B the 10.6 km ring main would have a high carbon footprint and further mains renewals / upgrades would still need to be carried out .
- TDC confirmed that Option 1A and Option 3A be taken forward for cost assessment.

TDC SEADOWN SCENARIO EVALUATION			Score					
Drivers	Impact (refer 'Drivers and Impact' worksheet for context)	Weighting	SCENARIO 1a	SCENARIO 1b	SCENARIO 2a	SCENARIO 2b	SCENARIO 3a	SCENARIO 3b
	TDC Total Weighted Score	100%	0.5	1.3	-0.3	0.5	8.8	7.5

Option 1A

This option highlights the full network requirements to achieve the drivers for this assessment.

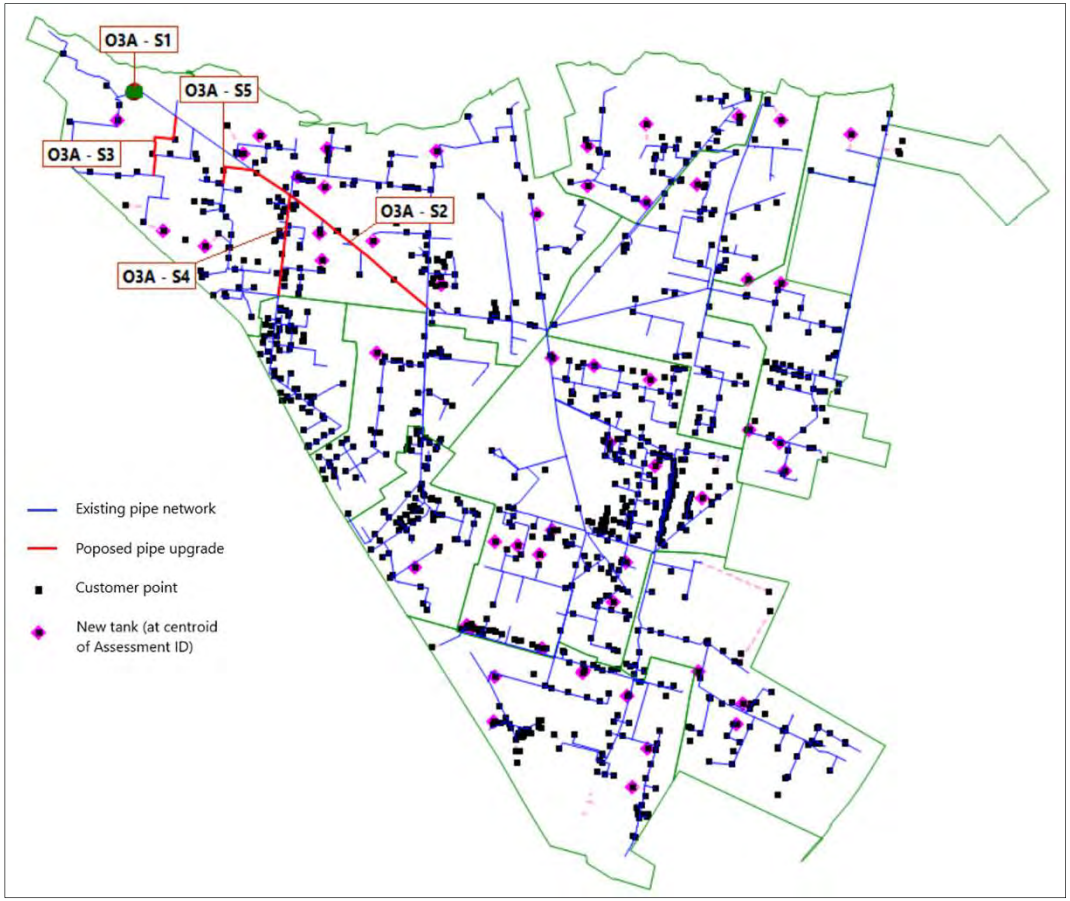
- 18 km length of network main to be upgraded
- Additional 12 km length of small mains to connect restricted tanks to troughs
- 40 restricted tanks
- Treated water storage (about 2640 m^3 for two days storage).



Option 3A

This option consider restricting all connections to a single restricted point of supply.

- 223 unrestricted tanks
- 612 troughs
- More than 5.4 km length of network main to be upgraded
- 30 km of small mains to connect new tanks to network.
- Additional 163 km length of small mains to connect restricted tanks to troughs (via existing or new tanks)
- Treated water storage (about 1300 m^3 for a day storage).



Cost Estimation

Ownership:

- TDC: Network up to and including the ballcock within tanks
- Private: Assets downstream of the ballcock (including the tanks themselves)

	Rough Order Cost Type*	Period	TDC	Private	Combined	Excl. Contingency	Incl. 50% Contingency
Option 1A	Lower	Capex	$2,960k	$690k	$3,650k	**$4.31 m**	**$6.47 m**
		Opex	$600k	$60k	$660k		
	Upper	Capex	$2,960k	$1,020k	$3,980k	**$4.76 m**	**$7.14 m**
		Opex	$600k	$180k	$780k		
Option 3A	Lower	Capex	$3,710k	$6,650k	$10,360k	**$11.81 m**	**$17.72 m**
		Opex	$680k	$770k	$1,450k		
	Upper	Capex	$3,710k	$10,670k	$14,380k	**$17.25 m**	**$25.88 m**
		Opex	$680k	$2,190k	$2,870k		

Conclusion:

This issues and options investigation has identified several scenarios aimed at improving the resilience and level of service within the Seadown water supply.

- Two scenarios were brought forward for costing following TDC's multi-criteria analysis – Option 1A and Option 3A. The cost estimate shows that the local pipe upgrade and selective trough connections to tanks and tank restrictions (Option 1A) will be considerably cheaper than targeting the restriction of all tanks and connecting all troughs to tanks (Option 3A).
- The estimated costs for Option 3A could be further refined by reusing existing tank connections (service pipes) where possible, or investigating supplying troughs by gravity through the relocation of tanks at strategic locations. This will need to be further investigated.

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